CANADA
DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS SERVICE

DOMINION EXPERIMENTAL STATION
LACOMBE
ALBERTA

G. E. DeLONG, B.S.A., M.Sc., Superintendent

PROGRESS REPORT
1947-1952

Part of the shorthorn herd at Lacombe being used in growth and performance studies.

Published by authority of the Rt. Hon. JAMES G. GARDINER, Minister of Agriculture,
Ottawa, Canada

10M—18307-3-54

CONTENTS

TECHNICAL STAFF

Administration

G. E. DeLong, B.S.A., M.Sc.	Superintendent

Animal Husbandry

J. G. Stothart, B.S.A., M.Sc.	Senior Animal Husbandman
H. T. Fredeen, B.S.A., M.Sc., Ph.D.	Animal Husbandman
G. H. Bowman, B.S.A.	Junior Animal Husbandman

Cereals

A. D. McFadden, B.Sc., M.Sc.	Senior Agronomist
E. C. Lowe, B.Sc.	Junior Agronomist

Field Husbandry

H. W. Leggett, B.S.A., B.Sc.	Agronomist
D. R. Walker, B.Sc.	Junior Agronomist

Forage Plants

H. B. Stelfox, B.Sc., M.Sc.	Agronomist

Horticulture

H. T. Allen, B.Sc., M.Sc.	Horticulturist

Illustration Stations

L. J. Anderson, B.S.A.	Supervisor
A. W. Wilton, B.S.A. (Resigned in 1952)	Supervisor

INTRODUCTION

The Dominion Experimental Station, Lacombe, Alta., was established in 1907, with work of a demonstrational nature predominating at that time. Activities, however, have progressed to research built around, and designed to develop, a balanced type of farming.

Swine breeding is the most important phase of the livestock work under way. A prepotent strain of Yorkshire, which will produce over 80 per cent Grade A market hogs, has been developed. Emphasis is also being placed on the development and production of a new breed of swine from a Berkshire X Landrace foundation. Progress to date is promising in that the new breed shows improvement in vigor and growthiness and has satisfactory prolificacy; but it requires further improvement in desirable bacon characteristics.

Progeny testing of beef type Shorthorn bulls, to develop a more growthy and quick gaining strain of beef cattle, is in progress.

Fertility studies with the White Wyandotte and the New Hampshire breeds of poultry is providing information which explains low hatchability in eggs used for hatching purposes.

Research with field crops includes studies involving cereal and forage crops. The production of new, early maturing and disease-resistant varieties of wheat, oats, and barley is in progress. In addition, the introduction and production of superior varieties of different forage crops is receiving much attention. Crop rotation, soil fertility, and weed control by cultural and chemical means is being studied.

Work in horticulture is providing information relative to the most suitable varieties of trees, shrubs, flowers, fruit, and vegetables. The station grounds are an inspiration to the large numbers of visitors each year.

Substations and Illustration Stations, supervised from Lacombe are located at Athabaska, St. Paul, Fort Kent, Ryley, Chauvin, Metiskow, Castor, Dickson, Chedderville, and Leslieville. These Stations provide much valuable agricultural information, and are also an important link with the local public.

84894—2

TABLE 1.—PRECIPITATION RECORDS

EXPERIMENTAL STATION, LACOMBE, ALBERTA

Monthly and Annual Precipitation Records (inches), 1908–1952 inclusive with 45-year averages and monthly extremes for the same period.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total Annual		
													Snowfall*	Rainfall	Precipitation
1908	0·20	0·97	1·06	0·26	3·56	6·46	1·88	1·73	0·31	0·40	—	0·25	25·2	14·56	17·08
1909	0·72	0·30	0·35	0·28	2·41	1·99	3·85	0·91	0·43	1·05	0·37	0·75	24·0	11·01	13·41
1910	0·73	0·74	0·33	0·04	1·63	3·87	1·35	2·61	1·00	0·27	0·51	0·30	26·1	10·77	13·38
1911	0·55	0·48	1·01	1·15	1·51	4·79	4·39	2·63	2·50	0·62	0·78	0·19	42·4	16·36	20·60
1912	0·76	0·16	0·13	1·29	2·92	3·00	5·29	4·44	1·27	1·56	0·93	0·08	42·1	17·62	21·83
1913	1·53	1·15	0·81	0·15	0·48	2·98	3·43	2·44	0·59	0·68	0·05	—	34·9	10·80	14·29
1914	1·45	1·00	0·80	0·34	1·28	6·07	1·11	1·10	2·36	0·30	1·50	0·98	63·7	11·92	18·29
1915	0·30	0·03	0·30	0·30	1·25	7·77	3·37	0·84	1·83	0·53	0·30	—	10·8	15·69	16·82
1916	0·40	1·38	0·52	0·60	2·04	3·57	4·31	5·22	3·06	1·01	0·40	0·45	34·0	19·50	22·96
1917	0·75	0·52	0·33	1·24	3·26	1·49	1·13	1·89	2·04	1·36	—	1·30	37·0	11·61	15·31
1918	0·53	0·15	0·30	4·60	0·94	1·47	1·94	3·93	0·13	0·02	1·20	0·73	17·1	15·23	16·94
1919	0·30	0·82	0·77	2·30	3·14	1·03	2·32	1·64	2·33	0·64	1·18	0·62	36·9	13·40	17·09
1920	1·34	0·40	0·91	2·23	1·61	1·81	1·52	0·38	1·56	0·72	0·01	0·24	29·0	9·83	12·73
1921	0·68	0·42	1·39	2·61	1·69	1·85	3·28	0·98	1·49	—	0·60	0·23	59·3	9·29	15·22
1922	0·91	0·72	0·30	1·07	1·30	1·75	1·88	2·94	0·84	0·52	0·02	1·36	32·2	9·17	13·91
1923	0·20	0·50	0·66	1·55	2·04	4·30	3·81	3·57	0·84	0·26	0·50	0·18	30·3	14·38	18·41
1924	0·80	0·88	1·06	1·65	0·97	0·82	4·21	1·95	0·79	2·66	0·65	2·80	78·4	11·40	19·24
1925	0·35	0·40	0·45	0·72	1·53	2·01	1·32	3·87	3·37	1·00	1·44	0·90	36·9	13·67	17·36
1926	1·10	1·13	0·88	0·39	3·44	2·02	2·66	5·02	3·86	0·62	1·49	0·98	51·5	18·44	23·59
1927	0·33	1·27	2·08	0·63	2·84	3·42	5·36	1·76	2·35	0·62	2·13	2·42	91·7	16·04	25·21
1928	0·25	0·37	0·56	1·70	0·50	7·30	1·66	2·56	0·74	0·18	0·01	0·32	32·1	12·94	16·15
1929	0·96	1·05	0·60	1·70	1·42	1·35	0·63	1·52	0·63	0·21	1·80	1·05	57·3	7·19	12·92
1930	0·20	0·17	0·22	1·27	1·61	2·08	3·72	2·93	1·19	0·85	0·35	0·30	16·9	13·10	14·89
1931	0·02	—	1·40	0·05	1·85	8·11	2·59	2·53	1·12	0·38	0·38	0·70	21·5	15·98	18·13
1932	0·32	1·10	0·67	4·61	2·08	3·97	2·30	1·84	2·77	1·25	0·15	0·40	31·9	19·62	22·81
1933	0·05	1·77	0·80	0·67	2·00	2·06	2·93	1·01	0·66	1·36	0·14	1·02	51·3	9·34	14·47
1934	0·66	0·12	0·88	0·93	2·27	2·50	1·38	1·24	2·09	0·02	0·53	0·55	35·7	9·60	13·17
1935	1·50	0·10	0·72	2·65	4·13	4·09	3·10	1·85	1·31	1·40	1·25	0·73	52·2	17·61	22·83
1936	1·00	0·60	1·60	0·85	2·58	1·92	2·03	1·91	1·05	0·59	0·39	0·62	48·9	10·25	15·14
1937	0·88	0·08	0·49	0·40	1·28	2·25	5·28	3·55	3·28	0·25	0·85	0·69	31·8	16·10	19·28

1938		0·60	0·45	0·38	1·18	2·19	1·70	2·48	4·71	0·33	1·16	0·51	0·17	25·8	13·28	15·86
1939		0·66	1·25	1·00	0·26	2·43	4·61	1·56	0·29	1·90	2·22	0·22	0·05	45·4	11·91	16·45
1940		0·61	0·37	2·29	3·21	1·92	1·80	2·83	0·52	0·67	1·50	1·15	0·53	62·1	11·19	17·40
1941		0·78	0·48	0·86	0·07	1·92	6·16	1·92	3·13	1·42	0·81	—	0·51	26·3	15·43	18·06
1942		0·14	0·55	0·29	1·52	2·11	5·33	4·50	2·71	1·26	0·44	1·91	0·53	44·4	16·85	21·29
1943		1·01	0·70	0·95	0·58	1·62	3·06	2·10	3·62	0·58	0·91	0·04	0·37	34·6	12·08	15·54
1944		0·33	1·43	1·46	0·48	4·37	4·99	6·13	1·87	2·95	—	0·27	0·15	30·6	21·37	24·43
1945		0·79	0·57	0·39	1·00	2·09	2·59	2·98	4·58	2·72	0·98	0·87	1·50	58·6	15·20	21·06
1946		0·59	0·47	0·44	0·74	1·10	5·81	2·16	2·13	1·93	0·62	1·55	0·80	41·2	14·22	18·34
1947		0·85	2·00	1·00	0·94	2·32	3·46	1·43	4·30	2·27	0·99	1·30	0·80	55·0	16·16	21·66
1948		0·65	2·80	0·70	4·61	2·72	1·80	4·41	1·88	1·02	0·35	0·50	0·41	84·2	13·43	21·85
1949		1·24	0·48	0·24	0·83	0·64	0·85	5·55	2·75	0·30	0·94	0·06	1·12	33·1	11·69	15·00
1950		0·92	0·17	0·84	1·61	0·31	2·35	2·73	1·46	0·95	1·98	0·32	0·50	57·0	8·44	14·14
1951		1·27	1·49	1·48	2·37	3·38	1·04	3·66	2·02	0·77	1·42	0·34	1·07	78·8	12·43	20·31
1952		1·03	0·57	0·14	0·26	1·88	6·66	2·53	2·51	1·28	0·71	0·07	T	20·1	15·63	17·64
45-year average		0·69	0·72	0·77	1·29	1·99	3·34	2·91	2·43	1·54	0·81	0·67	0·65	41·95	13·64	17·82
Monthly Extremes for the 45-year period	Driest	0·02	—	0·13	0·04	0·48	0·82	0·63	·30	—	—	—	0·29	—	—	12·73
	Year	1931	1931	1912	1910	1913	1924	1929	1949	1944	1917	1915	1939	—	—	1920
	Wettest	1·53	2·80	2·29	4·61	4·37	8·11	5·55	3·86	2·66	2·13	2·80	5·22	—	—	25·21
	Year	1913	1948	1940	1948	1944	1931	1949	1926	1924	1927	1924	1916	—	—	1927

* Snow is converted to water equivalent by the formula: 10 inches of snow equals one inch of water.

TABLE 2.—FROST RECORDS

EXPERIMENTAL STATION, LACOMBE, ALBERTA

Frost: 32°F. or lower, killing frost: 28°F. or lower.

Year	Last Frost in Spring		First Frost in Fall		No. of Frost Free Days	Last Killing Frost in Spring		First Killing Frost in Fall		No. of Killing Frost Free Days
	Date	Temp.	Date	Temp.		Date	Temp.	Date	Temp.	
1908	June 27	30·4	Aug. 21	26·5	55	May 1	27·3	Aug. 21	26·5	112
1909	June 29	31·8	Aug. 23	30·9	55	May 19	25·9	Sept. 14	24·0	118
1910	June 22	31·2	Aug. 23	31·9	61	June 3	26·7	Sept. 9	24·9	98
1911	May 29	31·5	Aug. 27	29·5	90	May 26	24·9	Sept. 7	27·9	104
1912	June 6	29·7	Aug. 30	30·0	85	June 5	27·3	Sept. 14	27·3	101
1913	May 18	26·7	July 25	31·9	67	May 18	26·7	Sept. 10	26·6	115
1914	May 29	28·9	Sept. 1	26·5	95	May 17	27·9	Sept. 1	26·5	107
1915	June 13	31·9	Sept. 11	21·9	90	April 28	24·0	Sept. 11	21·9	136
1916	June 7	31·9	Aug. 12	28·9	64	May 16	22·9	Sept. 28	23·4	135
1917	June 10	31·9	July 30	29·9	50	June 3	27·9	Sept. 28	27·9	117
1918	June 3	26·9	Sept. 3	27·9	91	June 3	26·9	Sept. 3	29·9	93
1919	July 3	31·0	Aug. 15	31·9	42	June 1	27·9	Sept. 2	25·2	93
1920	July 3	31·6	Aug. 31	29·0	48	June 13	26·9	Sept. 13	25·0	92
1921	July 10	29·9	Aug. 25	31·3	45	May 29	27·9	Sept. 2	25·4	96
1922	June 8	28·3	Sept. 6	29·0	89	June 7	25·1	Sept. 9	27·9	94
1923	May 24	26·0	Aug. 2	31·0	69	May 24	26·0	Sept. 11	25·5	110
1924	June 24	30·5	Aug. 31	28·5	68	June 23	27·0	Sept. 26	25·0	95
1925	June 6	30·0	Aug. 24	30·0	77	May 11	26·0	Sept. 20	25·0	132
1926	June 10	31·0	Sept. 8	29·5	90	May 12	24·0	Sept. 11	26·5	122
1927	May 26	30·0	Sept. 9	32·0	106	May 14	27·0	Sept. 15	24·0	124
1928	June 1	32·0	Aug. 23	29·0	83	May 10	23·0	Sept. 8	24·0	121
1929	June 24	31·0	Sept. 3	30·0	72	May 28	28·0	Sept. 4	24·0	99
1930	June 4	32·0	Aug. 31	32·0	88	May 22	25·0	Oct. 9	26·0	110
1931	June 4	29·5	Sept. 14	26·0	102	June 3	22·0	Sept. 14	26·0	103
1932	June 5	32·0	Aug. 31	30·0	87	May 25	28·0	Sept. 3	26·0	101
1933	June 11	29·0	Aug. 21	32·0	71	April 30	28·0	Sept. 17	27·0	140
1934	June 24	30·0	Aug. 24	25·0	61	May 12	25·0	Aug. 24	25·0	104
1935	June 6	32·0	Aug. 27	32·0	81	May 13	27·0	Sept. 3	26·0	113
1936	June 4	32·0	Sept. 9	32·0	97	May 12	28·0	Sept. 11	28·0	122
1937	June 10	32·0	Aug. 28	31·0	79	May 30	27·0	Sept. 24	26·0	117
1938	June 7	32·0	Aug. 23	32·0	77	May 16	26·0	Oct. 2	28·0	139

1939	June 7	31·0	Aug. 19	31·0	73	May 12	28·0	Sept. 9	24·0	120
1940	May 4	29·0	Sept. 9	30·0	138	April 17	28·0	Sept. 24	28·0	160
1941	May 23	32·0	Sept. 8	27·0	108	May 22	23·0	Sept. 8	27·0	109
1942	June 22	32·0	Sept. 17	32·0	87	May 18	28·0	Sept. 18	24·0	123
1943	June 7	32·0	Aug. 19	32·0	73	May 17	28·0	Sept. 2	28·0	108
1944	May 23	32·0	Sept. 19	28·0	119	May 11	28·0	Sept. 19	28·0	131
1945	June 29	32·0	Aug. 19	31·0	51	May 21	28·0	Sept. 25	25·0	127
1946	May 23	24·0	Sept. 8	31·0	108	May 23	24·0	Sept. 18	26·0	118
1947	May 29	26·0	Sept. 5	32·0	99	May 29	26·0	Oct. 6	24·0	130
1948	May 12	32·0	Sept. 4	28·0	115	May 3	26·0	Sept. 4	28·0	124
1949	June 27	32·0	Sept. 5	29·0	70	May 23	21·0	Sept. 12	17·0	112
1950	June 9	28·0	Aug. 19	30·0	71	June 9	28·0	Sept. 12	25·0	95
1951	June 29	32·0	Sept. 14	28·0	77	April 26	26·0	Sept. 14	28·0	141
1952	May 30	30·0	Sept. 16	32·0	97	May 7	24·0	Oct. 4	20·0	150
45-Year Average	June 9		Aug. 28		80·6	May 20		Sept. 13		116
Shortest Crop Season	1919				42	1919				93
Longest Crop Season	1940				138	1940				160

Earliest and Latest Frost Dates (32°F. or lower)

Years	
Last spring frost	Latest July 3, 1920 Earliest May 4, 1940
First fall frost	Latest Sept. 19, 1944 Earliest July 25, 1913

Earliest and Latest Killing Frost Dates (28°F. and lower)

Years	
Last spring killing frost	Latest June 1, 1919 Earliest April 17, 1940
First fall killing frost	Latest Oct. 9, 1930 Earliest Aug. 21, 1908

TABLE 3.—MEAN MINIMUM TEMPERATURE

Monthly and Annual Mean Minimum Temperature records 1947–52 inclusive with the 45-year averages

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1947	− 0·3	− 4·4	7·8	27·9	36·0	44·1	47·8	43·4	37·2	29·7	14·4	8·9
1948	7·2	− 7·5	1·4	15·0	39·3	46·8	48·3	44·7	36·4	26·8	15·9	−5·4
1949	− 9·9	−13·3	15·1	31·3	37·2	41·2	46·6	45·6	34·8	24·6	22·2	−7·3
1950	−29·1	− 1·7	7·2	24·8	34·1	42·2	48·2	43·2	35·9	25·6	4·5	0·1
1951	−10·8	− 6·4	− 2·5	24·3	38·4	39·8	49·1	44·5	33·4	21·8	12·9	−4·1
1952	−12·9	− 0·1	2·8	30·3	37·0	44·6	47·0	45·7	39·8	28·6	18·2	6·9
6-year average	− 9·3	− 5·6	5·3	25·6	37·0	43·1	47·8	44·5	36·3	26·2	14·7	−0·9
45-year average	− 5·2	− 1·6	9·6	25·6	35·4	42·8	47·0	43·6	35·5	25·9	12·6	1·4

MEAN MAXIMUM TEMPERATURE

1947	23·7	19·6	35·6	55·4	63·1	66·2	82·0	70·8	63·0	56·4	33·2	30·1
1948	29·9	16·0	28·6	37·3	63·9	72·8	74·8	73·3	66·1	58·9	38·9	16·2
1949	15·4	11·1	38·9	61·0	67·2	71·0	75·9	76·1	69·8	48·6	53·3	12·3
1950	− 7·6	24·8	29·5	45·3	60·9	73·7	74·8	71·1	67·9	45·8	24·0	25·4
1951	11·4	21·0	23·0	48·4	63·3	64·8	73·2	67·4	60·0	41·3	33·0	14·5
1952	5·6	24·6	25·8	50·8	66·0	65·8	70·1	70·5	66·7	58·7	39·5	30·1
6-year average	13·1	19·5	30·2	49·7	64·1	69·1	75·1	71·5	65·6	51·6	36·9	21·4
45-year average	19·6	25·1	36·3	52·1	63·5	67·7	75·6	73·2	64·5	54·0	36·7	24·6

MEAN TEMPERATURE

1947	11·7	7·6	21·7	41·7	49·6	55·2	64·9	57·1	50·1	43·1	23·8	19·5
1948	18·6	4·3	15·0	26·2	51·6	59·8	61·6	59·0	51·3	42·9	27·4	5·4
1949	2·8	− 1·1	27·0	46·2	52·2	56·1	61·3	60·9	52·3	36·9	37·8	2·5
1950	−18·3	11·6	18·3	35·1	47·5	50·8	61·5	57·2	51·9	35·7	14·3	12·7
1951	0·3	7·3	10·3	36·4	50·9	52·3	61·1	55·9	46·7	31·6	22·9	5·4
1952	3·6	12·3	14·3	40·5	51·5	55·2	58·6	58·1	53·3	43·7	28·9	18·5
6-year average	3·1	7·0	17·8	37·7	50·6	54·9	61·5	58·0	50·9	38·9	25·8	10·7
45-year average	7·3	11·8	22·9	38·8	49·5	55·1	61·3	58·4	50·0	40·0	24·6	12·9

TABLE 4.—WIND SPEED

Table showing wind speed (m.p.h.) with the long time averages:

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1947	6·2	4·7	4·2	6·3	6·9	4·9	5·4	—	—	—	—	—
1948	—	6·4	6·4	5·9	8·0	5·5	5·9	—	5·0	6·8	—	5·3
1949	—	—	—	—	—	5·9	7·4	5·7	6·7	6·1	6·8	5·1
1950	6·7	5·5	6·8	8·7	9·6	6·6	6·3	5·9	6·8	5·9	—	—
1951	—	—	—	—	7·2	7·1	—	—	—	6·9	7·3	4·9
1952												
No. Years	24	25	25	25	25	26	24	23	24	24	24	24
Average	5·0	5·0	5·8	6·8	7·2	6·5	6·1	5·2	6·1	6·2	5·5	5·4

SUNSHINE RECORDS

Monthly and Annual Sunshine Records 1947–52 inclusive with 45-year averages:

1947	66·8	107·8	184·1	191·6	273·0	208·6	350·1	208·5	168·8	134·0	68·2	71·5
1948	79·7	108·6	172·3	140·0	227·0	276·7	320·2	268·1	177·3	184·5	84·8	82·9
1949	102·2	117·0	190·4	219·9	238·5	264·0	278·0	315·4	234·1	138·0	146·2	67·5
1950	73·6	110·6	138·4	194·2	243·6	298·2	312·7	265·1	219·9	109·9	105·1	62·8
1951	79·4	88·4	158·1	205·1	261·5	233·5	266·1	226·1	165·8	110·4	66·6	75·7
1952	76·6	151·2	195·7	240·5	291·2	228·2	288·2	261·1	177·5	193·7	100·0	70·1
45-year average:												
Month	83·8	120·3	163·0	205·2	239·9	251·4	297·3	263·7	184·0	149·3	97·8	75·6
Day	2·70	4·30	5·26	6·84	7·74	8·38	9·59	8·51	6·15	4·82	3·26	2·44

EVAPORATION

Year	April	May	June	July	Aug.	Sept.	Oct.
1947	.....	.....	.....	3·76	3·12	1·87	.....
1949	.....	·91	5·13	.....	.....	.....	.....
1950	.....	.....	.....	.....	3·53	2·74	.....
1951	.....	3·26	2·97	3·93	2·75	1·74	.....
1952	.....	.....	.....	.....	4·84	4·16	.....
Years:	14	19	20	21	21	21	16
Average	1·09	3·24	3·16	3·88	3·37	1·94	·78

ANIMAL HUSBANDRY

J. G. Stothart and H. T. Fredeen

Horses

Horse Improvement Policy

Although the horse population in Canada and in Alberta has diminished rapidly in recent years it is likely that there will be a demand for a certain number of horses for some time to come. The continued interest in horse breeding in central Alberta supports this belief and in order to supply a nucleus of breeding stock a small stud of Clydesdales, including a stallion, is maintained at Lacombe. In addition to the Clydesdale stallion, Percheron and Thoroughbred stallions also stand for public service at the Station.

In the five years the Clydesdale stallions at Lacombe served a total of 173 mares which produced 100 foals, a percentage of 57·8. The Thoroughbred stallions were mated with 219 mares which produced 138 foals or a percentage of 63·0. In three years the Percheron stallion, Koncarhope, was bred to 203 mares which produced 107 or a percentage of 52·7 foals. These results are very satisfactory considering the fact that a number of mares are brought to the Station for only one service and are not tried back.

Production service of the department maintains Thoroughbred stallions at Lacombe for the primary purpose of promoting the production of hunter-type and stock horses.

Beef Cattle

Calfhood Vaccination

Calfhood vaccination as a control of contagious abortion was first practised at the Lacombe Experimental Station in 1945. Since then all heifer calves between the ages of six and eight months have been vaccinated with live culture *Brucella abortus* vaccine, strain 19. Vaccinated animals have not been segregated from the positive reactors in the herd.

The calving history of the herd since 1947, when the first vaccinated heifers began to reproduce, is summarized in Table 5. It is apparent from these figures that calfhood vaccination under the conditions at the Lacombe station has not been too effective in protecting the heifers from infection since a number of them have become positive to the blood test and their subsequent calving history has been disappointing. The age at which these heifers contracted infection has varied from two to five years.

TABLE 5.—CALVING SUMMARY FOR THE PERIOD 1947-1952

Reaction to Bang's test		Total number of cow-years	Normal calvings	Abortions	Non-breeders
Non-vaccinated	−	18	14	2	2
	+	70	51	5	14
	Q	2	2	0	0
Vaccinated	−	90	67	4	20
	+	44	13	18	12
	Q	9	6	0	3

84894—3

The reason why calfhood vaccination has not been so successful as a control at Lacombe as it has in many other herds may lie in the fact that a source of infection, possibly a highly virulent source, was maintained in the herd through the retention of reactor females, some of which had aborted. Future plans involve the elimination of all reactor cattle from the herd to test the validity of the above observation.

Performance Testing

Record of Performance for poultry and dairy cattle and Advanced Registry for swine are performance tests that have been national policies in Canada for many years. They provide information on the difference existing between sires or families and enable breeders to select for more efficient production. No such performance tests have been adopted for beef cattle although various schemes have been and are being investigated in the United States.

In 1949 the Experimental Farms Service initiated studies of performance testing for beef cattle. The objective was to find the most efficient method for evaluating the breeding potential of sires in terms of rate and economy of gain and carcass quality or beef type.

Results available to date show that progeny from the different sires used at Lacombe have differed by as much as 10 pounds in birth weight, 50 pounds in weaning weight and 25 per cent in daily rate of gain from weaning to 900 pounds. However, much more information is required before the application and usefulness of this type of performance testing can be evaluated.

Swine

The swine research program at Lacombe was expanded substantially during the period covered by this report. After conducting experiments over a period of years on feeding and management the main emphasis is now on research in breeding. In order to measure differences in strains and breeding methods the physical equipment and facilities of the station were increased by the construction of a modern 32-pen test piggery and a 30-pen breeding-stock piggery with outside concrete runs, as well as additional boar runs and pastures. The swine layout covers an area of 60 acres and includes three 10-acre summer sow pastures, thirty-five ½-acre test pastures, sixteen boar paddocks, and five 2-acre winter sow runs.

These facilities allow for the farrowing of approximately 125 litters per year and the feeding and holding of representatives of those litters under test conditions in order to study the performance and measure the genetic potentiality of various breeds, lines, and crosses.

Breeding Studies

Hight-low project—In 1946 ten Yorkshire litters were tested under the Advanced Registry for swine. A boar and three gilts were retained from each litter as possible breeding stock pending the results of the carcass tests. Carcass scores ranged from 62 to 78 and two representative gilts were selected from each of the two highest and lowest scoring litters. In subsequent seasons this high-low herd was bred to boars selected from both high and low scoring litters. This program gave results of high-high, high-low, low-high, and low-low matings. Breeding stock was retained from only the high-high and low-low litters and these in turn were mated to high and low boars.

This experiment is being replicated at the Experimental Station, Scott, Sask., and at the Experimental Stations at Ste. Anne de la Pocatiere, Que.,

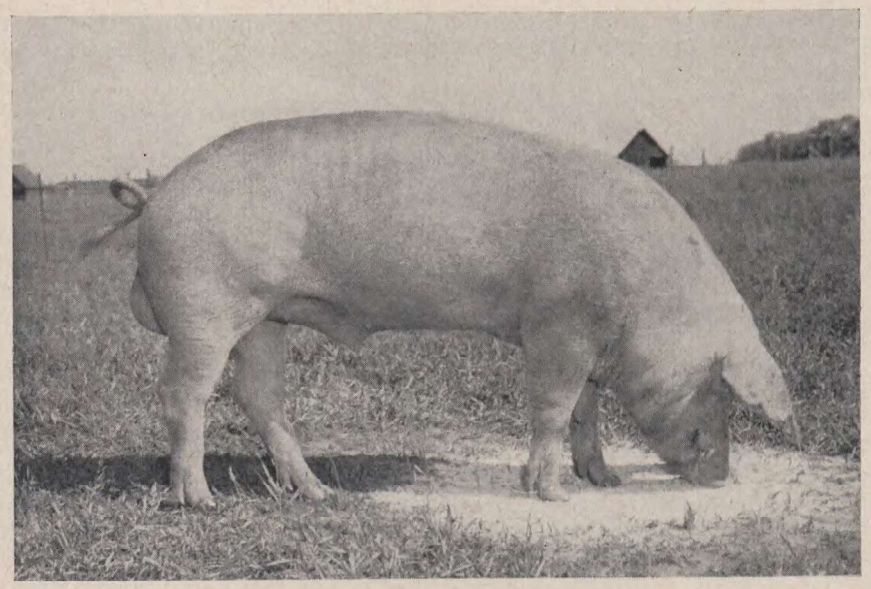


FIG. 1—Landrace-Chester boar, one of the foundation animals used in the swine breeding experiments at Lacombe.

and Fredericton, N.B., in the east. All groups were fed the A.R. feeding station ration and carcass data were collected in co-operation with the Production Service of the Department.

TABLE 6.—HIGH-LOW BREEDING RESULTS—LACOMBE, 1947-51

Year	Mating	No. of litters	Av. No. farrowed	Age at 200 lb. (day)	Feed per 100 lb. gain	A.R. carcass score	Grades %			
							A	B	C	D
1947	H-H (1)	4	11·0	179	343	79·3	75	25	.....	.....
	H-L (2)	4	10·5	193	367	72·7	83	17	.....	.....
1948	L-H (3)	5	13·4	207	411	66·8	40	60	.....	.....
	L-L (4)	4	10·3	203	381	70·2	46	54	.....	.....
	H-H (5)	4	13·0	211	412	79·3	75	19	.....	6
1949	L-H (6)	4	14·3	189	382	74·3	50	50	.....	.....
	L-L (7)	6	10·0	202	402	50·6	.....	69	26	5
1950	H-L (8)	6	12·6	207	401	74·4	67	33	.....	.....
	H-L (9)	5	7·0	216	416	78·6	92	8	.....	.....
	H-H (10)	5	9·2	228	429	81·1	100	.....	.....	.....
1951	L-H (11)	5	13·0	198	402	67·6	28	72	.....	.....
	L-H (12)	6	9·8	199	385	77·6	90	10	.....	.....
	L-L (13)	4	12·0	195	402	65·3	47	53	.....	.....
1952	H-H (14)	5	12·0	190	361	82·5	91	9	.....	.....
	L-L (15)	5	7·2	221	420	63·3	50	25	25	.....

In studying Table 6 it should be emphasized that the primary basis of selection for breeding stock for each succeeding generation was the carcass quality of litter mates as measured by the Advanced Registry score and that the females in mating groups 1 and 3 are the same, as are 2 and 4, 5 and 6, 7 and 8, 9 and 13, 10 and 11, and 12 and 14, in one case being mated to a high-line boar and in the other to a low. The females in mating group 5 are the

offspring of group 1, in 10 of 5, and in group 14 of group 10 in the high line; and those in group 7 are offspring of group 4, in 13 of 7, and in group 15 of group 13 in the low line.

The most striking observation from Table 6 is that there seems to be little or no difference between the two lines or their reciprocal crosses in rate of growth and feed economy as measured by the age at 200 pounds market weight and feed required per 100 pounds gain respectively. This contradicts a very popular opinion that thicker, fatter pigs, one of the main differences between the high and low lines in this experiment, gain faster with lower feed requirements. It is also indicated that the high line after three generations of selection on the basis of litter-mate carcass quality continue to produce good bacon pigs and the low line poor. The high-lows and low-highs were intermediary between the two.

As both these lines originated from the same herd and population it is interesting to note that after three generations the low line on visual appraisal had acquired a grossness of front end and richness of top indicative of overfinish, which was quite different from the good bacon type of the high line.

Development of Prepotent Inbred Lines of Yorkshires—With the object of locating outstanding strains of Yorkshire pigs an inbreeding project was initiated in 1942 on the Experimental Farms in co-operation with the Production Service of the Department. Representatives of strains which had demonstrated superiority under Advanced Registry testing were acquired and inbred to ascertain (1) their freedom from such defects as ruptures, ridglings and hermaphrodites, and (2) their carcass quality as an inbred line. A further objective of this project, which is being replicated on several experimental farms, was to demonstrate what prepotency might be expected from inbred sires and whether such prepotency could be predicted from the performance of the inbred line.

The procedure followed in this project was to inbreed as intensively as possible—sire-daughter, son-dam, and full brother-sister matings—at the outset in order to bring out as rapidly as possible any undesirable as well as desirable characteristics in a strain. This procedure accomplished its purpose but has in some cases limited the usefulness of a strain since the narrow base or the close relationship of the original animals has handicapped its later development and propagation. The one strain developed from a wider base at Lacombe has performed particularly well and no difficulty has been encountered in its maintenance.

To date six strains of Yorkshires have been inbred and tested at Lacombe.

Strain "C" produced bacon pigs of good quality but a number of them had pronounced swirls on their backs. While this was not one of the originally listed defects it has been noted that it is highly heritable and as it is very unpopular, if not unacceptable, with breeders, this strain was discarded.

Strain "M" founded on a boar which had an outstanding record in A.R. produced small litters and a number of defective pigs when inbred. Ruptures, ridglings, and hermaphrodites were noted in this strain and it was consequently discarded.

Strain "P" performed well in the rate-of-gain and feeding tests but the carcasses produced were not up to the standard desired in this project. The six litters tested averaged only 70 in A.R. score, being particularly weak in area of loin or lean meat content and carrying too much fat.

Part of strain "B" developed at the Dominion Experimental Farm, Brandon, Man., was maintained at Lacombe for several years. This strain was intensively inbred for several generations and proved itself free from defects and of high carcass quality. From a type point of view the pigs of this strain were plain

but they proved that type can be deceiving in trying to predict performance. By itself its litter size and vigor were disappointing, undoubtedly a direct result of inbreeding, but when outcrossed to both purebred and grade sows, boars of this strain produced excellent results. This outcrossing was achieved by using the "B" strain boars in commercial herds.

Strain "R" produced very weak pigs, and all died before weaning. In addition several deformities such as ruptures and incomplete navel sutures were noted. This strain was discarded.

Strain "L" at Lacombe was initiated by introducing the blood of an inbred boar developed at the Dominion Experimental Station, Lennoxville, Que., into part of the Lacombe Yorkshire herd and inbreeding. A wide base and the use of several boars in each of the five generations this strain has been inbred, has allowed for control of the inbreeding and has resulted in excellent litter size and vigor. Outstanding carcass quality has characterized this strain which is under test in several commercial herds.

Dangers in Inbreeding Swine—As shown above a high percentage of present strains of Yorkshires will not stand inbreeding. Theoretically, it is a sound method of promoting improvement—it actually was the method used in founding many of the common breeds of livestock—but considerably more information will be necessary before it can be recommended for general use.

Inbreeding will bring out the weaknesses as well as the strong points of a line or strain but unless great care is used in its application it can result in excessive losses. Because of these losses it is possible that other methods of breeding which are also being investigated at Lacombe may offer greater opportunities for improvement in the general quality and performance of Canadian swine.

Crossbred Foundations—The crossing of pure lines as a means of improvement in performance is an accepted principle in plant breeding. It has also been applied, in the form of breed crosses, by livestock breeders, but this practice has not shown to advantage in the production of Canadian bacon hogs. Certain improvement in rate of gain has been achieved by cross breeding but almost invariably this has been accompanied by a lowered carcass quality.

To investigate the possibilities of cross breeding for improvement of performance of the Canadian bacon hog, as measured by economy of gain and carcass quality, a program to develop new lines or breeds was inaugurated at Lacombe in 1948. The objective has been to develop lines which, when pure, would be as good as, if not better than, the Yorkshire and which when crossed with the Yorkshire would produce hybrid vigor for both economy and carcass quality.

That such a breed can be developed remains to be proved. However, new advances in the technique of breeding hogs and the use of performance tests and selection in improvement have given impetus to this program.

One of the first prerequisites of a high quality bacon pig is that it be white in color to avoid losses through "seedy" or discolored bellies. As white is generally dominant in pigs it was accepted at the outset that one of the parent breeds of any crossbred foundation should be white. Another principle adopted in the beginning of this project was that breeds other than the Yorkshire would be used to enhance the possibility of hybrid vigor when the new breed was eventually crossed with the Yorkshire.

Two new lines from crossbred foundations are under investigation at Lacombe. The first, started in the spring of 1948, is based on Landrace × Chester × Berkshire blood and after four generations of crossing, backcrossing and inter se matings this line shows promise. The average contribution of blood of the foundation breeds at the end of 1952 runs 55 per cent Landrace, 22 per cent Chester White, and 23 per cent Berkshire.

The other line started in 1949 is based on a Landrace × Chester × Minnesota No. 1 foundation and although this line has been in the process of development for only three generations it does not show the same promise as that containing the Berkshire blood. With both lines the white color comes from Landrace × Chester White boars procured originally from the United States Department of Agriculture Research Centre, Beltsville, Maryland, and latterly from a line from the same source being developed at the Central Experimental Farm, Ottawa. The Berkshire and Minnesota No. 1 females were procured from Ontario breeders and from the University of Minnesota, respectively, through the co-operation of the Production Service of the Department of Agriculture.

A mass of information is being accumulated in this project and after extensive tests the selection followed is based on litter, individual pig, and litter-mate performance. Several generations of testing and selection, followed by crossing tests with Yorkshire, will be necessary before any decision can be reached as to the usefulness of the new lines.

Nutritional Studies

Self feeding versus hand feeding for bacon production—The labor shortage in recent years has resulted in many labor saving devices in agriculture. One that has become widespread among swine producers is the self-feeder. The observation has been made that self feeding of bacon pigs results in a lowered carcass quality, principally through the higher degree of finish attained by self-fed pigs. To examine this observation, and to test the effect of adding bran to the self-fed ration, experiments were conducted at several universities and experimental stations, including the Lacombe station, during 1949.

The control ration used was the standard Advanced Registry feed mixture consisting of:

	1st period weaning to 125 lb.	2nd period 125 lb. to 200 lb.
Barley	43 lb.	46 lb.
Wheat	17 lb.	18 lb.
Oats	25 lb.	28 lb.
Protein	15 lb.	8 lb.

The protein supplement, included as 15 per cent of the ration in the first period and 8 per cent in the second period consisted of:

Tankage (50% protein)	50 lb.
Fishmeal (60% protein)	15 lb.
Linseed oilmeal (35% protein)	25 lb.
Iodized salt	5 lb.
Limestone	5 lb.

The experimental ration was the same during the first period (weaning to 125 pounds) but for the second period 20 per cent of bran was added. Four lots of 4 pigs each were placed on the experiment. Two lots were given the standard ration and the remaining two lots received the experimental ration. One lot on each ration was hand fed, the other lot being self fed.

Results at Lacombe indicated no difference in rate and economy of gain between the two rations or the two methods of feeding but the hand-fed groups produced carcasses that averaged about 10 points higher in carcass score than those from self feedings. The inclusion of bran was effective in improving the carcass of pigs on both systems of feeding.

This adverse effect of self feeding on carcass quality was not noted by the other units co-operating in this experiment. Consequently a second trial was undertaken at the Lacombe station in 1950 to further check these results, and to study the effects of including alfalfa meal in the self-fed ration.

All the pigs used in the experiment were sired by the same boar and were surplus stock from the high-low matings described elsewhere in this report for the year 1950. The rations fed and the results obtained are presented in Table 7.

TABLE 7.—RESULTS FROM SELF FEEDING OF RATIONS CONTAINING DIFFERENT AMOUNTS OF BRAN OR ALFALFA MEAL

Ration	Lot 1 Hand fed A.R.	Lot 2 Self fed A.R.	Lot 3 Self fed A.R. plus 20% bran in the 2nd period	Lot 4 Self fed A.R. plus 20% alfalfa meal in 2nd period	Lot 5 Self fed A.R. plus 10% bran in both periods	Lot 6 Self fed A.R. plus 10% alfalfa meal in both periods
No. of pigs	4	4	4	4	4	4
Av. daily gain	1·39	1·37	1·43	1·44	1·52	1·44
Feed per 100 lb. gain	406·8	432·2	434·1	436·2	396·3	466·4
A.R. carcass score	67·5	53·5	66·8	65·2	70·7	78·5
Dressing percentage	74·4	74·4	73·8	73·7	74·4	75·0

In this experiment the highest dressing percentage and the highest average carcass score were obtained from self-fed pigs given the A.R. ration containing 10 per cent alfalfa meal. However, the pigs on this ration wasted much feed and consequently their feed requirements appeared high. In a later trial lot 1, lot 2, and lot 6 were again compared to determine whether inclusion of alfalfa meal in the ration was responsible for this feed wastage. In this experiment lot 6 proved to be the most economical and from this it was concluded that the feed wastage previously encountered was merely a habit developed by the pigs of that particular group.

From the results obtained at Lacombe it was concluded that the self feeding of the standard A.R. ration, to which had been added 10 per cent alfalfa meal in both the growing and the finishing period, did not reduce carcass quality and promoted gains that were as rapid and as economical as those obtained from hand feeding the standard A.R. ration alone.

Feeding Value of Frozen Wheat for Swine.—During 1951 a feeding trial was conducted to compare the feeding value of frozen wheat of different weights per bushel with barley in terms of rate of gain, feed economy and carcass quality. Four rations were prepared. Ration 1 consisted of:

Barley ..... 60 pounds
Oats ..... 40 pounds
Protein-mineral supplement at 15% up to 120 pounds
8% up to 200 pounds

Frozen wheat of 3 different weights, 60 pounds, 50 pounds, and 40 pounds per bushel, was used in Rations 2, 3, and 4, respectively, to replace the barley of Ration 1. The protein-mineral supplement was the standard A.R. supplement used in the self-feeding experiments reported previously in this report.

All rations were self fed and water was available in automatic waterers. The results are summarized in Table 8.

From these results it appears that rate of gain is not impaired by the self feeding of frozen wheat although a greater quantity of feed is required when the frozen wheat is of such low quality as to weigh only 40 pounds per bushel. Frozen wheat weighing 60 pounds per bushel produced carcasses of lower quality. The chief reason for this was the over-finish of such carcasses.

TABLE 8.—EFFECT OF FEEDING FROZEN WHEAT IN PLACE OF BARLEY ON RATE OF GAIN, FEED ECONOMY, AND CARCASS QUALITY

—	Ration 1	Ration 2	Ration 3	Ration 4
	Barley	Frozen wheat 60 lb. per bu.	Frozen wheat 50 lb. per bu.	Frozen wheat 40 lb. per bu.
No. of pigs	8	8	7	8
Average daily gain	1·51	1·44	1·53	1·46
Feed per 100 pounds gain	413	419	397	479
Average total carcass score	66	56	64	62
Average length	30·1	30·0	30·1	30·1
Average thickness of loin fat	1·45	1·61	1·46	1·54
Average area of loin	3·78	3·64	3·72	3·77

CEREALS

A. D. McFadden and E. C. Lowe

The importance of grain crops to the agricultural economy of central Alberta is reflected in the production average for the area served by the Lacombe Station. Calculations based on data appearing in the 1951-52 edition of the Canada Year Book reveal that 54,000,000 bushels of wheat, 79,000,000 of oats, and 42,000,000 bushels of barley were produced annually in the area served by Lacombe during the 5-year period 1943-47. Other grain crops such as rye, flax, and peas were not produced extensively, yet to the few growers in the area who specialize in growing them these crops are of major importance.

Cereal work includes responsibility for evaluating the usefulness of existing varieties of all grain crops, for effecting improvement in varieties through breeding and selection, and for maintaining "Foundation Stock" of such varieties as are designated by the Canadian Seed Growers' Association. In addition, a number of special projects and co-operative tests are carried on in connection with the cereal improvement program for Western Canada.

The work at Lacombe may be discussed under sub-headings as follows:

Plant Breeding and Selection Work

Wheat

In the spring of 1949 the project on "Breeding Wheats for Northern Areas" was transferred from Ottawa to Lacombe. Since 1949 this project has been conducted on a co-operative basis, with Lacombe and Beaverlodge carrying on breeding and selection programs. Melfort and Indian Head, in Saskatchewan, have co-operated in the testing program and the Cereal Crops Division, Central Experimental Farm, Ottawa, has conducted all milling and baking tests.

During a three-year period (1949-51) 262 hybrid lines from 19 different crosses passed through rod-row yield trials in the search for some that would prove superior to existing varieties for production in northern areas. In general, early maturity was found to be associated with relatively low yielding potential and many higher-yielding hybrids proved inferior to Marquis (the standard for quality) in milling and baking quality. One medium-maturing hybrid line with high yielding potential was promising enough to warrant its advance to the Co-operative Wheat Test for growing in 1952.

Hybrid populations originating at Lacombe have had Saunders, Thatcher, C.T. 609 and 3669-17 as parents. The numbered parents are high-yielding,

medium-maturing varieties and it is hoped to improve the yielding potential of Saunders without losing desirable characteristics. Selection of individual plant lines from these crosses will commence in 1953.

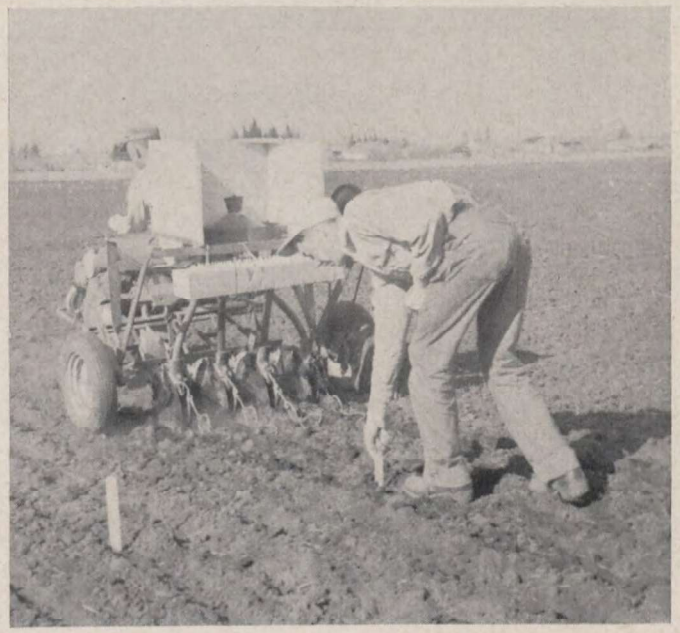


FIG. 2—Four-row power plot seeder in operation at Lacombe. With this unit two men can seed 480 rod rows per hour.

Barley

During the period under review the barley improvement program centred around the exploitation of hybrid lines selected from crosses involving two or more of the following varieties as parents: Montcalm, Olli, Sanalta, and Titan. The object was to develop an early maturing, non-shattering variety with other desirable characteristics. Two hybrid lines, from approximately 2,500 tested, showed sufficient promise for advancement to the Co-operative Barley Test. Seed stocks of these hybrids were increased in 1952 to provide a seed nucleus, should either one prove worthy of recommendation for licence. Approximately 150 single plant lines from 7 different crosses were received from Ottawa for exploitation in 1951. These had been selected at Ottawa for lodging resistance and maturity, and much information had been collected on their disease reaction.

Oats

Oat breeding and selection at Lacombe is centered around the production of early maturing, lodging-resistant, non-shattering varieties with other desirable characteristics. From 1947 to 1952 populations arising from seven different crosses were exploited. Approximately 400 single-plant lines were tested and two showed sufficient promise for advancement to the Co-operative Oat Test in 1952.

In 1950 a crossing program using Eagle and Larain was started at Lacombe. These parents were chosen because of the wide adaptability of Eagle throughout central Alberta and the very early maturity and good kernel type of Larain. The object is to develop a variety that is earlier maturing

than Eagle without losing any of the other desirable characteristics of this variety. By the fall of 1952 populations with Larain and Eagle in a single cross and with one, two, and three back crosses to Eagle, were built up for future selection and eventual testing of single plant lines. Some initial selection will be possible from these families in 1953.

National Testing Program

In order to assure adequate testing of new varieties a system of national testing has been perfected. Uniform tests are conducted for wheat, oats, barley, and flax at all branch Farms and Stations in Western Canada, at the Universities in the three Prairie Provinces, and on such private farms or substations as are deemed necessary to provide adequate coverage of the different soil and climatic conditions. All tests include a limited number of standard varieties as checks with which to compare new selections submitted by institutions engaged in breeding and selection work.

Before a variety is recommended for licensing it is included in these uniform tests for a period of three years. During this period considerable data are compiled on the relative merits of all varieties under test over a wide range of soil and climatic conditions. Only those varieties that prove superior to existing licensed varieties in one or more characteristics are recommended for licensing.

The Lacombe Station co-operates in this program by conducting tests for all crops mentioned above. Thus the Lacombe Station personnel are kept in close touch with the cereal varietal improvement program as it is being carried on in Western Canada.

Co-operative Projects

The Crop Testing Plan

This plan was initiated by the research department of the Searle Grain Company and affiliated companies in an effort to bring about an improvement in the seed used for the production of commercial grain. Essentially it is designed to determine the varietal purity of commercial seed.

Co-operating elevator agents sample the seed stocks of grain to be used for seed by the commercial grower. These samples are forwarded to central locations where they are grown to determine varietal purity at harvest time. The individual growers who submit the samples are notified through their local elevator agent as to the purity of their seed stock. This arrangement encourages growers who are producing undesirable grain to replace their seed stocks with seed that shows a high degree of varietal purity.

The Lacombe Station has co-operated in the growing of such samples since 1930. From 1947 to 1952 approximately 2,000 samples were grown for analysis. In 1947 only 34 per cent of the grain was classified as true to variety compared with 60 per cent in 1952. An analysis of the varietal percentages reveals that Thatcher went from 53 per cent in 1947 to 74 per cent in 1952. Red Bobs made up 23 per cent in 1947, but decreased to about 4 per cent in 1952. Garnet occupied 14 per cent in 1947 but decreased to 4 per cent in 1952. By 1952 Saunders occupied 13·2 per cent. The remaining percentages were of Marquis, Redman, Regent, and Renown. While the above may not necessarily present a true picture of the acreage devoted to different wheat varieties, the analysis does indicate the popularity of Thatcher wheat compared with other varieties.

C.S.G.A. Verification Tests

For many years the Lacombe Station has co-operated with the Canadian Seed Growers' Association by growing samples that represent lots of "Elite Stock Seed" and "Foundation Stock Seed" currently being produced in Alberta. Samples are checked carefully throughout the growing season and a report is forwarded to the Canadian Seed Growers' Association, Ottawa. Since these pure seed stocks are indicative of the varieties being grown for commercial markets, it is interesting to note the changes that took place during the 6-year period. In 1946 Canus, Marquis, Garnet, Red Bobs, Regent, and Thatcher wheat were represented; in 1952, Garnet, Saunders, Marquis, Rescue, and Thatcher. In oats, Ajax, Banner, Eagle, Exeter, Legacy, Vanguard, and Victory were submitted in 1946 compared with Ajax, Banner, Beaver, Eagle, Larain, and Victory in 1952. Newal, O.A.C. 21, Olli, Sanalta, Titan, and Trebi barley were grown in 1946 compared with Montcalm, Newal, Olli and Vantage in 1952.

Co-operative Seed Treatment Test

The Lacombe Station co-operates with the Dominion Plant Pathology Laboratory, Winnipeg, Man., in testing the effectiveness of many commercial seed treatments for the control of seed-borne diseases. Since the Lacombe test is one of many carried on in Western Canada and the northern United States, no specific results are given in this report. For recommendations regarding the effectiveness of any of the commercial products in the control of seed-borne diseases, enquiries should be directed to the Dominion Plant Pathology Laboratory, Winnipeg, Man.

Uniform Rust Nursery

A number of varieties of wheat, oats, barley, and rye are grown at many points throughout Western Canada and the northern United States to determine the presence of rusts and certain other diseases. This test offers a medium for determining the extent of disease infection from year to year in any one locality and makes it possible to guard against serious outbreaks of disease. Lacombe co-operates each year in growing this test and all material is forwarded to Winnipeg for close examination in the laboratory.

Special Projects

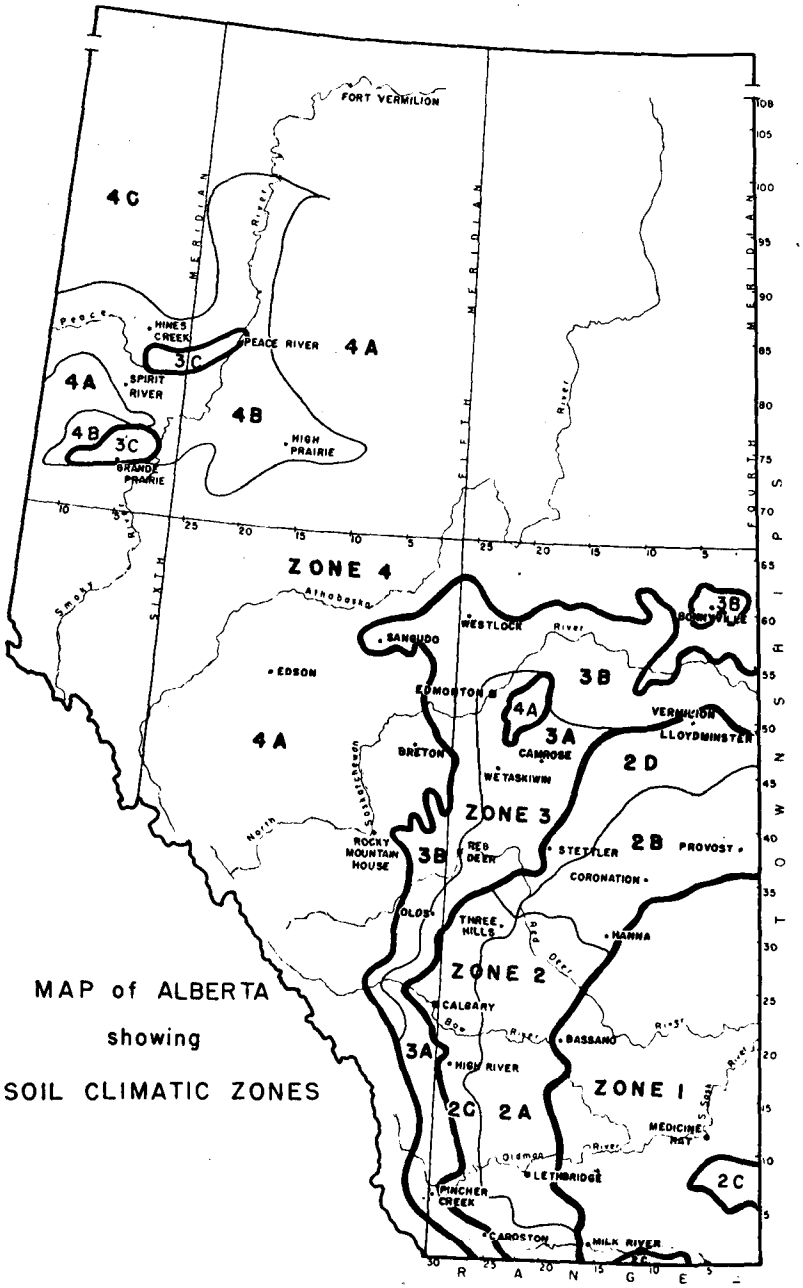
The Response of Varieties of Spring Wheat to Different Rates of Seeding

In the spring of 1949 a test was designed to study the response of varieties of spring wheat to different rates of seeding. This test was carried for the four years 1949-52 using Saunders, Thatcher, and Redman as varieties for study. The experiment was designed to compare rates of seeding based on the number of plants per given area. Actual rates in bushels per acre were determined by using the weight per 1,000 kernels for each variety. Thus, varieties with larger seed would be seeded at a heavier rate in bushels per acre than those with smaller seeds even though all varieties had the same number of seeds per given area. Thatcher has the smallest kernel, Saunders is slightly larger, and Redman has the largest kernel.

The study is being continued but a few general statements can be made from the 1949-52 results. The lighter rates of seeding produced a crop that required a longer period to reach maturity, was more resistant to lodging, and was generally taller than the crop that was produced from the heavier rates of seeding. Optimum yields were received from crops seeded at somewhat lighter rates than are generally recommended and used throughout central Alberta. The 4-year average yield data revealed optimum yields

from the following rates: Saunders 50 pounds per acre, Thatcher 46 pounds per acre, and Redman 58 pounds per acre. All rates were equivalent to an average plant spacing of 1 inch with rows 9 inches apart or 16 plants per square foot of land surface.

The above tests were conducted on well-prepared summerfallow and the crops were hand weeded thus preventing any competition from weeds. If the farmer is using chemical weed spray for the control of weeds and can be assured



of the production of a clean crop, the above results indicate the possibility of partially offsetting the cost of chemicals through a saving in the amount of seed used. Naturally, good seed with high germination would be essential.

Variety Testing

The Cereal Crops Division, in co-operation with the Illustration Stations Division, conducts variety tests with wheat, oats, barley, and flax at strategic points throughout the area served by the Lacombe Station. In recent years some 25 to 30 different tests for each crop have been supervised from Lacombe. Through these tests it is possible to determine, in a comparatively short period of time, the relative performance of varieties with respect to their local adaptability. The results obtained from such tests are the basis for making cereal varietal recommendations for the different soil climatic zones of the province.

The accompanying map shows the approximate boundaries of the different soil climatic zones. Since yield results appearing in Table 9 are reported on the basis of these soil climatic zones, reference should be made to the map when data are being reviewed.

TABLE 9.—GENERAL YIELD SUMMARY (BUSHELS PER ACRE) FOR WHEAT, OATS, BARLEY, AND FLAX, 1946–1952

Variety	Soil Climatic Zone						
	Brown Soil Zone				Black Soil Zone		Grey Soil
	2A	2B	2C	2D	3A	3B	4A
Wheat	17 Test Mean	16 Test Mean	18 Test Mean	8 Test Mean	12 Test Mean	6 Test Mean	13 Test Mean
Chinook	33·2	29·8	27·5	31·1	39·6	45·7	.....
Rescue	35·3	32·4	29·2	33·8	.....	.....	.....
Saunders	.....	.....	.....	.....	46·9	52·4	28·9
Thatcher	39·3	35·4	30·8	37·8	50·6	59·4	27·9
Oats	11 Test Mean	10 Test Mean	11 Test Mean	7 Test Mean	12 Test Mean	14 Test Mean	12 Test Mean
Abegweit	.....	.....	.....	.....	117·4	111·9	81·2
Ajax	81·0	78·7	74·3	80·9	.....	.....	.....
Beaver	.....	.....	.....	.....	101·8	99·2	72·4
Eagle	84·1	107·0	85·6	99·0	125·0	120·2	82·9
Exeter	90·2	99·8	85·2	101·0	126·0	111·7	91·3
Fortune	83·2	84·9	79·3	86·8	112·2	.....	77·9
Larain	.....	.....	.....	.....	.....	.....	59·9
Victory	81·1	96·5	83·6	97·4	115·1	108·1	81·9
Barley	11 Test Mean	11 Test Mean	14 Test Mean	6 Test Mean	6 Test Mean	25 Test Mean	13 Test Mean
Compana	60·1	53·5	50·6	56·2	.....	.....	.....
Montcalm	67·9	65·5	57·3	64·8	68·5	57·1	57·8
Newal	65·2	61·7	55·3	61·9	74·4	60·7	60·6
Olli	.....	.....	.....	.....	56·8	48·5	53·7
Titan	60·5	57·4	53·0	54·3	.....	.....	.....
Vantage	73·9	66·8	64·6	68·4	81·6	61·1	65·5
Velvon II	71·5	66·4	58·2	62·3	.....	.....	.....
Flax	7 Test Mean	5 Test Mean	7 Test Mean	6 Test Mean	10 Test Mean	9 Test Mean	
Dakota	23·1	20·1	22·1	26·0	31·0	27·3	
Redwing	20·7	18·7	20·2	23·7	27·6	25·0	
Redwood	22·9	22·3	25·5	30·3	33·9	31·8	
Rocket	23·3	23·0	23·7	26·8	32·9	30·1	
Royal	24·7	18·0	21·6	26·0	29·9	26·6	

Table 9 presents a yield summary for those varieties of wheat, oats, barley, and flax that were tested during the period under review. These yields may appear abnormally high but it must be realized that these results were obtained from rod-row trials conducted on well-prepared summerfallow and that all plots were hand weeded. Since the primary objective is to determine the relative performance of the different varieties the yield relationships are more significant than the actual yields.

Table 10 presents additional data compiled at Lacombe for all the varieties appearing in the previous table. These data will enable the reader to evaluate the varieties for maturity, length and strength of straw, and kernel characteristics. Further detailed information on these or any other variety may be secured by writing direct to the Dominion Experimental Station, Lacombe, Alberta.

TABLE 10.—MISCELLANEOUS DATA ON WHEAT, OATS, BARLEY, AND FLAX

Variety	Days to mature	Height in inches	Lodging resistance 1 strong 9 weak	Wt. per bushel in lb.	Wt. per 1,000 kernels in grams
Wheat—3-year average 1950–1952					
Chinook	131	45	3·1	59·3	31·7
Rescue	131	44	2·8	59·3	33·5
Saunders	128	41	1·3	58·7	34·3
Thatcher	132	44	1·4	60·0	33·9
Oats—3-year average 1950–1952					
Abegweit*	120·9	45·0	3·2	38·5	33·0
Ajax	111·6	43·3	2·7	40·3	28·1
Beaver	113·9	44·7	2·1	38·7	32·0
Eagle	120·9	43·7	1·5	40·7	28·7
Exeter	121·0	43·3	3·1	40·3	29·3
Fortune	113·2	45·3	2·3	38·3	29·7
Larain	109·3	44·0	2·7	42·6	32·8
Victory	122·8	47·3	3·5	41·3	30·5
Barley—3-year average 1950–1952					
Compana	109·8	37·0	6·4	46·7	46·6
Montcalm	114·5	50·0	5·3	48·0	33·2
Newal	111·1	47·0	4·2	49·0	36·1
Olli	102·3	41·3	2·1	46·7	32·1
Titan	107·4	44·5	2·0	49·0	35·6
Vantage	111·7	45·7	3·6	49·3	36·2
Velvon II	112·0	45·7	5·2	48·0	36·0
Flax—2-year average 1951–1952					
Dakota	136	26·5	1·0	53·7	6·2
Redwing	129	27·5	1·0	55·0	5·1
Redwood	139	28·0	1·0	51·5	6·0
Rocket	139	27·0	1·0	52·5	6·7
Royal	140	28·0	1·0	53·0	5·7

* 2 years only, 1951–52.

FIELD HUSBANDRY

H. W. Leggett and D. R. Walker

The Field Husbandry Division is responsible for crop rotation experiments, comparisons of cultural and cropping methods for farm crops, fertility trials on cereal crops, pasture and hay, and chemical and cultural weed control studies.

Crop Rotations

Permanency in agriculture is attainable, but only through the application of sound principles of land management and conservation. In central Alberta, crop rotations that include a grass and legume mixture increase the efficiency of production and at the same time help to ensure a permanent agriculture.

TABLE 11.—LONG-TIME CLIMATOLOGICAL AND YIELD DATA AT LACOMBE

—	1908–1952	1947–1952
Average annual precipitation	17·82 in.	18·43 in.
Average May, June, July, precipitation	8·00 in.	8·09 in.
Average frost-free Period (28°F.)	116 days	125 days
Average mean temperature April—September inclusive	52·6 °F.	52·3 °F.
Average wheat yield after fallow in a 3-year grain rotation	23·8 bu.	22·7 bu.
Average wheat yield after fallow in a 7-year mixed farming rotation	34·7 bu.	35·8 bu.
Average wheat yield after corn in a 6-year mixed farming rotation	35·8 bu.	44·8 bu.
Average wheat yield after potatoes in a 7-year mixed farming rotation	36·3 bu.	37·5 bu.
Average wheat yield after wheat in a 3-year grain rotation	14·3 bu.	13·9 bu.

Crop rotation experiments have been one of the main projects of the Lacombe Station and have been conducted since 1911. Three of these rotations conducted on a field scale have produced results that are of considerable value to the farming public of central Alberta.

Mixed-farming rotations that include a grass and legume mixture have proved better than straight grain rotations in the black soil zone. The long-time average wheat yield after fallow in a 3-year straight grain rotation is 23·8 bushels per acre while the yield of wheat after fallow in a 7-year mixed-farming rotation is 34·7 bushels per acre. This is a 10·9 bushel increase in favor of the diversified rotation. While all of the increase cannot be attributed to the fact that there are two years in a grass and legume crop, it is responsible for a considerable proportion. The other factor involved is barnyard manure, which is applied once in every 7 years.

Another important point that has been brought out by the long-term rotation experiments is that summerfallowing is not necessary for profitable grain production in the black soil zone. A 6-year rotation that has not had a complete year of summerfallow since its inception consistently outyields a 3-year straight grain rotation. The wheat after corn (for ensilage) in this rotation shows a long-term average increase of 12·2 bushels per acre over the wheat after summerfallow in the straight grain rotation. The grass and legume crop must be given some of the credit for this increase.

Table 12 shows that the grain yields from the mixed-farming rotations for the past five years remain high while the yields from the straight grain rotation have decreased from their long-term averages.

While it is improbable that potatoes or corn could be used extensively in any mixed-farming rotation in central Alberta, the production record of these crops is impressive. The hay yields on these rotations are somewhat disappointing, especially on the basis of the six years between 1947 and 1952. However,

in three of these years the moisture distribution was unfavourable for hay production. Moreover some consideration should be given to the benefit the other crops derived from the inclusion of the grass and legume mixture in the rotation.

Straight grain rotations have another disadvantage in that they become polluted with weeds much more quickly than mixed rotations. Weeds may still be a problem in mixed-farming rotations but they seldom become so serious that they materially affect crop yields.

TABLE 12.—YIELDS ON DIFFERENT ROTATIONS AT LACOMBE

(6-year period)

—	1913–1952	1947–1952
Rotation "C"		
Fallow		
Wheat	23·8	22·7
Wheat	14·3	13·9
Rotation "O"	1912-1952	1947-1952
Potatoes	7·47	8·50
Wheat	36·3	27·5
Oats	65·4	65·3
Fallow		
Wheat	34·7	35·8
Hay	1·62	1·04
Hay	1·25	0·70
Rotation "K"	1912-1952	1947-1952
Corn	10·24 ton	11·71 ton
Wheat	35·8	44·8
Barley	40·0	41·0
Hay	1·23 ton	0·60
Hay	1·84 ton	1·05
Hay	1·36 ton	0·69

The laying out of a crop rotation is an individual problem for each farm and depends on the type of farming that is followed. A good crop rotation should be one that maintains the productive capacity of the soil, helps to control weeds, provides ample feed for livestock, distributes labor more evenly, and gives a profitable return.

Commercial Fertilizers

TABLE 13.—THE EFFECT OF FERTILIZERS APPLIED TO WHEAT IN A 3-YEAR ROTATION

Rotation year	Crop	Treatment	Av. yield 20 years 1933–52	Av. increase 19 years	Av. yield 6 years 1947–52	
1	Fallow					
2	Wheat	Check	21·7	9·3	22·2	10·9
2	Wheat	50 lb. 11–48–0	31·0		33·1	
			Av. yield 19 years 1934–1952			
3	Wheat	Check	12·4	3·4	13·9	2·0
3	Wheat	Residual effect	15·7		15·9	

The use of 50 pounds of ammonium phosphate 11-48-0 on wheat after summerfallow, in the 3-year grain rotation "C" and the 7-year mixed-farming rotation "O", has given profitable average increases over a period of years. In the straight grain rotation the average yield per acre on fallow for the last 20 years has been 21·7 bushels and the application of the fertilizer has increased this yield to 31·0 bushels per acre. In the mixed-farming rotation where the average yield per acre for the last 11 years has been 38·9 bushels, the fertilizer has increased it to 46·4 bushels. In the 3-year straight grain rotation, the residual effect of the fertilizer is measured on the crop following the wheat after summerfallow. The average increase each year, over the last 19 years, has been 3·2 bushels per acre. It can be seen readily that the yield increases are extremely profitable. The increase in yield from the residual effect alone is more than enough to pay for the fertilizer application in the 3-year rotation. Even on the apparently highly fertile land of the mixed-farming rotation, the increase from fertilizer is extremely profitable. In areas where frost is a hazard, a phosphate fertilizer is valuable in that it will hasten the maturity of the crop by three or four days.

TABLE 14.—THE EFFECT OF FERTILIZER APPLIED TO WHEAT IN A 7-YEAR ROTATION

Rotation "O" Potatoes, Wheat, Oats, Fallow, Wheat, Hay, Hay.
5 Years

Rotation year	Crop	Treatment	Av. yield per acre 1942–52 11 years	Av. inc. 1945–52
5	Wheat	Check	38·9	7·5
5	Wheat	50 lb. 11-48-0	46·4	

Fertilizers for Hay and Pasture Crops

Experiments are under way to evaluate the use of commercial fertilizers for hay and pasture crops. While these have not been under test long enough to give specific recommendations, indications are that the use of suitable commercial fertilizers is profitable. Legume crops are heavy users of phosphate, and an application of one hundred to two hundred pounds of ammonium phosphate 16-20-0 has been advantageous. This fertilizer has proved of value for a mixture of grass and legume crops. Where the hay and pasture crop is composed of grasses alone, an application of a high nitrogen fertilizer such as ammonium nitrate 33.5-0-0 or ammonium sulphate 21-0-0 has been best.

Chemical Weed Control

Chemical weed control projects at this station have, since the advent of 2,4-D and other chemicals, comprised one of the major portions of the Field Husbandry research work. Susceptible annual weeds are more easily killed in the seedling growth stages with even as low a rate as 2 ounces of 2,4-D acid provided growth conditions are normal; that is plenty of soil moisture and weather conditions that promote rapid growth. Hemp nettle and wild buckwheat may be stunted in the seedling stage but not killed by dosages up to 6 ounces, 2,4-D acid per acre.

From the work done at this station on Canada thistle and sow-thistle during the past 4 years it seems evident that low-rate spraying for the *control* of these weeds in grain crops can be recommended if a few simple precautions are observed:

(1) Spray only when growing conditions are good; that is ample soil moisture and warm weather (60 to 75°F). (2) Four ounces 2,4-D acid per acre is the lowest rate one should use for these weeds. (3) The booms should be set high enough above the thistles so that all of the tall thistle plants will receive spray on the growing tips. This prevents the thistles from flowering and setting seed. (4) As long as growing conditions are good, thistles, both Canada thistle and sow-thistle, can be safely *controlled* in a growing crop in all stages of growth from the rosette to pre-bud.

The Control of Couch Grass by Chemicals

TCA was used on couch grass sod that was plowed in the fall of 1949 and worked down with a tandem disk. In May of 1950 this area was double-disked and on June 9 was cultivated, sprayed and double-disked. The average percentage kill of couch grass and inhibition of annual weeds as compared with the check plots was as follows: 25 lb. TCA killed 71·3 per cent of the couch grass, and inhibited the growth of annual weeds 50 per cent; 50 lb. TCA killed 81·3 per cent of the couch grass, and inhibited the growth of annual weeds 65 per cent; 75 lb. TCA killed 90·0 per cent of the couch grass, and inhibited the growth of annual weeds 85 per cent; 100 lb. TCA killed 93·8 per cent of the couch grass, and inhibited the growth of annual weeds 90 per cent. The combination of spraying with TCA and cultural treatments for the control of couch grass appears promising even with low-rate applications.

Effect of 2,4-D on Pasture Weeds

It has been possible to substantially reduce infestations of western snowberry (*Symphoricarpus occidentalis*) or buckbrush in pastures by spraying with 1·5 and 2 pounds of 2,4-D acid per acre of the butyl ester formulation at the pre-bud stage of growth. Identical plots sprayed in 1948, 1949, and 1950 have given similar results and have shown only limited regrowth in the first year after spraying. Western snowberry is a serious pasture weed in much of the area served by this Station and chemical control is the only practical means of eradicating it successfully.

FORAGE CROPS

H. B. Stelfox

Continued advancement in forage crop production throughout central Alberta has been evident during the 6-year period under review. Where previously seed production was of primary importance, considerable interest has now developed in the use of forage crops for hay, pasture, and soil conservation purposes. This interest is reflected in a more general use of grass-legume mixtures for hay and pasture in a crop rotation system. The acceptance of forage crops as an integral part of a balanced farming program points the way to a more stable and permanent type of agriculture for central Alberta.

The experimental work with forage crops involves the evaluation of species, varieties, and mixtures for hay and pasture in the different soil and climatic regions of the area. New promising species and varieties are being introduced and improvement of existing varieties is being sought through breeding and selection. A number of seed production problems are being investigated and several special projects are being conducted. Most of the forage crop work is centred at Lacombe but regional tests are conducted on Illustration Stations, Substations, and co-operating farms.

Red Clover Breeding

A breeding program in co-operation with the Dominion Plant Pathology Laboratory at Edmonton was started in 1947 with the primary object of developing a variety of red clover resistant to northern anthracnose. A large number of different varieties and strains of red clover have been tested in disease nurseries to determine their resistance to the disease. Siberian has been found to be the most susceptible variety while Dollard, Ukranian, Ott. 1945-46 (U.S.S.R.), and Otofte II have shown slightly more resistance than other varieties. No plants have been found to be completely free from infection but a wide range in degree of resistance exists between plants. Highly resistant selections obtained from the disease nurseries are further checked for resistance to northern anthracnose under controlled conditions in the greenhouse. Selections that continue to exhibit a high degree of resistance to the disease are progeny tested. Final selections are made on the basis of these tests. Four highly resistant selections are now being progeny tested.

In the breeding program, consideration is being given also to other important factors such as yield, general adaptability, and resistance to powdery mildew and winter crown rot.

Plant Introductions

Introduction nurseries are maintained at Lacombe and at the Athabasca grey wooded soil Substation in which new forage species are given a preliminary test to determine their suitability as forage plants for the region. A large number of different grasses and legumes and other forage plants have been tested in these nurseries in recent years. Many of them, such as the love grasses, mountain brome, tall fescue, orchard grass, narrowleaf birdsfoot trefoil, big trefoil, and strawberry clover, have winterkilled almost completely. Others such as sainfoin, broadleaf birdsfoot trefoil, and meadow fescue, although not highly winter hardy, showed more promise. Broadleaf birdsfoot trefoil is one of the more promising introductions. It is now being tested extensively in hay and pasture trials.

Variety and Strain Tests

New varieties and strains of a number of different forage crops adapted to production in central Alberta have been tested in comparison with standard varieties to determine their relative yielding ability and general suitability to the region. Only a few brief comments will be made on the results of these tests. Additional information can be obtained by writing direct to the station.

Corn (Ensilage)—Morden 74, Warwick 250, and Wisconsin (Canada) 240 have been the most promising hybrids tested on the basis of yield and earliness. However, corn is not to be generally recommended as an ensilage crop for central Alberta because of the short frost-free period and relatively cool growing season.

Field Roots—Acadia, Ditmars, and Laurentian have been the highest yielding and most suitable varieties of swede turnips while Tip Top has been the best variety of mangels tested.

Alfalfa—Ladak has been the highest yielding and one of the best adapted varieties for this region. It has outyielded Grimm and Rhizoma for hay by approximately 6 per cent and Ferax by 24 per cent.

Red Clover—Only the single-cut varieties have been sufficiently winter hardy for commercial production in the area. Altaswede is high yielding and moderately well adapted. Siberian is somewhat more winter hardy and more resistant to winter crown rot but is very susceptible to northern anthracnose.

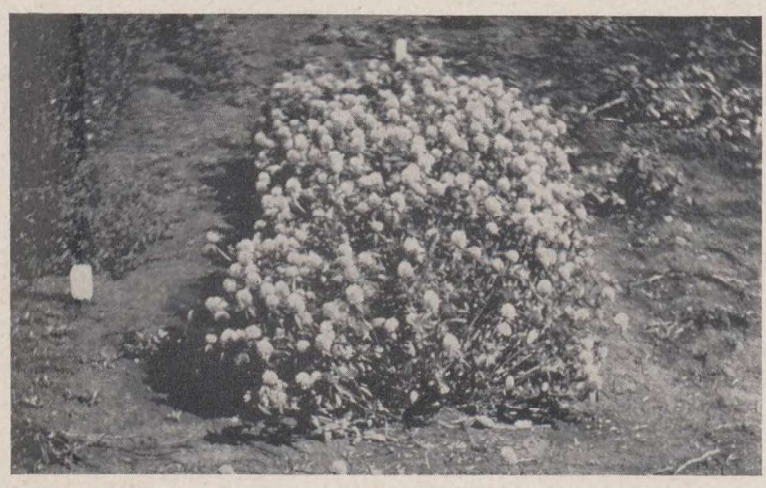


FIG. 3—A selection of Siberian red clover possessing a high degree of resistance to northern anthracnose.

FIG. 4—Severe infection of northern anthracnose on a Siberian red clover plant. Brown lesions develop as sunken areas on the stems and leaf petioles causing the leaves and blossoms to bend over presenting a shepherds' crook appearance. The leaves and blossoms wilt and die as the water supply from the plant is cut off.

Sweet Clover—Erector, a yellow-blossomed variety, has been the highest yielding and most promising of all varieties tested while Artic has been the best adapted white-blossomed variety.

White Clover—Common white Dutch has been the highest yielding and most winter hardy variety tested. Ladino has lacked sufficient winterhardiness to be recommended for use in central Alberta.

Timothy—Climax and Swallow have proved to be the best varieties on the basis of yield and quality of forage.

Brome—Northern strains of brome grass have outyielded southern strains by approximately 10 per cent for hay and 30 per cent for seed. Western Iowa has been the highest yielding variety while Manchar and Martin show considerable promise.

Perennial Hay Crops

In addition to variety tests, a number of other hay tests of different grass species grown alone and in combination with alfalfa have been conducted.

Grasses Grown Alone for Hay

A comparison of the average yields of several of the more common grass species grown in pure stands for hay over the past 4-year period is given in Table 15.

TABLE 15.—YIELDS OF DRY MATTER IN TONS PER ACRE OF SEVERAL COMMON GRASSES GROWN ALONE FOR HAY (1948-1951)

Species and strain	Seasonal production				4-year average
	1948	1949	1950	1951	
Crested wheat (Fairway)	4·26	1·08	0·95	1·09	1·84
Brome	4·23	0·68	0·94	1·28	1·78
Slender wheat (Fyra)	3·50	1·25	1·22	0·98	1·74
Reed canary grass	4·09	0·99	0·75	0·56	1·60
Slender wheat (Mecca)	2·78	1·07	0·92	0·94	1·43
Creeping red fescue (Duraturf)	4·44	0·63	0·33	0·30	1·43
Creeping red fescue (Olds)	4·14	0·57	0·44	0·38	1·38
Timothy	3·98	0·35	0·31	0·64	1·32
Red top	3·45	0·17	0·42	0·48	1·13
Kentucky blue grass	2·50	0·55	0·13	0·59	0·94

Since 1948 and 1951 were years of good moisture while 1949 and 1950 were extremely dry, the seasonal yields shown in Table 15 give a good indication of the yielding ability of the various species under both favorable and adverse moisture conditions. As an average of the 4-year period, crested wheat grass, brome and slender wheat grass were the most productive species. Although reed canary grass is usually considered to be a special-purpose grass adapted to low-lying areas subject to flooding, its performance in this test indicates that it compares very favorably in yield with brome under dryland conditions.

Several new grass species grown in pure stands for hay were compared with Fairway crested wheat during the same period. The yield data obtained are presented in Table 16.

The relatively high yields produced by Russian wild rye during the dry years of 1949 and 1950 are particularly interesting. This grass recovers quickly after cutting and has the ability to continue growth during hot, dry periods when other species such as crested wheat grass are dormant.

TABLE 16.—YIELD OF DRY MATTER IN TONS PER ACRE OF SEVERAL NEW GRASSES GROWN ALONE FOR HAY (1948–1951)

Species and strain	Seasonal production				4-year average
	1948	1949	1950	1951	
Intermediate wheat grass	4·77	0·68	0·99	1·25	1·92
Standard crested wheat (S131)	4·80	0·65	0·84	1·28	1·89
Russian wild rye (S114)	2·87	1·66	1·62	1·07	1·80
Intermediate wheat grass (Ree)	4·39	0·67	0·72	1·18	1·74
Crested wheat grass (Fairway)	4·10	0·96	0·76	1·02	1·71
Canada wild rye (S1324)	3·49	0·51	0·75	1·65	1·60
Virginia wild rye	3·34	0·90	0·76	0·78	1·44
Tall wheat grass (S64)	3·08	0·73	0·47	0·95	1·31

Chemical analyses of the forage produced by the various species included in this test revealed that the average protein content of Russian wild rye was approximately 3 per cent higher than that of Fairway crested wheat and 3·5 and 4 per cent higher that that of tall wheat grass and intermediate wheat grass, respectively.

Grass-Alfalfa Mixtures

Mixtures of grasses and legumes for hay have proved to be much superior to pure stands. Not only are mixtures preferable from the soil improvement standpoint, but they produce higher yields than pure stands. The average yields of several different grasses grown alone and in combination with alfalfa for hay over a 3-year period, 1949-51, are given in Table 17.

TABLE 17.—YIELD OF DRY MATTER IN TONS PER ACRE OF SEVERAL DIFFERENT GRASSES GROWN ALONE AND IN MIXTURES WITH ALFALFA FOR HAY (1949–1951)

Species and strain	3-Year Average	
	Pure species	With alfalfa
Canada wild rye (S1348)	1·68	1·81
Intermediate wheat grass (Ree)	1·59	1·91
Standard crested wheat (S131)	1·50	1·91
Crested wheat grass (Fairway)	1·46	1·80
Brome (Commercial)	1·43	1·62
Tall wheat grass (S64)	1·12	1·85
Virginia wild rye	0·95	1·77

It will be noted from Table 17 that in each instance the alfalfa-grass mixture outyielded the pure stand of grass. The average increase in yield was 0·42 ton per acre or approximately 30 per cent.

Annual Hay Crops

Seventeen different crops and mixtures were tested for a 3-year period, 1950-1952, to determine their value as annual hays. Oats were found to be the best cereal crop for this purpose. The varieties Victory, Eagle, and Fortune were superior to all other varieties tested, both from the standpoint of yield and quality of hay produced. No increase in yield and only a slight increase in protein content was obtained by growing sweet clover, Siberian millet, Italian rye grass, or fall rye in mixtures with oats.

Pasture Investigations

The pasture research work, which has been conducted by the Forage Crops Division of the Lacombe Station, has involved principally the evaluation of species, varieties and mixtures of grasses and legumes in small plots clipped closely several times each year to approximate actual grazing conditions. A number of different annual crops also have been tested in this manner to determine their value for pasture.

Perennial Pasture Crops

During the period covered by this report little additional information on perennial pasture crops has been secured. Adverse weather conditions prevented perennial pasture tests from becoming established satisfactorily in 1949 and 1950. Three new tests were seeded and became well established in 1951. The object of these tests is to evaluate a number of relatively new species such as Russian wild rye, intermediate wheat grass, Canada wild rye, big blue grass, birdsfoot trefoil and several others when seeded alone and in various mixtures for pasture. Information on these new tests and previously conducted ones may be secured by writing the station.

Annual Pasture Crops

Seven varieties of oats and various other crops and mixtures were tested over the 3-year period, 1950-1952, to determine their value for annual pasture. Protein and dry-matter yields were obtained from clippings made each time growth reached a height of 9 to 12 inches. Beaver and Fortune produced the highest yields of dry matter of the seven varieties of oats tested but Eagle and Exeter produced equally high yields of protein. Larain and Ajax were inferior

FIG. 5—This type of combination seeder and packer gives a firm seedbed, uniform distribution of seed, and shallow seeding, thereby eliminating much of the risk involved in establishing good stands of grasses and legumes.

oat varieties for pasture purposes. Fall rye, winter wheat, and Dwarf Essex rape produced less dry matter but more protein per acre than oats. A mixture of Eagle oats with Italian rye grass was the most productive crop tested. Mixtures of oats and rape, and oats and fall rye were also high yielding and produced higher yields of protein than oats alone. Sweet clover grown in a mixture with oats contributed very little to the mixture.

Seed Production

Forage crop seed production continues to play an important role in the cropping program of many farms in central Alberta. Seed production studies on several different forage crops have been conducted during the period under review.

Cultural and Management Requirements of Russian Wild Rye

Russian wild rye has been an erratic seed producer in the prairie regions of Canada and the United States where it has shown considerable promise as a dry-land pasture species. In 1947 an experiment was initiated at the Swift Current and Lacombe Stations to study some of the factors involved in seed production of this grass. The results of five years of testing have demonstrated that satisfactory seed yields of Russian wild rye can be obtained in the black soil zone of central Alberta if proper management practices are followed. Russian wild rye has been found to be specific in its requirements for seed production, particularly with regard to time of seeding, row spacing, and management of seedling stands. Spring seeding without a companion crop is necessary for obtaining a seed crop the following year. Solid seeded stands seldom produce more than one good seed crop. Clipping or grazing of seedling stands retards plant development and seriously reduces the first seed crop.

Data presented in Table 18 show that, as an average from five crops from the same stand, rows spaced two to three feet apart were more productive than narrower or wider spacings.

TABLE 18.—EFFECT OF ROW SPACING AND FERTILIZER ON THE SEED YIELDS OF RUSSIAN WILD RYE

Comparison	Average seed yield in lb. per ac.					
	1948	1949	1950	1951	1952	Mean
1 foot row spacing	344	400	245	181	61	246
2 foot row spacing	181	880	463	295	143	392
3 foot row spacing	92	744	510	343	183	374
4 foot row spacing	87	598	517	368	181	350
Check—no fertilizer	96	678	418	264	131	318
100 lb./ac. A.P. 16–20–0	211	638	455	299	146	350
225 lb./ac. A.P. 16–20–0	220	650	428	328	148	355

Applications of 100 and 225 pounds per acre of ammonium phosphate (16-20) resulted in increased seed yields only in 1948 and 1951 when moisture conditions were very favorable.

The removal of aftermath growth, by burning early in the spring before active growth starts, has been found to have a beneficial effect on the seed production of Russian wild rye in some years.

Cultural and Management Requirements of Creeping Red Fescue

It has been determined that seed yields of creeping red fescue in solid stands decrease rapidly after the second crop year. However, since swathing and combining from the swath has been found to be the most practical method of harvesting the seed, broadcast seedings are usually preferred to row seedings. By reducing the broadcast seeding rate to 4 pounds per acre, sparser stands are obtained and satisfactory seed yields can be maintained for several years.

Creeping red fescue does not establish itself so quickly as brome or crested wheat grass, consequently it must be given every chance to become well established in the seedling year in order to produce a good seed crop the following year. Spring seeding without a companion crop therefore results in the highest first crop yields. If a companion grain crop is used it should be seeded at one-half the normal rate and the grass seed should be cross-drilled after the grain has been seeded.

The results of fertilizer trials conducted on creeping red fescue for seed in the black soil zone of central Alberta have not been conclusive. In general, however, ammonium nitrate applied at rates of 200 to 300 pounds per acre to two-year-old and older stands has resulted in profitable yield increases of both seed and forage.

Harvesting Reed Canary Grass Seed

Several methods of harvesting seed of reed canary grass were compared in 1951. Straight combining, when approximately 75 per cent of the panicles had ripe seed in the upper half, proved to be much more satisfactory than harvesting with the binder, or straight combining when practically all of the seed was ripe.

FIG. 6—Combining reed canary grass. Direct combining of this crop is more satisfactory than harvesting with a binder. To obtain maximum seed yields it is necessary to combine the crop when the majority of the panicles on the upper part of the plant are ripe.

Fertilizer Increases Alsike Clover Seed Yields

Extensive fertilizer tests on alsike clover have been conducted at several points in the grey wooded soil zone during the past four years. The results of these tests indicate that substantial increases in seed and forage yields can be obtained by the use of commercial fertilizer. Seed and forage yields have been doubled and in some instances trebled by the use of fertilizers containing sulphur and phosphorus.

Sulphur has been found to be the most beneficial fertilizing element and the use of fertilizers containing it is essential to successful alsike clover production in that region. Phosphorus, applied alone, has increased yields in

some instances but generally it has been of little value unless combined with sulphur. The largest yield increases were obtained from fertilizers containing both of these elements. Nitrogen and potassium were not beneficial when applied alone, and increased yields only slightly when applied in combination with sulphur and phosphorus.

Ammonium phosphate (16-20) has generally given the best results. When applied at rates varying from 75 to 150 pounds per acre, it has increased seed yields by as much as 100 to 150 pounds per acre, and forage yields by one-half to one and one-half tons per acre. Similar results were obtained from other commercial fertilizers applied at rates giving comparable amounts of sulphur and phosphorus.

Early spring application of fertilizer was generally more effective than late fall application. However, sulphur in the pure rather than in the sulphate form gave the best results when applied in the fall.

Fertilizer tests conducted in the black soil zone have shown profitable seed increases resulting from an application of 50 pounds per acre of ammonium phosphate (11-48). Additional increases in seed yield were obtained when a potash fertilizer was applied in conjunction with the ammonium phosphate.

Cultural Studies

Fall Seeding of Grasses and Legumes

In 1950 a study was started to determine the effect on stand establishment of seeding various grasses and legumes into stubble in the fall of the year. Seedings of crested wheat grass, brome, timothy, creeping red fescue, reed canary grass, alfalfa, sweet clover, alsike clover and red clover were made at 2-week intervals from August 15 until after freeze-up and a subsequent seeding was made early the following spring. This experiment was repeated in 1951 and 1952.

The results of these tests would indicate that, provided soil moisture conditions are good, alfalfa and the five grass species mentioned above usually establish satisfactory stands when seeded into stubble between August 15 and September 15. Sweet clover, red clover, and alsike clover seeded during the same period rarely establish a stand. Good stands of all species usually result from late fall seedings made after freeze-up and from early spring seedings. Seed of each of the four legume species was found to germinate at much lower temperatures in the fall of the year than seed of the four grass species. This observation indicates the necessity of waiting until after freeze-up before making a late fall seeding of a legume or a grass-legume mixture.

Effect of Time of Harvesting Second Cutting of Alfalfa

Earlier studies revealed that there is a critical period in the fall of the year when the cutting of alfalfa results in severe winterkilling or winter injury of the stand. An experiment was started in 1950 to determine just when this critical period occurs and the effect of cutting at that time on subsequent yield and persistence of the stand. In each of the three years that this experiment has been conducted, the plots from which the second cutting of alfalfa was harvested during the last two weeks of August were the ones that suffered winter injury. These plots made one to two inches of re-growth prior to freeze-up while the plots cut after the end of August made practically no re-growth. It is apparent that the amount of re-growth made following the second cutting will determine largely the amount of winter injury that is likely to follow. The second cutting should be made early enough to permit sufficient re-growth for replenishing plant food reserves in the roots or else it should be delayed until active growth has ceased.

HORTICULTURE

H. T. Allen

A general expansion in all phases of the horticultural work has taken place over the past six years. New projects of a specialized nature aimed primarily at crop improvement have been undertaken. The acquisition of new equipment has made it possible to keep abreast of this expansion.

Ornamentals

Deciduous Trees and Shrubs

Hardy bush roses have been featured at the Lacombe Station for the past few years. The majority of the bush roses are rather unattractive from the standpoint of foliage characteristics and form of bush, with possibly two good exceptions. These are the Scotch rose, *Rosa spinosissima* and the red leaf rose *Rosa rubrifolia.*

The only trailing or vine type rose that has been tested is the Max Graf which is hardy enough if it is laid flat on the ground in early fall so that ample snow protection can be obtained.

The following list is made up of the better varieties of hardy bush roses with the flower type appearing in brackets.

Betty Bland (Double pink)
George Will (Double rosy pink)
Hansa (Double rose)
Harisons Yellow (Double yellow)
John McNab (Double pink)
Rosa gallica (Double red)
Sir Thomas Lipton (Double white)
Tetonkaha (Double pink)
F. J. Grootendorst (Small double red)
North Star (Double white)

Several species of trees and shrubs are on test that are not too common. These have some outstanding features and are worthy subjects for landscape purposes.

Aesculus glabra, Ohio Buckeye—This is similar to the horse chestnut but has proved to be hardier.

Carangana arborescens var. Lorberg—This is the most attractive variety of caragana that has been tested. It forms a large shrub with graceful branches of drooping habit and leaves that are very fine, light green in color, and needle-like.

Maackia amurensis, Amur Maackie—This shrub has an upright growth habit with attractive compound leaves similar to, but larger, than those of caragana. It produces long spikes of creamy white flowers that are quite prominent.

Prinsepia sinensis, Cherry Prinsepia—This species is mentioned elsewhere as a desirable hedge plant. It is equally good as a shrub, having an upright growth habit with branches that are somewhat drooping. Spines and fruit that turn a brick red in the fall are additional features.

Quercus macrocarpa, Burr Oak—This oak is native to regions of southern Manitoba and southeastern Saskatchewan and has proved absolutely dependable in central Alberta.

No weeping willow of sufficient hardiness for central Alberta has yet been tested at the station. One species, *Salix blanda,* that has a weeping habit of growth did fairly well for a few seasons but killed out in 1950.

Evergreens

Certain evergreens find a wide use in foundation plantings and several have been used with success for such a purpose at the Station. *Juniperus scopulorum,*

the Rocky Mountain Juniper, is the most vigorous growing of any tested. It has done well in a sunny exposure and is especially attractive because of its bluish color. The Savin juniper, *Juniperus sabina*; Pfitzer juniper, *Juniperus chinensis;* and mugo pine, *Pinus mugo mughus* have all done well in foundation plantings. The blue variety of creeping juniper, *Juniperus horizontalis,* is succeeding in the station rockery. The pyramidal form of the eastern cedar, *Thuja occidentails,* var. pyramidalis is a good evergreen to plant where a tall columnar type is desired. It is subject to browning in the early spring, if in an exposed location. A burlap screen arranged to shade the plants has given the necessary protection but it is better to plant this species in somewhat shady locations.

Hedges

One of the most desirable characteristics of a hedge is its ability to remain attractive over a long period of time. Many hedges were set out in the experimental plots as early as 1911 but only two of these are still being maintained. One, the native white spruce, *Picea glauca,* is an excellent high hedge and is highly recommended for screening purposes. The other is the pygmy peashrub, *Caragana pygmaea,* a slow growing species that has been maintained as a low type hedge over this 41-year period.

Two lilac hedges—the Hungarian lilac, *Syringa josikaea,* and the Amur lilac, *Syringa amurensis*—were planted in 1914 and have formed high compact hedges of excellent quality.

Perennial Flowers

Many perennials have been grown successfully but each season a few species are better than others. The following list contains those perennials that have been most outstanding during the past six seasons.

Achillia ptarmica var. The Pearl
Aquilegia longissima hyb.
Arabis alpina
Aubrieta deltoides
Campanula persicifolia
    var. Mrs. Harrison
    var. Telham Beauty
Cerastium tomentosum
Chrysanthemum maximum
    var. Ester Read
Cimicifuga racemosa
Dianthus deltoides dbl.
Dianthus plumarius
    var. Mrs. Sinkins
    var. Dazzler
Delphinium hybridum (Pacific Giants)
Dicentra formosa
Dictamnus albus fraxinella
Digitalis ambigua
Gaillardia aristata
Geranium ibericum
Gypsophila repens
Lychnis viscaria dbl.
Lythrum salicaria
Phlox subulata
    var. Ada Blackjack
    var. Boughen
    var. Garthside
    var. Pyramid
    var. Sweetheart
Sedum spectabile
  Gypsophila repens
Senecio doronicum
Trollius europaeus

The above table does not include the many hardy varieties of daylilies (Hemerocallis), iris, lilies (Lilium), and peonies (Paeonia), that are very satisfactory in most seasons.

Tree Fruits

A general expansion in the fruit work was begun in 1947 when additional land was obtained for a new orchard. To date, winter injury has been the limiting factor in establishing the new orchard as even the hardiest varieties of crabapples have suffered to a limited extent. The only apple variety that is showing sufficient hardiness is Heyer No. 12 which produced some fruit in the third season after planting. Rescue, an apple-crabapple hybrid, has not proved completely hardy. In previous tests Rosilda proved to be a satisfactory variety in this class of tree fruit.

Dolgo is still regarded as one of the best crabapples. It is hardy, vigorous, and the brightly colored fruits make it quite ornamental. Like Heyer No. 12, it began to bear in the third year after planting. Columbia, Florence, Osman, and a few seedlings under number have shown considerable hardiness in the past few seasons but as yet none have produced fruit.

The hardiest and most promising tree plums are those selected from the native Manitoba plum which include such varieties as Assiniboine, Bounty, Dandy, Dropmore Blue, and Norther. All other varieties on test have not been hardy.

The sandcherry plum hybrids are all subject to winter injury. In most seasons, however, some fruit is produced on the lower branches, which are the ones that receive the most snow cover. Algoma, Dura, Mansan, Manor, and Sapa have all produced fruit and are recommended for trial.

In 1948 an excellent crop of fruit was obtained from the Nanking cherry, *Prunus tomentosa*. Crops can be expected only once every four or five years, however, as late spring frosts usually destroy the blossoms which develop early in the season.

Bush and Small Fruits

Currants

In recent tests with black currants the varieties Buddenburg, Climax, and Kerry have proved hardy, and have produced fruit of good size and quality. Recent production, however, has not been very satisfactory, but based upon previous records these varieties along with Black Naples, Lees Prolific, Magnus, and Saunders have been good yielders. Boskoop Giant is the largest fruited variety, has excellent quality but is lower yielding than the above varieties.

To date, Greenfield has been the best yielding variety of red currant followed by Victoria, Perfection, and Pamona. Prince Albert, Red Lake, Holland, and Stephens No. 9 are other varieties that have given good performances in past seasons. White Grape and Large White are two varieties of white currants that have proved to be hardy and good yielders.

Gooseberries

Abundance and Pixwell are the only varieties that have been satisfactory. Other varieties that have been tested are either poor producers or lack winter hardiness.

Raspberries

A new plantation set out in the spring of 1948 began to produce to a limited extent in 1950. As a check for winter hardiness one-half of each variety row is given the standard treatment for winter protection by bending the canes and holding them in a bent position by placing soil on their tips. In 1949-50 injury ranged from 20 to 90 per cent with little difference between covered and exposed canes. In 1950-51 injury ranged from 0 to 60 per cent, with Honeyking and Viking showing no injury and Gatineau very little. In 1951-52 injury ranged from 0 to 90 per cent with Honeyking the only variety to come through the winter without injury. As a consequence a 43-foot row of Honeyking yielded 20·5 pounds of fruit while no other variety in the plot yielded over 2 pounds. The common varieties, Chief, Latham, and Newburgh have shown considerable tenderness while Viking has been variable. Although the practice of bending and covering the cane tips for winter protection has not been completely effective, it has helped in certain cases to bring the canes through the winter and ensure a crop the next season.

Strawberries

In past seasons the everbearing varieties have given as good yields in the early summer as have the June bearing varieties. Occasionally the everbearers have given small crops in the fall but as a general rule the first frosts occur before the plants have a chance to produce. Gem, Pixie, and Sweetheart have been the best everbearing varieties.

Senator Dunlap is the most popular June bearing variety and has been a good yielding, good quality variety. In recent tests, however, Prince Albert has outyielded all other varieties.

Vegetables

Few vegetable crops, other than potatoes, are grown on a commercial scale in central Alberta. Vegetable investigations have largely been confined to the testing of varieties and determining which are most suitable for this area. Following is a list of recommended varieties:

Asparagus: Mary Washington
Beans: Broad—Broad Windsor
Bush, green—Bountiful, Stringless Green Pod, Tendergreen.
yellow—Golden Wax, Pencil Pod Black Wax, Round Pod Kidney Wax.
Pole—Blue Lake, Scarlet Runner.
Beets: Crimson Globe, Detroit Dark Red, Early Flat Egyptian.
Broccoli: Italian Green Sprouting.
Brussels Sprouts: Dalkeith, Long Island Improved.
Cabbage: Early—Early Vienna, Golden Acre, Viking.
Midseason—Glory of Enkhuizen.
Late—Danish Ballhead, Copenhagen Market, Penn State Ballhead.
Red—Red Acre, Red Haco.
Carrot: Amsterdam, Imperator, Nantes, Red Cored Chantenay.
Cauliflower: Codonia, Erfurt, Snowball, Snowdrift, Snow Queen.
Celery: Cornell No. 19, Golden Self Blanching, Utah.
Citron: Green Seeded Preserving, Red Seeded Preserving.
Corn: Banting, Dorinny, Early Alberta Squaw, Seneca 60.
Cucumber: Pickling—Early Russian, Mincu, National Pickling.
Slicing—Early Fortune, Marketer, Straight 8, Taxpayer.
Endive: Full Hearted Improved, Moss Curled.
Herbs: Dill, Rosemary, Sage, Savory, Sweet Basil, Sweet Marjoram, Thyme.
Kohlrabi: Early Purple Vienna, Early White Vienna.
Leek: Musselburg.
Lettuce: Butterhead—Big Boston.
Crisphead—Great Lakes, Iceberg, New York No. 12.
Leaf—Grand Rapids.
Muskmelon: Farnorth (some seasons).
Onions: Ebenezer, Red Wethersfield, Southport Yellow Globe, Yellow Globe Danvers, Sweet Spanish.
Parsley: Moss Curled.
Parsnips: Hollow Crown, Short Thick.
Peas: Early—Little Marvel, Thomas Laxton, Wisconsin Early Sweet.
Midseason—Director, Homesteader.
Late—Onward, Stratagem.
Peppers: (Most Seasons) Harris Earliest, Windsor A.
Potato: Early—Warba.
Midseason—Canus, Irish Cobbler.
Late—Netted Gem.
Pumpkin: Early Cheyenne, Sugar.
Radish: Most varieties.
Rhubarb: Canada Red, Early Sunrise, Macdonald.
Rutabaga: Acadia, Canadian Gem, Laurentian.
Salsify: Scorzonera.
Spinach: Bloomsdale, King of Denmark, Princess Juliana.
Squash: Buttercup, Golden Hubbard, Green Hubbard, Kitchenette.
Swiss Chard: Lucullus.
Tomato: Non-staking—Bounty, Early Chatham, Earlinorth, Redskin.
Staking—Abel, Earliana.
Vegetable Marrow: Cocozelle, Zucchini.

Special Projects

Tomato Breeding

A tomato breeding program was initiated in 1949 to develop an early tomato more suited to central Alberta conditions. The majority of gardeners who grow tomatoes do so for green fruit either for pickling purposes or ripening indoors, primarily because of lack of suitable early varieties. In the best seasons a large fruited variety will ripen about one-tenth of the total yield. Early Chatham has to date given better results than any other large fruited variety. Early varieties like Farthest North are too small. Already 16 crosses and 160 selections have been made. Several selections show promise but it is too early to tell whether they will prove of value.

Seed Production of the Canus Potato

In 1946 the Canus variety of potato was introduced. The cross from which this variety originated was made by the United States Department of Agriculture and the final selection was made at Lacombe from a seedling in a co-operative project between the United States Department of Agriculture and the Canada Department of Agriculture.

In the variety trials this seedling showed considerable promise as it was a good yielder, early to midseason in maturity, and produced tubers that were round and flat in shape, smooth and white skinned, of good quality, and had few and shallow eyes. In seven years of trials prior to 1946 Canus averaged 411 bushels per acre as compared with 353 for Netted Gem, 343 for Irish Cobbler, and 414 for Chippewa. Because of this favorable performance Canus was named and introduced by the Lacombe station.

Since its introduction some 556 bushels of seed have been distributed to interested growers. It has met with great success in the Peace River region and as far north as Whitehorse. It has also done very well in the grey wooded areas in the western section of Central Alberta and on irrigated and dry land in southern Alberta. Its popularity elsewhere appears to be confined to the home gardener rather than the large producer.

FIG. 7—Weed control in peas (foreground) using a selective weed killer applied when the peas were about four inches in height. Note the weed growth (background) where the chemicals were not applied.

Chemical Weed Control in Vegetable Crops

Certain herbicides offer a practical approach to the weed problem with certain vegetable crops when they are grown on a large scale. To date the following treatments have given the most definite results.

Both the amine and sodium salt of 2,4-D have been used for the control of weeds in the Sugar Prince variety of sweet corn. The chemical should be applied at the rate of 0·5 pounds of acid equivalent per acre, approximately four weeks after germination while the weeds are still small.

The sodium salt of 2,4-D at the rate of 0·5 pounds acid equivalent per acre in 25 gallons of water has given good weed control in potatoes, sprayed when the plants are about three inches in height.

Weed control in carrots and parsnips has been obtained by spraying with dry-cleaning fluid, such as Varsol, at the rate of 80 gallons per acre. Spraying should be done when the carrots or parsnips are in the two- to four-true-leaf stage. Lower rates may not give good control of weeds and higher rates have been found to cause excessive leaf burning.

Dow selective, a dinitro preparation, has given good control of weeds in garden peas. This chemical was applied at the rate of three quarts in 100 gallons of water per acre and sprayed when the peas were about 4 inches in height. Calcium cyanamide at 80 pounds per acre has also given good weed control in peas for a 3-week period when applied about 5 days prior to pea germination.

TCA has proved satisfactory for the control of weeds in rutabagas when applied as a pre-planting treatment at the rate of 40 pounds per acre 6 days prior to seeding.

ILLUSTRATION STATIONS
and
DISTRICT EXPERIMENT SUBSTATIONS

L. J. Anderson

Illustration Stations and District Experiment Substations are operated on privately owned farms on a co-operative basis between the owner and the Experimental Farms Service. The investigations conducted represent experiments seeking the solution to farm problems of each district. Records are kept by each station operator, making possible farm business studies and an analysis of the various farm enterprises.

Changes in stations have been made during the past six years as shown in Table 19.

TABLE 19.—LOCATION OF STATIONS, NAMES OF OPERATORS, AND SOIL TYPE

Stations	Operators	Soil Type
Experiment Substations—		
Athabasca	J. Eherer	grey wooded
District Experiment Substations—		
Castor	F. M. Pals	clay loam
Metiskow	Ed Masson	fine sandy loam
Red Deer (closed in 1949)	F. W. Chisholm and H. P. Hartrick	sandy loam
Illustration Stations—		
Bonnyville (opened in 1951)	W. G. Levasseur	clay loam
Chauvin	E. A. Pitman	sandy loam
Chedderville	Howard Williams	grey wooded
Dickson	J. A. Sandberg	clay loam and peat
Evansburg (opened in 1952)	R. Weist and Sons	grey wooded
Fallis (closed in 1951)	H. W. Margerison	grey wooded
Leslieville	G. N. Lynn	clay loam and peat
Ryley (opened in 1950)	Geo. W. Lyons and Sons	solodized solonetz loam
St. Paul	J. R. LaFrance	sandy loam

Regional Precipitation

The precipitation data from the stations during the period under review are given in Table 20.

TABLE 20.—PRECIPITATION RECORDS—1947-1952, INCLUSIVE

Soil zone	Stations	1947 in.	1948 in.	1949 in.	1950 in.	1951 in.	1952 in.	Av. in.
Zone 2 Dark Brown	Castor	16·26	13·06	9·71	17·48	23·20	11·16	15·14
	Chauvin	11·35	8·87	11·58	18·47	16·20	12·57	13·17
	Metiskow	13·50	18·61	11·50	21·75	20·20	13·39	16·49
Zone 3 Black	Dickson	34·91	18·36	15·78	12·87	39·67	.....	24·32
	Lacombe	21·66	21·85	15·00	14·14	20·31	17·64	18·43
	Red Deer	20·43	.....	14·57	.....	.....	.....	17·50
	Ryley	.....	.....	.....	.....	21·82	13·28	17·55
	St. Paul	14·84	9·21	7·49	10·10	17·45	15·96	12·51
Zone 4 Transitional and grey wooded	Athabasca	.....	12·75	17·30	9·62	20·18	13·47	14·66
	Chedderville	25·34	15·35	9·92	14·89	26·36	15·88	17·96
	Fallis	24·72	20·61	20·13	11·25	26·63	.....	20·67
	Leslieville	18·82	20·66	13·17	9·24	26·52	19·15	17·93

Rotation Studies

Rotation studies constitute one of the major phases of work conducted on all stations. All rotations are designed to fit into a well-balanced mixed-farming program which provides for adequate feed for livestock, cash crops, and weed and erosion control, without depleting soil fertility. The rotations on individual stations are recorded in Table 21.

TABLE 21.—LIST OF ROTATIONS AND LOCATION

Rotations	Cropping sequence	Stations
2-year rotations	(1) Fallow-wheat	Castor, Metiskow, Ryley
	(2) Fallow-coarse grain	Metiskow
3-year rotations	(1) Fallow-wheat-coarse grain	Athabasca, Bonnyville, Chedderville, Metiskow
	(2) Fallow-wheat-wheat	Ryley
	(3) Fallow-wheat-hay	Athabasca, Chedderville, Metiskow, Ryley
5-year rotations	(1) Coarse grain-coarse grain-coarse grain-hay-hay	Dickson, Fallis, Red Deer
	(2) Coarse grain-coarse grain-hay-hay-hay	Chedderville, Leslieville, Metiskow
	(3) Fallow-wheat-coarse grain-hay-coarse grain	Bonnyville
6-year rotations	(1) Wheat-coarse grain-coarse grain-hay-hay-hay	Athabasca, Evansburg
	(2) Wheat-coarse grain-hay-hay-hay-hay	Castor
7-year rotations	(1) Fallow-wheat-hay-hay-hay-coarse grain-coarse grain	Chauvin, St. Paul

The 2-year rotations have a definite place on the light sandy soil at Metiskow. This land is subject to drifting and every precaution possible must be taken to conserve moisture and a trash cover. The average yield of wheat

after fallow has been 13·8 bushels per acre, and for oats after fallow 28·0 bushels per acre over a 14-year period. In comparison, the average yields in the 3-year rotation of fallow-wheat-oats at this station were 10.6 bushels per acre for wheat and 13.9 bushels per acre for oats. A modified 3-year rotation of fallow-wheat-hay appears to have some promise for this district. One field is seeded down to a grass-legume mixture and left until the stand becomes unproductive, while the remaining two fields are rotated on a fallow-wheat basis. Since moisture is a limiting factor in establishing hay stands it is not advisable to use a nurse crop. Spring or fall seeding into stubble has been more practical than seeding on fallow with a nurse crop. To avoid soil erosion, hay land should be broken in the spring and cropped the same year.

At Castor, wheat after fallow has averaged 19.5 bushels per acre in comparison with 14.2 bushels per acre for wheat after four years of hay. This reduction in yield has not been apparent in areas of higher rainfall such as at Dickson, Fallis, and Red Deer.

Quack grass presents a problem at Chedderville during wet years because it is impossible to work the breaking adequately. In such cases it may be advisable to use a full year of fallow. At Athabasca, where rainfall is less, the control of quack grass is not a serious problem.

The results obtained from two 3-year rotations at Chedderville through 7 years and Athabasca through 5 years are as follows:

Chedderville	—Wheat after fallow and oats	—32.6 bu./ac.
	—Wheat after fallow and oats—fertilized ammonium phosphate 16-20, 100 lb. plus sulphur 6 lb.	—38.0 bu./ac.
	—Wheat after fallow and hay	—34.0 bu./ac.
	—Wheat after fallow and hay—fertilized ammonium phosphate 16-20, 100 lb. plus sulphur 6 lb.	—46.6 bu./ac.
Athabasca	—Wheat after fallow and oats	—24.9 bu./ac.
	—Wheat after fallow and oats fertilized manure 15 tons	—29.0 bu./ac.
	—Wheat after fallow and hay	—23.8 bu./ac.
	—Wheat after fallow and hay fertilized manure 15 tons	—31.0 bu./ac.

A study of the yield data for individual years shows that rotations containing hay outyield the grain rotations during wet years, whereas when moisture is lacking the grain rotations yield equally well.

Fertilizer Studies

The data shown in Table 22 indicate that ammonium phosphate fertilizers applied at rates from 50 to 75 pounds per acre have given best results on cereal crops.

TABLE 22.—SUMMARY OF CEREAL FERTILIZER TESTS—BUSHELS PER ACRE

Treatment*	Rate lb. per acre	Dark Brown Soil Zone				Black Soil Zone					
		Castor wheat 1951 and 1952	Metiskow spring rye 1949	Chauvin wheat 1950, 1951 and 1952	Av.	Dickson oats 1950	Ryley wheat 1950, 1951 and 1952	St. Paul wheat 1949, 1951, and 1952	Red Deer wheat 1949	Bonnyville wheat 1951 and 1952	Av.
A.P. 11-48	25	54·2	5·4	43·2	34·3	37·9	44·7	44·8	26·0	48·1	40·3
A.P. 11-48	50	56·1	4·3	46·2	35·5	41·2	43·4	48·1	28·2	51·6	42·5
A.P. 11-48	75	57·6	5·6	47·4	36·9	32·2	46·1	48·3	.....	50·8	44·4
A.P. 16-20	36	54·8	4·6	42·5	33·9	37·2	39·7	42·9	27·5	44·4	38·3
A.P. 16-20	60	53·5	5·1	46·2	34·9	48·4	39·5	46·5	23·3	51·3	41·8
Triple Super	19	50·2	4·4	42·9	32·5	42·0	37·3	43·4	25·5	36·2	36·9
Triple Super	32	49·4	4·4	43·4	32·4	45·4	39·0	44·2	25·7	44·5	39·8
KCl	30	43·6	4·2	40·2	29·3	28·7	37·9	40·3	23·1	43·8	34·8
A.P. 11-48+KCl	50,30	54·9	5·0	44·2	34·7	43·8	43·8	48·3	25·7	51·2	42·6
Check	.....	49·6	4·4	41·0	31·7	32·6	35·9	37·3	27·0	42·2	35·0
Average	.....	52·4	4·7	47·3	34·8	38·9	40·7	44·5	25·8	46·4	39·3

* A. .—Ammonium phosphate; Triple super—triple superphosphate; KCl—potassium chloride.

TABLE 23.—FERTILIZER RESULTS ON GREY WOODED SOILS

Treatments*	Rate lb. per acre	Wheat after fallow and oats (bu./ac.)		Wheat after fallow and legume hay (bu./ac.)		Oats after wheat (residual bu./ac.)		Legume hay after wheat (Residual tons per ac.)	
		Chedderville 7-year av.	Athabasca 5-year av.	Chedderville 7-year av.	Athabasca 5-year av.	Chedderville 5-year av.	Athabasca 5-year av.	Chedderville 5-year av.	Athabasca 4-year av.
Manure	15T	**43·8**	**29·0**	44·7	**31·0**	**44·1**	**41·2**	1·25	1·27
Amm. nitrate	50	33·6	21·6	31·1	22·8	33·2	31·4	0·44	0·74
Sulphur	20	33·0	24·7	42·9	28·9	30·2	38·4	2·03	1·24
Amm. sulphate	80	38·5	24·0	**47·6**	26·3	30·1	34·2	2·47	**1·54**
Triple super	45	34·0	25·0	33·4	26·4	35·4	36·0	1·10	1·08
A.P. 11–48 + Amm. nitrate	45, 36	35·3	26·3	41·5	26·3	29·6	33·8	0·55	1·10
A.P. 16–20 + sulphur	100, 6	38·0	25·6	46·6	30·1	28·1	36·0	3·10	1·34
A.P. 16–20 + Pot. sulphate	100, 40	38·4	21·6	45·3	24·8	26·6	34·6	**3·62**	1·01
Check		32·6	24·9	34·0	23·8	33·4	32·9	0·74	0·84

* Amm. nitrate—Ammonium nitrate; Amm. sulphate—Ammonium sulphate; Triple super—triple superphosphate: A.P.—Ammonium phosphate; Pot. sulphate—potassium sulphate.

Table 23 shows the importance of sulphur-bearing fertilizers and manure, particularly in hay rotations, on grey wooded soils. In general, the wheat yields are higher in the hay rotation than in the grain rotations at both stations.

The response to phosphate fertilizers on timothy hay grown on peat soil is very pronounced as shown in Table 24. Heavy rates applied early in the spring produce the highest yield increases.

TABLE 24.—EFFECT OF COMMERCIAL FERTILIZERS ON TIMOTHY HAY YIELDS ON PEAT SOIL AT LESLIEVILLE

Treatments*	Yields in tons per acre					
	1950		1951		2-year av.	
	Fall application	Spring application	Fall application	Spring application	Fall application	Spring application
167 lb. A.P. 16-20-0	1·12	1·37	1·29	1·84	1·20	1·60
35 lb. A.P. 11-48-0 + 32 lb. KCl 0-0-50	1·20	1·23	1·43	1·66	1·32	1·44
35 lb. A.P. 11-48-0 + 32 lb. KCl + 16 lb. S	1·14	1·24	1·35	1·62	1·24	1·43
70 lb. A.P. 11-48-0	1·10	1·32	1·37	1·48	1·24	1·40
83 lb. A.P. 16-20-0	1·09	1·16	1·31	1·49	1·20	1·32
35 lb. A.P. 11-48-0	0·93	1·15	1·30	1·32	1·12	1·24
44 lb. T.S.P. 0-38-0 + 16 lb. S	0·94	1·12	1·24	1·36	1·09	1·24
44 lb. T.S.P. 0-38-0	1·04	0·96	1·22	1·30	1·13	1·13
124 lb. A.S. 21-0-0	0·83	0·90	0·70	0·70	0·76	0·80
32 lb. KCl 0-0-50 + 16 lb. S	0·79	0·82	0·73	0·74	0·76	0·78
62 lb. A.S. 21-0-0	0·79	0·78	0·76	0·70	0·78	0·74
32 lb. KCl 0-0-50	0·87	0·69	0·78	0·70	0·82	0·70
78 lb. A.N. 33·5-0-0	0·84	0·69	0·72	0·66	0·78	0·68
16 lb. Sulphur	0·85	0·67	0·76	0·63	0·80	0·65
39 lb. A.N. 33·5-0-0	0·74	0·74	0·69	0·69	0·72	0·72
Check	0·71	0·67	0·72	0·58	0·72	0·62

* A.P.—Ammonium phosphate; KCl—potassium chloride; T.S.P.—triple superphosphate; A.S.—Ammonium sulphate; A.N.—Ammonium nitrate.

Cereals

The results of cereal variety tests conducted on the stations are reported in the Cereal Division section of this report.

The production of adapted varieties of cereal and forage crops is promoted on the stations so that these farms may serve as sources of pure seed for farmers in surrounding districts. A total of 28,300 bushels of seed grain, 13,310 pounds of forage crop seed, and 27 bushels of potatoes were distributed by station operators during 1947-52.

Forage Crops

The policy of growing adapted grass-legume mixtures for hay and pasture has been adhered to by all operators. Alfalfa is grown most extensively throughout the area; alsike and red clover may replace it in short-term rotations in moist regions of the transitional and grey wooded soil zone. Sweet clover when included with grass-alfalfa mixtures has increased hay yields during the first crop year. Timothy does well in all zones except the dark brown soil zone. Brome is suitable throughout the area. Crested wheat grass is well adapted to the dark brown soil zone where drought resistance is important.

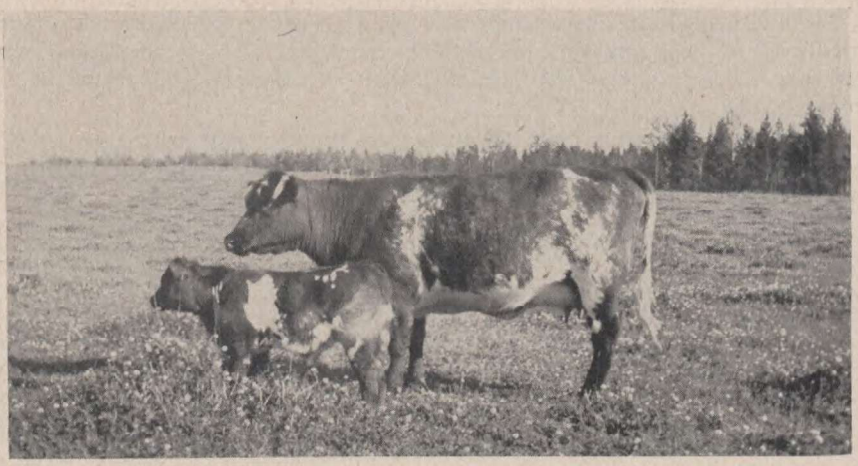


FIG. 8—Grey wooded soils respond well to legume crops, manure, and sulphur-bearing fertilizers. This picture shows a cow and calf from the registered Shorthorn herd on the Illustration Station at Chedderville. The effect of manure droppings on the timothy-alsike pasture may be noted in the background, and indicates the extent to which this soil responds to fertilizer treatment.

Horticulture

The selection of adapted vegetables and varieties is important because of the variable climatic conditions throughout the area. Early maturing varieties must be grown in Zone 4 where the frost-free period is short. Corn, tomatoes and vine crops seldom mature in this area. In Zone 3, medium early varieties are grown successfully. In Zone 2, late varieties mature almost every year. Information regarding vegetable varieties may be found in the Horticulture Division section of this report.

Livestock

Livestock policies are designed to promote the development of improved herds or flocks from which neighbouring farmers may procure breeding stock. Most of the operators keep purebred sires. Animals distributed for breeding purposes during the past six years included 146 cattle, 68 hogs, and 3 sheep. A total of 2,325 dozen hatching eggs were sold during the same period.

TABLE 25.—SUMMARY OF CEREAL CROP YIELDS AND COST OF PRODUCTION

Stations	Preceding crop	Average			
		No. of Years grown	Yield per ac./bu.	Cost per bu. $	Cost per acre $
Wheat					
Castor	Summerfallow	13	15·0	0·59	8·89
Chauvin	Summerfallow	17	21·5	0·47	9·68
Metiskow	Summerfallow	12	12·0	0·55	7·57
Chedderville	Hay and Break	2	27·3	0·56	15·32
St. Paul	Summerfallow	2	23·0	0·71	16·24
Oats					
Leslieville	Hay and Break	4	52·1	0·49	21·29
Fallis	Hay and Break	8	68·0	0·23	15·54
Barley					
Chedderville	Hay and Break	12	20·1	0·55	10·97

Farm Management

Cost-of-production data (Table 25) indicate that the cost per acre is closely related to the size of the farm unit and the type of soil. The larger farms such as at Metiskow, Chauvin, and Castor allow for more economical use of machinery and labor. This is offset, however, by lower yields making the cost per bushel of grain comparable with that at other Stations.

Sources of Revenue—1947-1951 Inclusive

Percentage of Gross Revenue

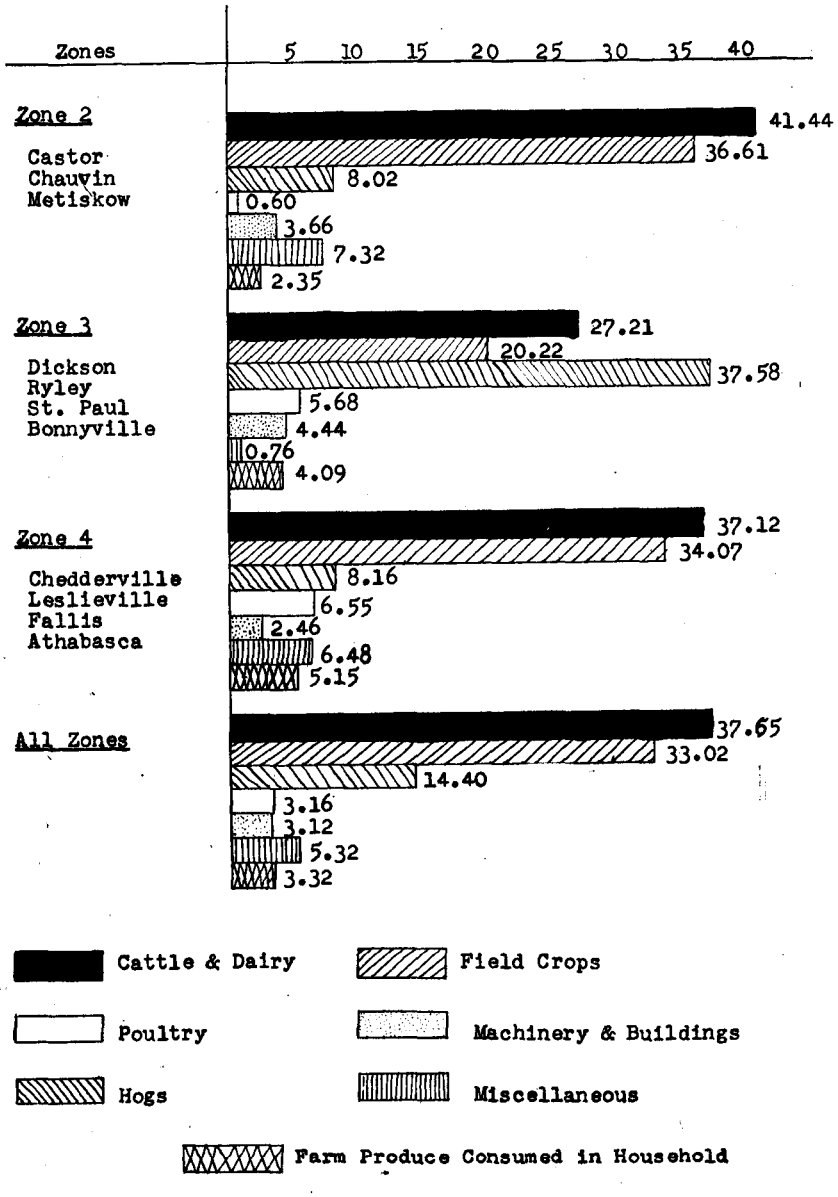


TABLE 26.—AVERAGE CAPITAL INVESTMENT, INCREASE IN CAPITAL INVESTMENT, AND GROSS REVENUE PER ACRE OF CROPLAND IN CENTRAL ALBERTA—1947-51

Stations	Land and buildings		Livestock		Machinery and equipment		Per cent increase in total capital investment from 1944-46 to 1947-51	Investment per acre of cropland 1947-51	Gross revenue per acre cropland 1947-51
	Per cent of total		Per cent of total		Per cent of total				
	1944-46	1947-51	1944-46	1947-51	1944-46	1947-51			
	%	%	%	%	%	%	%	$	$
Zone 2									
Castor	58·08	52·81	29·52	21·02	12·40	26·16	−18·49	27·12	13·26
Chauvin	35·90	41·44	39·89	34·86	24·21	23·70	34·16	47·70	17·30
Metiskow	43·24	27·73	31·54	38·87	25·22	33·40	78·87	36·25	11·16
Zone 3									
Dickson	62·43	47·00	17·92	24·55	19·65	28·45	16·01	101·30	30·10
St. Paul	62·69	46·26	20·71	33·13	16·60	20·60	69·61	81·65	29·48
Zone 4									
Athabasca*	.....	39·26	.....	30·30	.....	30·44	.....	74·27	23·00
Chedderville	45·56	29·82	37·13	37·89	17·31	32·29	137·47	100·08	30·78
Fallis	61·80	61·35	25·71	24·80	12·49	13·85	7·12	80·03	43·34
Leslieville	71·59	63·67	12·50	13·82	15·91	22·51	7·22	67·13	13·50

*4-year average 1948-1951, inclusive.

The graph on sources of revenue shows a satisfactory balance between field crops and livestock in all zones. A comparison of the revenue from the different enterprises, including all zones, shows that cattle contributed the most followed in order by field crops, hogs, miscellaneous, farm produce consumed, poultry, and machinery and buildings.

Table 26 shows that the total capital investment from 1944-46 to 1947-51 increased at all stations except Castor. This could be attributed to an increase in land, in number of livestock, or the purchase of new machinery and equipment. The decrease at Castor resulted mainly from a reduction in cattle and acreage.

In general the percentage of total capital invested in land and buildings decreased at all stations during the past five years. This was offset by a general increase in percentage invested in machinery and equipment. This can be accounted for in that few changes were made in land and buildings and by higher purchasing costs of machinery. The percentage of total capital invested in livestock during the same period remained relatively the same at all stations except St. Paul where there was an increase in livestock population. The ratio of total capital invested in land and buildings, livestock, and machinery and equipment between zones is fairly constant.

Both the average investments and revenues per acre of cropland are considerably less in Zone 2 than in Zones 3 and 4. This is to be expected because of the larger acreages of the farms in Zone 2.

POULTRY

H. T. Fredeen

Since 1946 the entire facilities for poultry research at the Lacombe Station have been devoted to a study of the inheritance of fertility and hatchability. Two breeds of poultry, White Wyandotte and New Hampshire, have been maintained for this purpose. The former breed produces an excellent market bird and performs reasonably well in the laying house, but low fertility, which appears to be characteristic of this breed, has made it unpopular among poultry breeders. The New Hampshire, in contrast, has excellent reproductive performance. It also performs well in the laying house, and is a good market bird.

Reciprocal crosses were made between these two breeds to obtain information on the inheritance of reproductive performance. The results of three years of this research are summarized in Table 27.

TABLE 27.—REPRODUCTIVE PERFORMANCE OF PURE WHITE WYANDOTTES AND NEW HAMPSHIRES AND THEIR RECIPROCAL CROSSES

Mating	Pure White Wyandotte	White Wyandotte male New Hampshire female	New Hampshire male White Wyandotte female	Pure New Hampshire
Total eggs set	2,032	2,353	2,112	2,366
Per cent fertility	71·5	81·5	83·5	88·2
Per cent hatchability of fertile eggs	61·7	75·6	72·5	71·4

All matings were made as pen matings with 10 females to each male. Since there was a definite possibility that low fertility, as measured by this method, could result from failure of the White Wyandotte male to mate with

sufficient frequency, a second series of experiments was conducted in which all matings were made by artificial insemination. Each female was inseminated once with a standard quantity of semen, and the fertilizing ability of the semen was measured by the number of days that elapsed between this insemination and the time that the hen laid her last fertile egg. The results obtained from this experiment, presented in Table 28, show that the low fertility of the White Wyandotte results, in part at least, from a low viability of the semen.

TABLE 28.—AVERAGE DURATION OF FERTILITY (DAYS) FOLLOWING ARTIFICIAL INSEMINATION IN THE WHITE WYANDOTTE, NEW HAMPSHIRE, AND THEIR RECIPROCAL CROSSES

—	White Wyandotte	White Wyandotte × New Hampshire	New Hampshire × White Wyandotte	New Hampshire
Duration of fertility (days)	7·3	7·0	9·0	10·2

The Effect of Protamone on Growth and Reproduction

Experimental work at Lacombe has indicated that the feeding of small amounts of protamone in the ration may influence growth rate and gonad development of the White Wyandotte. In the summer of 1951 White Wyandotte and New Hampshire chicks were divided into two equal groups at hatching with one group receiving the normal growing ration while the other was fed the same ration plus 10 grams of protamone per 100 pounds of feed. The results (Table 29) showed that, while protamone apparently depressed the growth rate of both breeds, gonad size in the White Wynadotte was increased by approximately 50 per cent. Further study during 1952 substantiated these findings.

In another phase of this study it was found that protamone in the ration of breeding males was effective in increasing the viability of semen from the White Wyandotte, but had a slight depressing effect in the New Hampshire. These studies are being continued.

TABLE 29.—AVERAGE LIVE WEIGHT AT 6 MONTHS OF AGE AND AVERAGE TESTES WEIGHT OF WHITE WYANDOTTE AND NEW HAMPSHIRE COCKERELS ON CONTROL AND PROTAMONE SUPPLEMENTED RATIONS

—	Average live weight (grams)	Average testes weight (grams)
White Wyandotte control	2,550·9	3·15
White Wyandotte protamone	2,436·8	4·47
New Hampshire control	2,580·6	8·14
New Hampshire protamone	2,502·3	8·35

MAJOR FIELDS OF INVESTIGATION

Animal Husbandry—

Methods of Performance Testing with Beef Cattle.
Selection and Breeding Methods for the Improvement of the Canadian Yorkshire.
Development and Testing of New Breeds of Swine from Hybrid Foundations.
Carcass Studies and Methods for Evaluating Bacon Quality.

Cereals—

Variety Testing of Spring Wheats, Oats, Barley, Flax, and Fall Rye.
Breeding New Varieties of Spring Wheat, Oats, and Barley.
Production and Maintenance of Foundation, Elite and Other Seed Stocks of Certain Varieties of Spring Wheat, Oats, and Barley.
Physiological Studies on Spring Wheat (dates of seeding).

Field Husbandry—

Meteorological Records.
Rotation Experiments, Three, Six, Seven, and Eight Year.
Soil Fertility Studies on Wheat, Oats, Barley, Hay and Pasture.
Cultural Methods (tillage, green manure, cover crops, etc.).
Herbicide Studies (effect on weeds and cultivated crops).
Tractor Operating Costs.

Forage Crops—

Plant Breeding (Red Clover).
Introduction of New Species.
Variety Testing of Alfalfa, Brome Grass, Corn, Red clover, Sweet clover, Timothy, and White clover.
Perennial and Biennial Grasses and Legumes for Pasture and Hay.
Annual Grasses, Legumes, and other crops for Pasture and Hay.
Seed Production Studies with Grasses and Legumes.
Physiological Studies (dates of seeding grasses and legumes, time of cutting alfalfa for hay).
Taxonomy (herbarium).

Horticulture—

Plant Breeding (tomatoes, potatoes).
Herbicide Studies in Vegetable Crops.
Seed Production of the Canus Potato.
Variety Testing of Vegetables, Bush Fruits, Tree Fruits, Ornamental Trees, Shrubs, Evergreens, Hedges, Perennial, and Annual Flowers.

Illustration Stations—

Rotation Experiments, Two, Three, Five, Six and Seven Year.
Soil Fertility Studies on Cereal and Forage Crops.
Cultural Studies (weed control, strip farming, management of solonetzic soils).
Meteorological Records (temperature and precipitation).

Introduction and Testing of Varieties of Wheat, Oats, Barley, and Flax.
Perennial and Biennial Grasses and Legumes for Hay, Pasture, and Seed.
Horticultural Studies (garden, orchard, and home beautification).
Livestock Pathological Records and Distribution of Cattle, Sheep, Swine, and Poultry for Breeding Purposes.
Farm Management Studies (yield and cost of production, sources of revenue, land utilization, and capital investments).

Poultry

Factors Affecting Reproduction Performance in Poultry.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1954.