CANADA
DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS SERVICE

DOMINION EXPERIMENTAL FARM

AGASSIZ

BRITISH COLUMBIA

W. H. HICKS, B.S.A., SUPERINTENDENT

PROGRESS REPORT

1936-1947

PRESIDENT KLINCK, UNIVERSITY OF B.C.,
UNVEILING BRONZE PLAQUE JUNE 15, 1938,
TO COMMEMORATE FIFTIETH ANNIVERSARY
OF AGASSIZ DOMINION EXPERIMENTAL FARM

Published by authority of the Rt. Hon. James G. Gardiner, Minister of Agriculture,
Ottawa, Canada.

TABLE OF CONTENTS

PERSONNEL

Dominion Experimental Farm

Agassiz, B.C.

W. H. HICKS, B.S.A.,
Superintendent.

M. F. CLARKE, M.S.A.,
Senior Assistant. Agronomy.

T. H. ANSTEY, M.S.A.,
Assistant. Horticulture.

D. K. TAYLOR, M.S.A.,
Assistant. Cereals.

R. M. HALL, B.S.A.,
Supervisor of Illustration Stations.

B. A. DICKSON, M.S.A.,
Soil Specialist.

These officers, besides being responsible for the work done in their respective Divisions, have written the chapters that go to make up this Report.

K. MacBean, B.S.A., was promoted to Smithers, B.C., in August, 1937, as Officer-in-Charge.

J. J. Woods, M.S.A., was promoted to Saanichton, B.C., as Superintendent, in April, 1941.

INTRODUCTION

The Agassiz Dominion Experimental Farm is situated in the lower Fraser Valley of British Columbia, 70 miles east of Vancouver. It is one of the original five Canadian experimental farms, being authorized by Parliament in 1886 and established in 1888. During the last 36 years livestock and general farming problems have been emphasized, but prior to 1911 horticulture was the main line of work. This experimental farm, with the 13 illustration stations supervised from it, serves the agricultural community of the southwestern mainland region of the province. A high producing herd of Holstein cattle and a good flock of Barred Plymouth Rock hens are kept at Agassiz, from which breeding individuals have been widely distributed to improve the quality of stock throughout the farming areas of British Columbia.

For several years the agricultural students of the University of British Columbia have held an annual Field Day on this Farm, usually in March. This has developed into a rather large affair with up to 200 students now making the journey by train and participating in a varied program rather than stock judging only. Improved road conditions have facilitated transportation problems to this area and consequently more visitors, not only in organized groups but also in private parties, call. The taking over of the Harrison Hot Springs Hotel by the military forces in 1943 lessened the number of visitors temporarily, but this situation has returned to normal.

Through the years Junior Farmer groups, members of Boards of Trade, American students, farmers' organizations, livestock Breed associations, beekeepers, poultry producers, and many others have made use of facilities at this Farm. A very pleasing event took place June 15, 1938, at the time of the B.C. Horse Breeders' Association Field Day, when Dr. L. S. Klinck, then President of the University of British Columbia, unveiled a bronze plaque at the main gate commemorating fifty years of service for the Agassiz Farm.

Apart from keeping the present buildings in reasonable repair, little building was carried on. In 1938 a greenhouse was erected for the Horticultural Division. The following year, a thirty-six foot extension was added to the horse barn. In 1944, a fifty-four foot extension was added to the west end of the agronomy building, and cereal, soils and forage laboratories were later completed in the building. The old dairy was removed and replaced by a modern milk house, and a new cottage was erected in 1947. A very useful addition of sixty-eight acres was secured in December, 1941, when the L. A. Agassiz property, adjoining on the east, was purchased. May 22, 1946, marked the removal of an ancient landmark when the old water tower collapsed. This was later replaced by a modern electric motor and pressure tank. Intermittently from 1940 for five years some logging was done on the northeast area of the Farm, first for birch and later for other logs.

T. H. Anstey, M.S.A., commenced work March 1, 1946, in charge of the Horticultural Department. On June 1, 1946, D. K. Taylor, M.S.A., was given charge of the cereal investigational work. In July, 1946, B. A. Dickson, M.S.A., was employed by the Field Husbandry Division as a soil specialist and started work in the Fraser Valley with headquarters at Agassiz.

Staff changes did not all consist of additions. On October 23, 1946, G. C. Harper, Herdsman, was superannuated due to ill health. He had been employed in charge of the dairy herd for over 26 years.

Similarly, A. Martin, in charge of the poultry work since June, 1923, was superannuated on October 22, 1946, due to age.

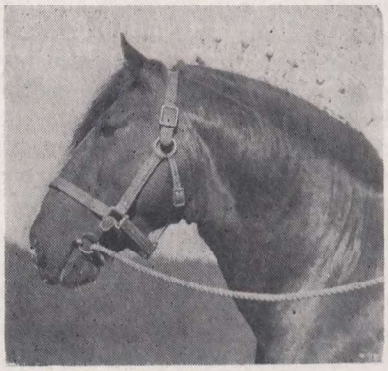


TABLE 1.—SUMMARY OF METEOROLOGICAL RECORDS

Dominion Experimental Farm, Agassiz, B.C.
1892—1947 (56 years)

Month	Temperature			Precipitation			Sunshine		
	Highest in 56 years	Lowest in 56 years	Mean 34 years	Highest in 56 years	Lowest in 56 years	Average 56 years	Highest in 56 years	Lowest in 56 years	Average 56 years
	°F.	°F.	°F.	in.	in.	in.	hr.	hr.	hr.
January	62	−13	35·4	20·03	1·67	7·17	103·0	11·4	47·4
February	68	−12	38·6	14·92	0·82	5·79	143·6	23·0	73·2
March	77	10	43·7	13·78	1·98	5·66	142·4	51·4	97·6
April	90	26	50·2	9·95	1·38	4·62	215·1	34·0	123·3
May	93	28	55·8	8·46	0·39	4·20	229·1	90·4	159·6
June	97	35	60·0	12·06	0·35	3·80	256·0	80·0	157·0
July	100	38	64·2	5·09	0·02	1·96	303·2	106·3	219·6
August	103	35	64·5	7·94	0·00	2·08	298·2	95·4	197·3
September	96	32	59·3	12·42	0·26	4·19	208·8	60·3	134·9
October	83	20	51·1	14·85	0·77	6·47	165·2	50·5	97·2
November	69	9	42·7	15·61	2·09	8·06	93·8	12·9	48·2
December	66	−3	37·3	16·75	0·53	7·92	86·1	11·4	39·0
Annual	.....	.....	50·2	.....	.....	61·92	.....	.....	1394·3

TABLE 2.—ANNUAL PRECIPITATION

Dominion Experimental Farm, Agassiz, B.C.
1892—1947 (56 years)

(inches)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1892...	6·82	3·37	6·01	4·04	5·73	3·16	3·27	2·78	6·94	5·99	15·39	4·46	67·96
1893...	5·04	7·31	6·84	8·09	6·57	5·44	1·55	1·83	4·98	6·24	10·76	7·67	71·92
1894...	6·63	7·71	6·61	8·28	4·89	3·70	1·28	0·24	8·26	10·73	10·27	8·34	76·94
1895...	7·45	7·72	3·69	3·03	6·39	2·45	0·97	0·70	6·67	0·77	5·85	10·74	56·68
1896...	8·87	11·65	4·18	5·29	4·62	2·86	0·03	0·38	2·19	6·34	9·87	14·70	70·98
1897...	6·19	2·21	7·91	3·12	4·42	12·06	4·58	1·13	6·50	6·23	5·45	3·33	63·13
1898...	5·06	7·25	2·35	3·50	2·62	4·19	3·41	0·81	3·93	7·21	4·89	4·39	49·61
1899...	6·70	7·86	4·81	3·27	6·62	2·42	1·76	4·17	3·07	5·86	11·44	10·15	68·28
1900...	13·40	3·31	7·79	3·40	7·60	10·76	1·21	5·65	2·77	5·13	3·39	8·30	73·21
1901...	7·60	4·49	3·16	4·80	7·80	1·25	.....	1·59	4·15	4·15	10·57	4·76	53·36
1902...	3·08	6·66	5·55	3·05	4·17	2·43	2·58	3·30	2·79	3·55	9·82	6·74	52·72
1903...	6·59	2·04	4·84	5·30	3·58	6·00	2·30	5·08	7·30	2·71	3·31	4·41	56·47
1904...	6·70	6·06	5·62	3·45	2·34	3·42	3·45	2·30	2·37	3·20	6·43	9·32	54·67
1905...	5·76	4·38	5·60	4·86	8·46	3·20	2·40	2·80	8·40	8·42	2·51	4·26	61·05
1906...	6·35	4·68	2·04	2·04	7·40	6·40	2·36	1·04	6·32	9·18	10·50	6·59	64·90
1907...	4·31	6·30	7·46	7·40	2·30	4·36	1·08	6·40	3·30	1·24	8·42	5·50	56·47
1908...	3·10	5·72	7·64	4·60	2·66	5·28	2·60	1·24	1·90	3·93	7·45	2·52	48·68
1909...	4·43	5·38	2·30	4·22	2·32	2·36	3·49	3·18	6·35	5·49	20·88	2·10	61·35
1910...	4·58	5·41	5·36	3·02	4·93	5·51	2·16	3·90	3·47	7·10	7·61	6·70	59·76
1911...	4·98	3·56	2·76	2·62	6·75	1·65	1·12	2·97	4·91	3·57	10·50	7·69	53·08
1912...	4·31	10·66	2·18	4·26	3·99	5·95	5·09	7·84	2·50	6·99	13·82	10·09	77·68
1913...	20·03	5·12	6·84	4·72	6·08	7·33	3·71	2·71	7·68	8·84	12·29	3·36	88·77
1914...	13·33	3·43	3·12	2·94	3·55	5·18	0·15	0·60	6·29	7·53	14·72	0·53	61·37
1915...	7·17	5·67	2·45	5·37	5·20	2·36	1·62	0·07	1·26	11·26	7·75	15·39	65·57
1916...	2·89	4·93	13·78	6·30	4·98	2·60	4·67	0·98	1·68	1·76	7·83	6·72	59·20
1917...	10·10	4·92	5·60	9·84	2·22	4·30	0·59	1·10	3·44	6·84	8·71	14·79	72·45
1918...	9·76	7·02	10·66	1·38	4·64	1·74	2·28	7·94	0·26	14·85	9·06	13·39	82·98
1919...	11·01	6·98	5·07	6·26	4·71	2·68	0·66	0·45	6·70	5·90	15·61	9·63	75·66
1920...	15·08	2·04	6·44	9·95	4·56	8·39	1·21	1·67	12·42	11·35	4·80	8·46	86·37
1921...	9·83	9·82	5·21	5·58	3·58	5·20	2·18	1·81	7·67	12·79	11·34	9·52	84·53
1922...	5·06	4·01	6·98	4·80	4·74	1·23	0·02	3·62	5·07	10·41	2·23	7·59	55·76
1923...	12·40	3·80	3·57	2·76	7·68	2·89	1·87	0·29	4·68	3·63	7·42	12·54	63·53
1924...	9·69	14·92	2·13	3·93	1·03	2·20	2·48	1·24	4·63	9·23	9·58	13·17	74·23
1925...	14·15	9·97	8·17	3·61	3·23	0·79	0·66	2·22	0·43	3·31	5·94	9·00	61·49
1926...	5·98	5·24	1·98	3·54	6·62	0·92	0·21	3·13	2·90	6·54	4·99	9·52	51·57
1927...	5·08	3·81	5·40	3·25	3·05	0·61	1·10	3·32	6·29	9·33	6·98	6·07	54·27
1928...	4·45	0·82	5·56	2·81	2·03	1·98	1·41	0·86	2·63	9·12	4·90	4·49	41·06
1929...	1·67	1·46	4·25	2·12	4·29	3·03	0·51	0·95	1·47	4·03	2·35	4·36	30·49
1930...	3·61	5·90	2·26	2·26	3·54	2·69	0·12	0·01	4·33	5·85	4·82	2·93	38·32
1931...	5·07	4·03	5·96	5·24	3·44	4·48	0·64	0·13	4·80	2·05	8·40	7·70	51·84
1932...	9·42	14·69	11·19	4·61	1·65	3·35	4·30	1·00	5·27	8·20	14·74	11·71	90·63
1933...	12·18	7·18	6·68	1·80	3·93	2·89	2·50	0·78	9·28	12·12	5·89	15·75	81·98
1934...	12·74	3·16	8·51	2·14	7·59	1·13	2·48	1·52	8·28	6·36	7·90	10·10	67·00
1935...	19·49	3·37	5·39	2·32	0·80	4·96	2·29	1·42	3·37	7·46	4·66	4·12	60·15
1936...	9·50	7·05	8·85	6·09	3·67	3·92	2·40	2·15	2·69	2·49	2·09	12·10	63·00
1937...	2·47	7·87	3·71	8·05	3·67	5·15	0·78	3·43	0·87	7·36	11·20	9·46	64·02
1938...	4·26	1·44	4·53	5·81	2·37	0·35	1·04	1·11	1·34	6·09	7·08	11·90	47·32
1939...	10·26	6·29	3·97	3·99	3·43	4·37	3·22	1·14	1·52	8·43	8·41	12·57	67·60
1940...	3·57	8·06	7·75	4·41	3·60	0·92	2·68	2·33	1·85	7·70	4·27	7·01	54·15
1941...	5·43	3·41	2·65	3·31	5·72	2·72	0·53	3·15	10·01	8·17	7·38	9·24	61·72
1942...	2·30	1·98	5·66	4·34	1·96	4·32	2·48	0·38	1·21	4·51	8·17	10·14	47·45
1943...	5·65	6·58	7·88	5·49	3·79	2·82	3·23	2·01	2·79	7·49	2·65	5·64	56·02
1944...	6·69	3·76	4·90	3·74	4·66	2·42	2·06	2·31	3·23	5·27	6·74	3·45	49·23
1945...	9·10	5·39	8·81	4·98	2·74	1·71	1·05	0·85	5·89	11·50	9·49	6·50	68·01
1946...	10·02	7·51	8·30	5·51	0·39	3·98	1·50	1·30	2·23	5·75	4·56	10·58	61·63
1947...	12·56	5·79	4·67	4·15	1·05	4·39	1·83	0·70	2·34	14·05	5·50	13·35	70·38
Aver. 56 yrs. 1892-1947.	7·17	5·79	5·66	4·62	4·20	3·80	1·96	2·08	4·19	6·47	8·06	7·92	62·60

TABLE 3.—THE OCCURRENCE OF FROST AND FROST-FREE PERIODS

Dominion Experimental Farm, Agassiz, B.C.

1914–1947
with averages for 1914–1947, 34 years

(Freezing Temperature 32 degrees F., or lower)

Year	Spring Frosts	Fall Frosts	Frost-Free Periods
	Date of Last Frost in Spring	Date of First Frost in Fall	Days Frost Free
1914	April 29	November 13	198
1915	April 29	November 6	191
1916	March 14	October 5	204
1917	April 22	October 17	177
1918	May 24	November 6	165
1919	May 3	September 28	147
1920	May 20	October 21	153
1921	April 4	November 17	226
1922	May 8	November 3	178
1923	May 1	November 9	191
1924	April 20	October 11	173
1925	March 23	October 15	205
1926	March 7	November 16	253
1927	April 20	November 10	203
1928	April 6	November 18	225
1929	April 9	November 4	208
1930	March 20	October 13	206
1931	March 11	November 15	248
1932	March 7	November 24	261
1933	April 8	October 21	195
1934	April 3	December 1	241
1935	April 2	October 26	207
1936	April 5	October 22	199
1937	March 28	November 13	229
1938	March 31	November 5	218
1939	April 4	December 24	263
1940	February 27	November 9	255
1941	February 25	November 20	267
1942	April 2	November 20	231
1943	April 24	October 28	184
1944	April 18	November 13	208
1945	April 13	November 6	206
1946	April 5	October 11	198
1947	March 2	November 19	261
Average 34 years	April 7	November 2	211·6 days

Date of the latest spring frost on record, May 24, 1918.
Date of the earliest fall frost on record, September 28, 1919.
Shortest frost-free period on record 147 days (1919).
Longest frost-free period on record, 267 (1941).
Meteorological records taken in co-operation with the Meteorological Division of the Department of Transport.

SEASONAL

1936-1947

The year 1936 opened wet and mild with some growth showing. February was cold with a minimum of —3 degrees, the lowest for this month since 1893. The spring was late, with March roads very bad. On June 3, the Fraser River started to rise and continued until it was the highest since the all-time high of 1894. Much of the low land between the town and the river was flooded. The autumn provided beautiful dry weather which continued until Christmas and resulted in a shortage of domestic water at that time.

January, 1937, was bright, windy and cold, with snow up to February 20. The spring was late, oat seeding being delayed until May 1. Pastures were good and one of the heaviest hay crops on record was stored in excellent condition during the dry season. The corn crop was very heavy and lodged badly, hence had to be harvested by hand. Christmas saw one of the worst snow storms on record, with roads blocked for several days.

The dry year of 1938, with 15·98 inches less precipitation than the 46-year average, was drier than usual in every month except April and December. June recorded the least rain since 1892. All crops were early in planting and harvesting. A maximum of 99 degrees recorded July 20 was the highest in 40 years. Christmas was delightful but snow the following day blocked roads for a short period.

The year 1939 was wet with 67·6 inches recorded. Some hay was destroyed in the field by excessive rainfall.

The following year was the reverse, precipitation being 8·63 inches less than the average. The spring was very early with oat seeding March 25 and harvesting completed in four months, and threshing August 7. Seldom before had such a heavy, excellent hay crop been stored as was harvested during a dry period, June 13-July 15.

Much work was done on the land in February of 1941. A maximum of 75 degrees was recorded in March and at the close of the month rhubarb and asparagus were marketable. By April 25 a maximum of 81 degrees was registered and with July, the driest for eleven years, heat was intense with a maximum from July 13-18 recorded each day above 90 degrees, with 100 degrees on July 16. This was the highest temperature since 1898. Oat yields, like those of other crops, were light with an early hay crop stored in excellent condition. September, with 10·01 inches of precipitation, was the wettest ever recorded here except in 1920.

The year 1942 was very dry, with 15 inches less precipitation than the fifty-year average. A maximum of 96 degrees in June was the highest for this month for seventeen years. Strawberries were a poor crop but rain at just the correct time resulted in an excellent raspberry crop.

Except for January, 1909 when -5 degrees were recorded, January 16, 1943, with 4 degrees below zero, was the lowest on record. The cold spell from January 16-24 never saw the temperature above 18 degrees. The spring was very late with feed scarce. The corn crop lodged badly just previous to harvesting. The year closed with beautiful dry weather and a scarce domestic water supply.

The next year, 1944, was a normal one, except somewhat drier. December recorded the least precipitation for fourteen years and again streams, sloughs and wells were very low in water.

In 1945, precipitation was heavy when 68·01 inches were recorded, beating the 53-year average by 6·08 inches. The increased rain was fairly well distributed. Spring was late with oat seeding delayed until May 1. The season was short and harvesting and threshing were done under good conditions. The winter started early with a minimum of 19 degrees recorded on November 8, the lowest November temperature since 1921.

The year, 1946, opened with four wet months and a late spring. The balance of the year was comparatively dry with May having less than a half-inch and being the driest May since 1891. Hay harvested during May was of excellent quality. Hay not cut then had to be left, due to weather conditions, until it was over-ripe. Oats and straw were of excellent quality. The corn crop was light. Winter started November 17, with snow, winds and low temperatures. Schools had to be closed, the Agassiz-Rosedale ferry was cancelled, roads were icy, and milk had to be shipped via rail for a few days.

The last year covered by this report, 1947, was very wet with a total precipitation of 70·36 inches, 39·96 inches of which fell in January, October and December. The spring was early with 75 degrees recorded on March 15, the earliest ever recorded in any year. All crops were good, particularly pastures, and milk production had a high average.

ANIMAL HUSBANDRY

Dairy Cattle

The starting point of the Agassiz Experimental Farm Holstein herd dates back to 1912, when a bull and a carload of grade females were imported from Ontario. The same year, three purebred foundation cows were purchased from J. M. Steeves, of Steveston, B.C. Three years later, two heifer calves bred by Frank Bishop and two 2-year-old heifers from Ontario were added. These seven foundation cows represented the only female blood lines incorporated into the Agassiz herd. Later two of these families were discarded until now the entire herd is descended from five foundation cows. The original grade herd was used for experimental work while the purebred herd increased in size. In 1921 the last of the grades were disposed of, the herd being retained as a purebred herd ever since. Since 1936, seven bulls have been used extensively in the herd, one from Hay's Limited and two each from Colony Farm and Ottawa Experimental Farm, and two also of home breeding. During this same period 49 bulls were sold to dairy farmers, all but six remaining in British Columbia.

The policy followed up to 1940 was to test some of the best cows and most of the 2-year-old heifers in R.O.P. Since then, all cows as they freshen are entered in R.O.P., and up to October, 1942, were milked three times per day. In 1945 some of the best producers were again put on 3-times-per-day milking. During the past dozen years, twelve 20,000-pound milk records were completed by members of the herd, bringing the all-time total up to twenty-six. The

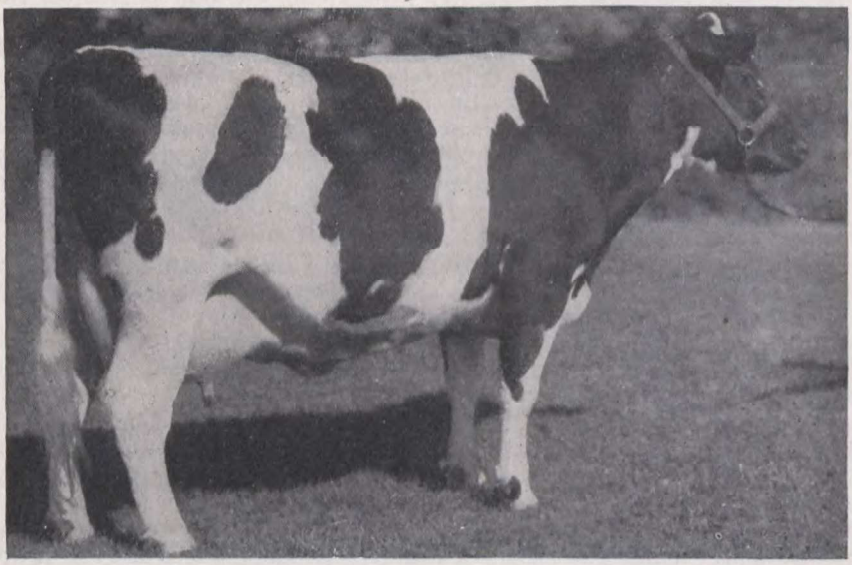


Fig. 1.—Agassiz DeKol Sylvia Romeo—454871. Reserve All-Canadian Aged Cow—1946. Production 20,000 pounds of milk, 726 pounds of fat.

best of these was completed by Agassiz Mercena Hartog Lulu—417866—, in 1947. As a seven-year-old she produced 27,005 pounds of milk and 978 of fat. This gives her the honour of the highest 3X record made in the herd and replaces Agassiz Sylvia DeKol Rajah—240791—with 25,052 pounds of milk and 900 of fat.

More important than good yearly records are those of Lifetime Production. Six cows in the herd have completed R.O.P. Lifetime records over 100,000 pounds of milk, as shown in Table 4.

TABLE 4.—COWS WITH LIFETIME PRODUCTION OVER 100,000 LB.

Name of Cow	Lb. Milk	Lb. Fat
Agassiz Lulu Fobes Tsussie	146,549	5,146
Agassiz DeKol Sylvia Perfection	121,421	4,017
Agassiz Mercena Hartog	106,488	4,000
Agassiz Sylvia Perfection	104,423	3,711
Agassiz Mercena Wayne	103,691	3,390
Agassiz Lulu Canary Fobes	103,547	3,859

The average production of all cows finishing lactations from 1936-46, whether 305-or 365-day tests and including all ages, was 12,742 pounds of milk and 451 pounds of fat. The feed cost of milk during the summer months was 74 cents per 100 lb. and for the winter months $1.15.

Except for showing six Holsteins at the Chilliwack Class B Fair in 1944 and ten head in 1946, no Exhibition work with Holsteins was attempted during the years covered by this report. At the latter show Agassiz DeKol Sylvia Romeo won the mature milking cow class and, as this was an accredited Holstein show, Sylvia was eligible to compete for All-Canadian honours. Accordingly, her photograph was sent to the *Canadian Holstein-Friesian Journal* and she succeeded in winning the Reserve All-Canadian Honours for the year. She has since completed two 20,000-pound records.

During the regular annual test in June, 1931, one cow reacted to the T.B. test and the herd lost the accredited standing it had held the three preceding years. The same thing was repeated in May, 1933, but from then up to the time covered by this report, with one exception, the herd had retained its accreditation. The exception was in March, 1945, when one cow was suspicious and another positive to the T.B. test. These animals were disposed of and the herd on re-tests in May and November was declared clean.

Contagious Abortion

In 1917 a cow in the Agassiz herd aborted, the next year there were two, and the following year three. Then occurred an epidemic of abortion which reached its height in 1921 when 43 per cent of the freshening cows gave birth to premature calves. From then on, with slight exceptions, there was a gradual decrease until 1929, which was the first year in twelve without the loss of a calf. The following year was also abortion free. Three abortions occurred in 1931, one in 1932, while the next couple of years were free. In 1935, five cows out of thirty freshening aborted, while in 1936—the first year covered by this report—one out of twenty-eight did likewise.

Figure 2 shows the trend of abortions in the herd for twelve years, as indicated by the solid line. Starting with 3 per cent of the freshening cows in 1936, the increase went to 9 per cent the following year, and 30 per cent in 1938. Then followed a very sharp drop, 16 per cent in 1939, and only one cow in each of the next two years. Since then there have been no abortions.

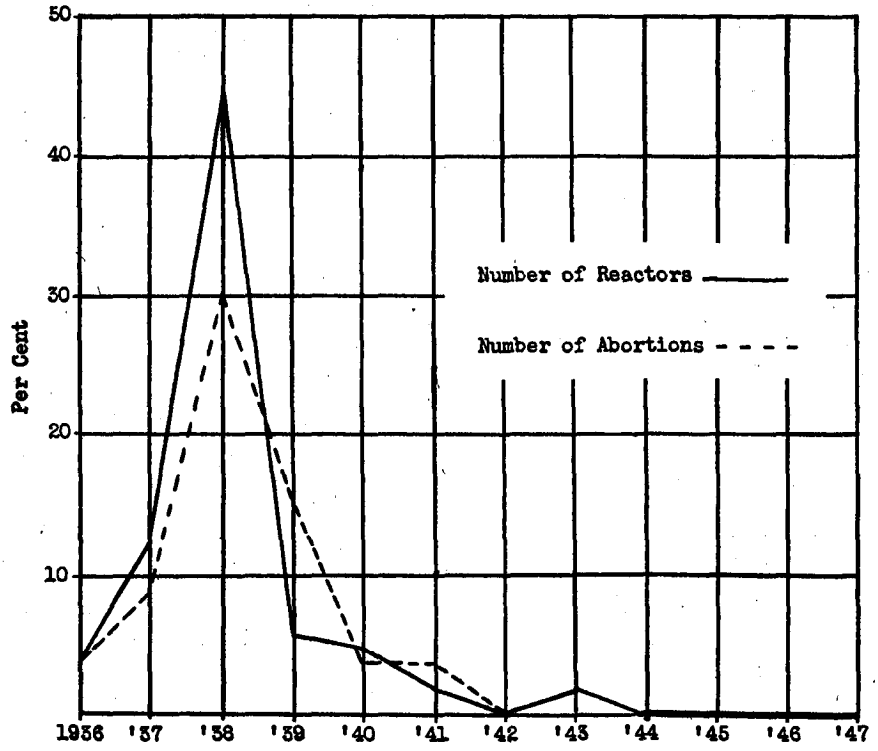


Fig. 2.—Blood test for abortion.

Blood Test for Bang's Disease

Although some blood testing was done in 1920, 1922 and 1924, it was not until 1927 that regular testing on a definite planned scale was commenced. During that year, with five tests of the herd made, 30 per cent were reactors. This number very gradually decreased until in 1932 all animals were negative and this continued until December, 1936. The following year reactors jumped to 12 per cent and the next year up to 45 per cent, with a very sharp decline again in 1939 to 6 per cent and a gradual drop to zero in 1942. Except for one cow showing positive in 1943, the blood test and abortions were nil for the five years following 1942.

The high increase in abortions and blood test reactors in 1938 is directly traceable to the use of a contaminated pasture. During the flood of 1936 a neighbour used a pasture field adjoining this Farm and this provided the contact which caused the trouble.

Calfhood Vaccination Results

Since April, 1942, all female calves born and retained in the herd until of suitable age have been vaccinated with strain 19. At the present time, only ten females over seven years of age are in the herd that have not been treated, besides a group of newly-born calves.

A regular blood test program has been carried out in conjunction with the vaccination. The entire herd was tested six times a year up to and including 1944, but since then four times annually has been deemed sufficient. All calves were negative to the blood test previous to vaccination and all were positive

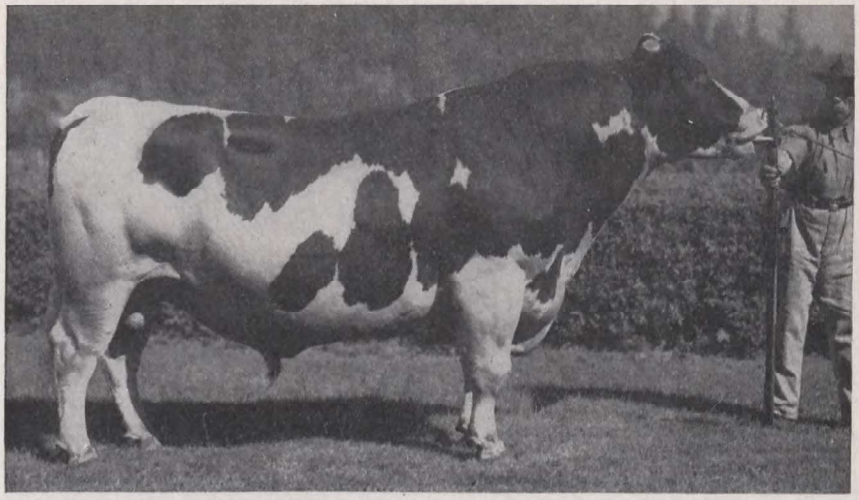


Fig. 3.—Agassiz Canary Lulu Perfection—116261. This is the sire of several good cows in the Agassiz herd. The best daughter to date is Agassiz Mercena Hartog Lulu—417866. (Milk 27,005 pounds, fat 978 pounds).

afterward, although two had to be treated a second time. All were blood-tested monthly afterward until they reacted negatively. Only two heifers have been bred while positive, but on the other hand none had to be held over past the normal breeding age.

The calves were four to eight months of age when vaccinated, with an average of six months. Some became negative four months after treatment, with the average just six months. Two heifers, born December, 1945, and January, 1946, were vaccinated in September, 1946, and were bred October and November, 1947, respectively. These heifers are safely in calf and still show "suspicious" to the blood test, fifteen months after vaccination. This is the only break in the expected course of events. The future of these two animals will be watched with interest.

During the entire period since vaccination there has not been a known abortion in the herd nor, with only one exception, has there been a suspicious or positive reaction to the blood test—vaccinated calves, of course, excepted. This cow, No. 416, was positive in December, 1943, and on re-testing gave the same result so was slaughtered. As this cow stood facing the door where visitors passed by, the theory is that outside contact was the cause.

Some vaccinated heifers have been sold from the herd since 1942, but of those retained all have calved normally and all of breeding age are in calf at the present time.

Horses

The Clydesdale horses maintained on this Farm are a credit to the breed. All are purebred and all bred on the Farm except the stallion. Four foundation mares were purchased in Saskatchewan, two in 1919 and the other pair the following year. These mares were never sold and lived to an average of 23 years of age.

In 1936 under the Federal Premium Mare Policy the stallion Radiance—25908—was stationed here. That year he bred 47 mares. Due to a cancerous growth in one eye this horse had to be destroyed after the breeding season the

Fig. 4.—Ribbons and trophies won by the Clydesdale horses at the Golden Gate World Fair, San Francisco, 1939.

next year. In 1938 no stallion was kept but in April, 1939, Dunmore Fine Art—28874—was imported and stood here for service for eight seasons. During this period he bred each year 27, 37, 31, 38, 24, 14, 9 and 7 mares. These figures show clearly how interest in horse breeding has definitely subsided in this area.

During the period covered by this report, 1936-1947, 54 foals were born and 43 of them raised. During this same time, 9 horses were supplied to other B.C. Stations and 36 were sold to regular customers.

Accurate feed and other costs were recorded on horse maintenance. The average feed cost on eight of the horses doing most of the work was $101.09 for an average of 1,319 year-hours work performed, or 7·66 cents per hour. When labour, depreciation, shelter, harness and shoeing was added, the total cost of horse labour per hour was 17.34 cents. These costs gradually increased from year to year. The horses were kept in good working condition, were well shod and harnessed, and worked nine hours per day when work was available and weather permitted. Very seldom was a horse of any kind kept in the barn all day. Any animal not working was turned out to pasture or exercise, and with care being used in feeding very little sickness occurred.

Horse labour was used almost entirely on the Farm, except on the disk, cultivator, binder and of late years the manure spreader. Only one tractor was in use, chiefly for belt work.

For publicity purposes during the past twelve years, Clydesdale horses were exhibited at leading Exhibitions, except in 1940, 1941 and 1945. In every instance but one they were able to win at least a reserve junior championship and were able to win fourteen Grand Championships. At the Vancouver Winter Fair in 1939 both Grand Championships were won. This feat was duplicated at the Golden Gate World Fair at San Francisco in 1939, again at Chilliwack in 1942 and at the Pacific National Exhibition in 1947. Except for the Golden Gate show the highlight of Clydesdale showing was at the Canadian Royal in 1947. With six horses exhibited, all were in the money whenever shown. They won:

1 first and Reserve Junior Championship
3 seconds
3 thirds
3 fourths.

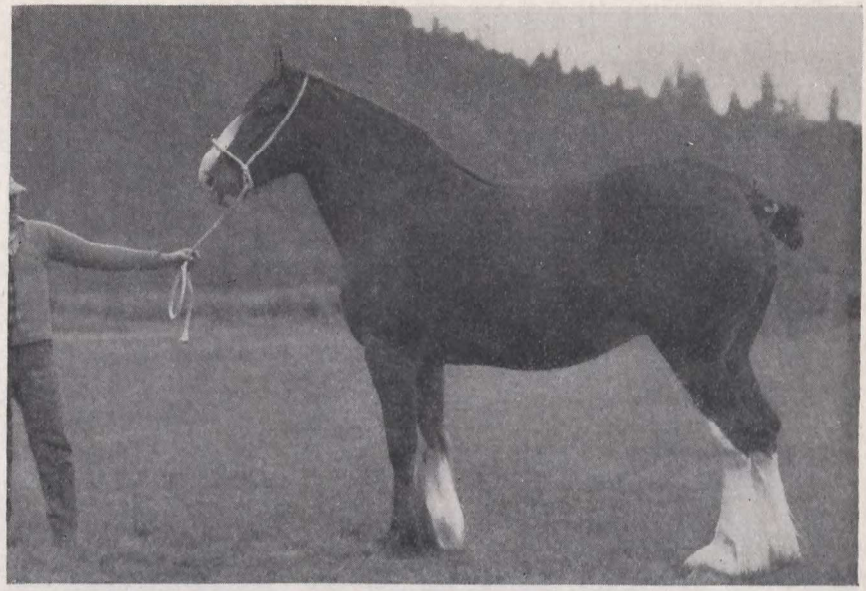


Fig. 5.—Phyllis, 62465: Sire, Dunmore Fine Art, 28874. Dam, Queen O' the May, 56448. Grand Champion Clydesdale mare at Chilliwack in 1944 and at Pacific National Exhibition, Vancouver, in 1947.

Fig. 6.—First prize group of five draught horses, any age, any breed, any sex, owned by Exhibitor at the Pacific National Exhibition, Vancouver, B.C., 1947. Each animal won first in individual class. Animal nearest camera; Dick, won strong Agricultural Class on halter; Miss Dignity, won Yearling Class and Reserve Grand Champion; Lilli Marlene, won 3 year old Class; Miss Modesty, won Brood Mare Class and was Grand Champion at World Fair, San Francisco in 1939; Phyllis, won Yeld Mare and was Grand Champion. This Group except Miss Modesty was also shown at the Canadian Royal Winter Fair in November, 1947, at Toronto, Ont. The gelding was third, Miss Dignity won first and Reserve Junior Champion, Lilli was fourth and Phyllis third, in a strong class of sixteen yeld mares.

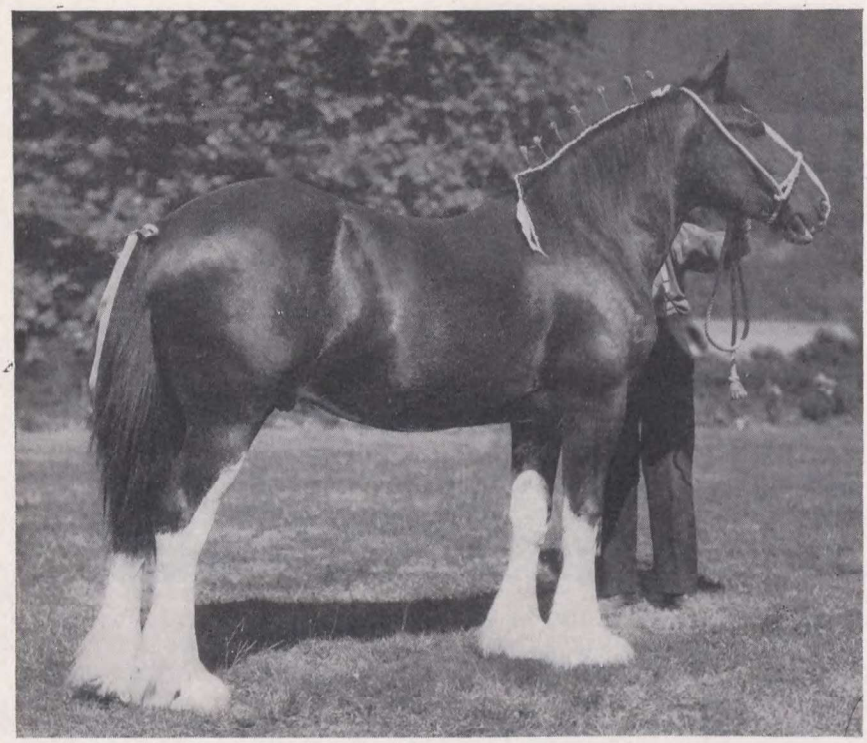


Fig. 7.—Blue Bomber. Grand Champion Clydesdale Stallion at Chilliwack, B.C., 1942, as a two-year-old.

The best wins besides the Reserve Junior Championship were: second in the open get-of-sire, being defeated only by a group of three imported stallions, and hence being the top Canadian get; second in a group of three mares owned by exhibitor; and third in a class of sixteen yeld mares. These were excellent wins when it is remembered that the best Clydesdales across Canada were competing and Agassiz horses had a 2,635-mile train trip before competing.

Sheep

In 1892 a Dorset Horn ram and two ewes were introduced on this Farm and representatives of this breed have been bred here ever since. These sheep are prolific, frequently producing triplets, occasionally quadruplets, and the ewes are good milkers and will breed almost any season of the year. They are particularly suitable for out-of-season lamb production. The ewes here have always been so good that some difficulty has been experienced in locating suitable rams to mate with them.

During the past twelve years the flock has averaged in size about 70 head. During that time 549 sheep were sold. Of these, 45 were rams and 48 ewes for breeding purposes. A few good flocks have been established in the province but the rams were mostly used in grade flocks.

In the period covered by this report 473 lambings produced 754 lambs, or 149 per cent. Of the 754 lambs born, 639 or 84·7 per cent were raised. This is 1·35 living lambs per pregnant ewe. In the last nine years accurate birth

weights of the lambs were recorded. The data from 489 purebred Dorset lambs show an average birth weight of 8·2 pounds, and living lambs range from 3·4 to 16·5 pounds.

Due to the habit of Dorset ewes breeding at off-season dates, some data are available on their suitability for Easter lamb production. For four years, 1936-1939, some early lambs were reared for this purpose and sold at Easter. The difference in price obtained for these lambs as compared with the regular crop ranged from $1.63 to $3.78. Later, when war prices influenced the market and ceilings were established, it was more profitable to hold back the breeding dates to secure only spring lambs. In fact, in 1941 September-marketed lambs brought the highest average price that year.

Another matter investigated was the economy of having the Dorset ewes produce two crops of lambs per year. By doing this a ewe may easily raise three to four lambs in a twelve-month period. Data to date show that after a few years the ewes begin to produce singles and hence in the overall test the results are no better. It is not uncommon to have a young vigorous ram lamb mate with some of the ewes he is running with before weaning and this results in the ewe producing the second crop in the year. Three crops in two years is a satisfactory goal.

Wool production is not heavy from the Dorset flock. In the last dozen years 715 fleeces averaged 6·29 pounds per fleece and after an amount for freight, sacks, membership, etc., was deducted, the price received was 21·9 cents per pound, or just under $1.38 per sheep. The wool sold through the Canadian Co-operative Wool Growers Association has graded about half Medium Staple (⅜ blood staple) and the balance Low Medium Staple (¼ blood staple).

Since 1941, phenothiazine has been used to good advantage in worm control. At first, the ewes were treated with four tablets after lambing and again in September. This was rather expensive. Some trouble was experienced in giving tablets to lambs. It all entailed considerable labour. During the last couple of seasons in the period covered by this report, phenothiazine mixed with salt was before the flock from January to June and the results were satisfactory with labour negligible.

During the last five years of the period covered by this report, a Burdizzo instrument has been used for castrating and docking the lambs. This bloodless method is humane and if care is exercised it is considered the best system known. This tool costs about $12.

During the autumn of 1944 a Suffolk and a Hampshire ram were purchased, with the object in view of crossing on the Dorset ewes. Many of the ewes mated returned to the services of these as well as the pure-bred Dorset. This meant the 1945 lambing season was a long drawn out affair extending from February 5 to May 15. This fact tended to detract from the results. Four ewes lambed to the Suffolk service raised seven lambs which in 138 days averaged 95·1 pounds. Fourteen ewes mated to the Hampshire ram produced 19 lambs which in 132 days averaged 89·3 pounds. Twelve ewes raised 16 pure Dorset lambs which in 147 days averaged only 87·5 pounds.

During the next two seasons only the Hampshire cross was made, with the crosses giving better results each year than the purebreds. Not only were the lambs heavier at birth but they continued to grow faster and make more economical gains. In two seasons, 41 ewes bred to a Dorset ram raised 68 lambs as compared with 26 ewes mated to the Hampshire which raised 37 lambs. This increase in lambs in favour of the purebred lambs did not offset the more rapid gains of the cross-breds.

Swine

ADVANCED REGISTRY

Advanced Registry work has been carried on since 1936. During this period 33 sows, retained for breeding purposes, were tested on Advanced Registry. The various averages for these litters are very interesting. An average of 11·27 pigs were farrowed, and 9·45 pigs weaned. The average feed cost per weaned pig was $1.57 and average daily gain per pig from weaning to finishing was 1·30 pounds. The average number of days from birth to finishing weight was 178·5 days, and the average feed cost per 100 pounds of gain at finishing was $5.245. The average Advanced Registry score of all sows was 78·3 points including 8 failures (under 75 points).

ADAPTATION OF THE ADVANCED REGISTRY FEED MIXTURE FOR THE SELF-FEEDING OF HOGS

An experiment was conducted during 1941 and 1942 to determine the suitability of Advanced Registry meal mixtures for bacon production and a comparison of self-feeding. Forty pigs in all were used for this test, being divided into four duplicate lots of five pigs each. The following meal mixtures were fed.

Lot I: Barley 50, oats 30, wheat 20 per cent during the growing period, and 60, 10 and 30 per cent, respectively, during the finishing period.

Lot II: Barley 40, oats 40, wheat 20 per cent during the growing season and 50, 20 and 30 per cent, respectively, during the finishing period.

Lot III: Received the same ration as Lot I, but with alfalfa leafmeal added at the rate of 5 pounds to each 100 pounds of the complete mixture.

Lot IV: Received the same ration as Lot 1, but had 6 pounds of skim-milk per pig per day.

In comparing self-feeding with hand-feeding in each instance, the self-fed lots made greater gains not only in live weights but also in dressed weights. The self-fed groups, in each instance, consumed more feed than the hand-fed lots. This was particularly true between Lots IV and V. Even though the gains in

Fig. 8.—Yorkshire breeding stock on pasture.

the self-fed group were the highest they did not offset the extra cost of feed so that the cost of 100 pounds gain was slightly greater in the self-fed lots; the difference was hardly significant. The greater saving of labour with the self-fed lots would more than offset this difference.

There was so little difference in gains and costs between any of the different types of feeds that any of them could be recommended.

OPTIMUM LEVELS OF PROTEIN SUPPLEMENTS

During 1936 and 1937 an experiment was conducted to determine the optimum levels of protein supplement and the effect of a single basal mixture fed during the growing and finishing periods; also to determine the effect of self-feeding versus hand-feeding.

The basal ration to be fed from the beginning to 100-110 pounds weight was in the proportion of barley 50, wheat 20, oats 30. From 100-110 pounds to finishing the ration was changed to barley 60, wheat 30 and oats 10. The single basal ration for both periods was the same as the above finishing ration. The protein supplement which was used contained the following percentages: tankage 50, fishmeal 15, linseed oilmeal 25, iodized salt 5, and limestone or bonemeal 5. Each lot contained five hogs.

Lot I received 85 per cent of the basal ration and 15 per cent protein supplement during the growing period, and 90 per cent and 10 per cent, respectively, during the finishing period.

Lot II was fed the same rations in a self-feeder.

Lot III was fed 88 per cent of the basal ration with 12 per cent protein during the growing period and 94 per cent and 6 per cent, respectively, during the finishing period.

Lot IV was fed the same rations in a self-feeder.

Lot V was fed the single basal ration, 85 per cent, with 15 per cent protein supplement during the growing period, and 90 per cent and 10 per cent, respectively, during the finishing period.

Lot VI was fed the same rations in a self-feeder.

Lot VII was fed the single basal ration, 88 per cent, with 12 per cent protein during the growing period, with 94 per cent and 6 per cent, respectively, during the finishing period.

Lot VIII was fed the same rations in a self-feeder.

The basal ration groups showed some superiority over the single basal ration groups in meal consumed per 100 pounds gain of carcass weight. The basal ration group also had a cheaper feed cost per 100 pounds gain. Three of the four groups which were hand-fed showed a superiority in a carcass grading score. The 15 per cent and 10 per cent protein supplement rations were superior to the 12 per cent and 6 per cent protein rations in the hand-fed group. Hand feeding produced cheaper gains than self-feeding, labour not included.

SPRING VERSUS FALL FARROWING

An experiment on the advantages of spring- and fall-farrowed pigs to the age of three weeks was carried out from 1937 to 1946 inclusive. During eight of the ten years the fall litters were superior in numbers born, numbers alive at three weeks and average weight at three weeks. The ten-year averages are shown in Table 5.

TABLE 5.—SPRING vs. FALL FARROWING

—	Spring	Fall
Numbers born	10·02	10·77
Alive at 3 weeks	7·80	8·72
Average weight at 3 weeks (lb.)	9·73	10·17

These figures clearly illustrate the advantages of fall litters over spring litters.

LOW, MEDIUM, AND HIGH AMOUNTS OF OATS FOR BACON HOGS

During 1937 and 1938 two experiments were conducted to determine the feasibility of using higher concentrations of oats in swine rations in the Fraser Valley. Protein was supplied by skim-milk. These two products are the most readily available feeds in the Fraser Valley. Trough feeding was compared with self-feeding during the same experiment.

The general feeding plan was the same as the plan used for "Comparison of Protein Supplement Levels, Single Basal Mixture and Hand- Versus Self-feeding for Bacon Hogs", mentioned previously. The low-oat group received 30 per cent oats in the basal mixture, the medium-oat group 40 per cent, and the high-oat group 50 per cent during the growing periods. During the finishing periods the percentage of oats was 10, 20 and 30, respectively.

The average of the results of all lots for the two years definitely illustrates that hand-feeding requires less feed per pound of gain. In all cases the carcass score was better for hand-fed groups. It required slightly less feed per 100 pounds gain from the high to the low percentage of oats during the growing period. However, it took progressively more feed per 100 pounds gain from low to high during the finishing period. The medium and high oat groups had a slightly lower total feed cost per 100 pounds gain than the low group.

This experiment illustrates that there is an advantage in using a higher concentration of oats in growing and finishing rations of bacon hogs in the Fraser Valley when the oats are home-grown and supplemented with skim-milk.

COMPARISON OF TANKAGE AND VARIOUS GRADES OF FISHMEAL FOR SWINE FEEDING

This experiment was conducted in 1938 and 1939 to evaluate tankage and fishmeal as protein supplements for growing and fattening swine; to determine the relative efficiency of various grades of fishmeal for growth and feed economy; and to determine the effect of tankage and fishmeals on the quality and flavour of market hog carcasses. Eight lots of five hogs each were used.

The results of the various tests illustrate that white fishmeal, low oil fishmeal and oily fishmeal produced greater and cheaper returns than tankage when fed as a protein supplement. There was no significant difference between the three types of fishmeal for growth and economy of production. The quality of the carcasses and the flavour of the meat was determined by slaughter and cooking tests. The cooking tests were carried out in the presence of six persons. It was generally agreed that all samples were satisfactory for odour, texture and taste. Tests for the "iodine values" of fat give a value for softness or hardness of fat. There was a slightly higher iodine value for the group fed the oily fishmeal. This would indicate that the fat from hogs fed oily fishmeal tends to be slightly soft.

B.C. FEED BOARD RECOMMENDATIONS

A comparison of the B.C. Feed Board recommendations for growing pigs was made in 1936. Thirty pigs were divided evenly into six pens of five pigs each and fed three different rations in duplicate.

Lot I received a mixture of 200 pounds ground barley, 200 pounds ground oats, 200 pounds ground wheat, 6 pounds salt, 6 pounds bonemeal, with 6 pounds of skim-milk per pig per day.

Lot II received the same except 70 pounds of tankage was added to the grain mixture to replace the milk.

Lot III received the same ration as Lot I, with shorts and peas replacing the wheat, and the barley percentage increased.

The greatest and cheapest gains were made by Lot I. The lowest and most expensive gains were made by Lot III.

RELATIVE VALUE OF PROTEINS OF ANIMAL AND VEGETABLE ORIGIN

During 1942, 1943 and 1945 experiments were carried out to determine the relative value of proteins of animal and vegetable origin. Oilcake meal was compared with tankage. During the three years the results show no significant difference in either of the rations for gain, cost of production or slaughter tests. Most lots showed as much variability within lots as between lots. Three lots of five pigs each were used each year.

FIELD HUSBANDRY

Cost of Operating a Tractor

A new 12-20 h.p. Wallis tractor was purchased in 1931 at a cost of $965. An accurate account was kept of all operating expenses to the end of 1945, at which time it was traded in for a new model. The costs were divided into yearly fixed costs (depreciation 10 per cent, interest at 6 per cent of half the initial cost, and repair and servicing work), fuel and oil, and operator costs. The fourteen-year average for hours of work per year was 458 hours for an average yearly fuel consumption of 680 gallons, or 1·48 gallons per hour. The average daily fixed costs were $3.78, average daily fuel and oil costs were $3.17, and the average daily operator cost was $3.35, or a total average daily cost of $10.30.

The tractor had a trade-in value of $300, which would lower the daily fixed costs. However, this was an inflated value due to the scarcity and higher cost price of new tractors and would not be so high in normal times.

Barn-Curing Hay

Experiments with the barn-curing or finishing of hay were conducted at Agassiz for two years. Admittedly the data must be regarded as preliminary but in view of the wide interest in this method a brief outline of results to date is justified.

The method consists of placing partially-cured hay over a system of wooden ducts laid on the mow floor and forcing a large volume of unheated air through the mass of hay by means of a large capacity fan until drying is completed. It is generally recommended by those who have tried the system that the hay be placed in a layer not exceeding eight feet in depth after it has been field-wilted down to 40-60 per cent moisture. Supporters of the method further contend that by handling partially-wilted hay, loss of valuable leaf is practically eliminated and if drying is carried out properly the green colour is retained, thus making a high grade feed.

The Agassiz installation was placed in a mow 30 by 36 feet and equipped with a fan capable of delivering 16,000 cubic feet of air per minute, or approximately 15 cubic feet per square foot of mow area per minute. Total cost of the installation, including materials, labour, fan and electric wiring, was $586.05.

In 1946 three separate trials were run and in 1947 four lots of hay were finished on the system. In most cases the hay was field-wilted down to 45 per

Fig. 9.—Taking moisture and temperature readings in connection with the barn hay-drying experiments.

cent moisture before storing was started. By the time hauling was finished the last loads had a moisture content of approximately 30 per cent. In one instance an attempt was made to dry hay that approached a moisture content of 60 per cent and this proved impracticable.

The mow finishing period extended between ten and fourteen days and at the end of the period the hay was dried down to 15-20 per cent moisture. Field wilting, from a freshly cut moisture content of 75 per cent down to 45 per cent, required 24 to 36 hours in good weather.

The resulting product after mow finishing represented some measure of improvement over field curing in respect to carotene and in some instances in protein. These amounts proved insufficient to show superiority in a feeding trial with a uniform group of milking heifers.

TABLE 6.—OPERATING COSTS OF BARN-CURING HAY DURING TWO SEASONS

—		1946	1947
Total tonnage of dry hay produced		42·30	37·92
Tonnage of water evaporated		11·55	13·73
Total hours of operation		438·90	607·90
Cost of power consumed	$	37·04	53·02
Power cost per ton of dry hay	$	0·87	1·40
Power cost per ton of water evaporated	$	3·21	3·86
Annual depreciation (6 per cent of $586·05)	$	35·15	35·16
Depreciation per ton of hay produced	$	0·83	0·93
Cost per ton of hay (power plus depreciation)	$	1·70	2·33

More complete data on the 1946 experiments are given in the article entitled "Barn Curing Hay" by W. Kalbfleisch, M. F. Clarke, and P. O. Ripley, published in Scientific Agriculture, Volume 27, No. 12, December, 1947. While existing data indicate only limited possibilities for the method, studies will be continued further to fully explore all aspects of the problem.

Sprinkler Irrigation of Pastures

During 1947, preliminary studies were undertaken to check on the feasibility of using sprinkler irrigation to increase summer pasture production. In addition to checking on yields and costs of irrigation, a series of fertilizer applications were studied. Irrigating started early in July and three applications of water were made during a two-month period, each irrigation amounting to 2-2½ acre inches of water. This investigation was conducted on the farm of O. N. Wells at Sardis, B.C. The pasture selected was one of very high production that had been originally seeded in 1930.

For the remainder of the pasture season, July to early November inclusive, the average increase in green forage for three irrigation treatments amounted to 161 per cent. In terms of dry matter the increase was 122 per cent, the irrigated grass being more succulent and therefore carrying a slightly lower dry-matter percentage. The cost of irrigating, including depreciation at 10 per cent, electric power, and labour, averaged $14.33 per acre for 33 acres.

Owing to the heavy sustained production, extra fertilizer was deemed necessary and three treatments were made on different areas. These ranged in cost from $4.95 to $13.81 per acre. Expressing the increased dry-matter production in terms of second crop alfalfa hay at a price of $35.00 per ton, the average net profit, after deducting fertilizer plus irrigating costs, amounted to $32.87 per acre. Furthermore, the heavier rates of fertilization appear more profitable than the minimum rate. As a further check, one fertilizer treatment was applied early in July to a non-irrigated section of the field, and this failed to give any increase in yield in the dry summer period.

Prior to the start of the experiment, June rainfall was slightly above average. July and August were rather dry, however, being only 63 per cent of normal at Agassiz. September and October, on the other hand, were wetter than average. During the fall the irrigated plots continued to produce at a higher rate than the non-irrigated. The areas not receiving irrigation dried out rather badly in August and failed to recover fully in the fall.

This test during the 1947 season indicates somewhat striking possibilities for sprinkler irrigation of pasture. But, because of the relatively high capital investment in sprinkler equipment, certain requirements must be met if it is to be used profitably. These are: first, high grade pastures containing a good balance of grasses and legumes; second, a high state of soil fertility; and third, good grazing management. In addition, generous fertilizer applications are advisable to offset the added drain of heavy midsummer production.

Fertilizer Experiments

Experiments with fertilizers for field crops have been of two categories. First, a long-term fertility experiment using three crops in rotation, begun in 1937 and carried on continuously; second, experiments designed for making specific fertilizer recommendations for pastures and grain crops. In regard to grain crops, tests were on small-sized plots and these were also set out on private farms at several other points in the Fraser Valley.

LONG-TERM FERTILITY EXPERIMENT

This experiment was begun in 1937 and represented an expansion of similar work that had been carried out previously in a series of short-duration studies. From 1937 to 1943, inclusive, the three crops grown in rotation were mangels, oats and clover. From 1944 to 1947, inclusive, ensilage corn has been substituted for mangels, the other two crops remaining the same.

The fertility treatments comprised twelve different chemical fertilizer formulas applied at two rates of 500 and 1,000 pounds per acre to the hoed crop. Another series included varying rates of manure with and without chemical fertilizers, also applied directly to the hoed crop. Within the manure series provision was made for a comparison between rotted and fresh manure and further between fresh manure applied in the fall and a spring application. Yields of all three crops were taken in rotation, thus giving information on carry-over effects. The data also permit of determining the proper fertilizer and manurial treatments for mangels or corn. Ultimately, after a period of several years, it will be possible to obtain information on the effects of the practices followed on the soil itself, such as in resepect to organic-matter content where varying rates of manure are applied, and on the supplies of available nitrogen, phosphorus and potash.

FERTILIZER AND MANURIAL RESPONSE OF MANGELS

The pattern of response to varying fertilizer and manure applications is summarized in Table 7.

TABLE 7.—SUMMARY OF YIELDS OF MANGELS FOR A 7-YEAR PERIOD

Treatment	Yield in tons per acre	
	Fertilizer at 500 lb. per acre	Fertilizer at 1,000 lb. per acre
0–12–6	7·22	10·81
2–12–6	9·94	10·53
4–12–6	8·67	11·91
6–12–6	9·96	13·14
4–0–6	7·14	7·59
4–6–6	8·46	10·47
4–18–6	9·47	14·11
0–12–0	8·44	9·30
4–12–0	7·01	9·79
4–12–12	8·96	14·38
4–8–10	6·97	10·40
4–12–6 plus borax	8·70	–
Check (No Treatment)	4·58	4·58

TABLE 7—*(Conc.)*

MANURE PLUS FERTILIZER SERIES

Treatment	Yield in tons per acre
Manure, 10 tons (rotted)*	12·49
Manure, 20 tons (rotted)	16·01
Manure, 30 tons (rotted)	18·22
Manure, 10 tons (rotted) plus 250 lb. superphosphate	13·45
Manure, 10 tons (rotted) plus 500 lb. superphosphate	15·50
Manure, 20 tons (rotted) plus 250 lb. superphosphate	18·49
Manure, 10 tons (rotted) plus 500 lb. 2–12–6	14·91
Manure, 10 tons (rotted) plus 500 lb. 4–12–6	14·15
Manure, 10 tons (rotted) plus 500 lb. 2–12–6, plus 50 lb. sulphate of ammonia to grain crop	14·51
Manure, 20 tons (fresh in spring)	18·01
Manure, 20 tons (fresh in fall)	16·76
Check (No treatment)	6·90

* Rotted manure was applied in the fall.

Considering first the data for chemical fertilizers, certain definite trends are apparent. On the basis of the general average, formulas supplying all three plant food elements, nitrogen, phosphorus and potash, have given the highest yields at both levels of application. Differences in yield resulting from progressive but slight increases in one constituent within the complete formulas are surprisingly uniform for all three elements. On the whole, 4-12-12, 6-12-6 and 4-18-6 appear the most satisfactory formulas for mangels under the prevailing conditions of the test. In terms of the formulas available on the market a 4-10-10 would be comparable with the 4-12-12 mixture of the experiment. Where manure is not used, doubling the rate of fertilizer application has given an average increase of 32·6 per cent, with a range of approximately 10 to 60 per cent in different treatments.

The section of the table dealing with manurial treatments shows that rotted manure at 20 tons per acre plus superphosphate at 250 pounds has given the highest yield. Ranking slightly below this treatment are rotted manure at 30 tons and fresh manure at 20 tons applied in the spring. Using superphosphate at 500 pounds to supplement manure at 10 tons would appear slightly more effective than the complete formulas used at the same rate. It is apparent that rotted manure alone at 10 tons per acre is definitely too low a rate of application. On the basis of statistical analysis the 30-ton rate is not significantly better than the 20-ton rate but both are superior to the 10-ton application. Upon comparing the effect of manure with the fertilizer only (no manure) series, it will be noted that manure has proved much better. Throughout the course of the experiment, the manure series invariably gave a more uniform response. On the whole, the manured plots gave an average increase of 40 per cent over chemical fertilizer at 1,000 pounds per acre without manure.

YIELDS OF OATS AND RED CLOVER FOLLOWING MANGELS

With but one exception, in the manured series, all treatments were applied directly to the hoed crop. The yields given in Table 8 represent the carry-over effect.

The response of oats to fertilizer applied to the hoed crop the previous year does not follow a definite trend. Evidence of increased yield in favour of earlier fertilizer treatments is shown by the uniform increase over the checks. When the yields of oats for the two rates of fertilizer are compared it is evident that the 1,000-pound rate applied to mangels has resulted in only a small increase on the average, amounting to slightly less than 10 per cent for the average of all plots.

TABLE 8.—SUMMARY OF YIELD DATA FOR OATS AND CLOVER AFTER MANGELS

Treatment (Applied to Mangels)	Yield per acre			
	Fertilizer at 500 lb. per acre		Fertilizer at 1,000 lb. per acre	
	Oats	Clover	Oats	Clover
	Bushels	Tons dry matter	Bushels	Tons dry matter
0–12–6	44·9	3·24	45·2	3·82
2–12–6	43·7	3·69	45·2	3·68
4–12–6	43·7	3·64	49·1	3·89
6–12–6	47·7	3·75	52·9	3·68
4–0–6	44·3	3·69	43·2	3·86
4–6–6	46·9	3·58	47·2	3·78
4–18–6	48·1	3·72	48·5	3·69
0–12–0	47·1	3·65	48·2	3·45
4–12–0	45·7	3·39	47·2	3·77
4–12–12	46·6	3·69	46·0	3·88
4–8–10	42·9	3·36	45·6	3·87
4–12–6 plus borax	46·3	3·54	–	–
Check (No treatment)	42·2	3·35	42·2	3·35

MANURE PLUS FERTILIZER SERIES

Treatment	Yield per acre	
	Oats	Clover
	Bushels	Tons dry matter
Manure, 10 tons (rotted)	55·1	3·82
Manure, 20 tons (rotted)	54·2	3·95
Manure, 30 tons (rotted)	56·2	4·19
Manure, 10 tons (rotted) plus 250 lb. superphosphate	50·8	3·89
Manure, 10 tons (rotted) plus 500 lb. superphosphate	54·8	3·87
Manure, 20 tons (rotted) plus 250 lb. superphosphate	55·8	4·15
Manure, 10 tons (rotted) plus 500 lb. 2–16–6	53·9	3·81
Manure, 10 tons (rotted) plus 500 lb. 4–12–6	55·3	3·84
Manure, 10 tons (rotted) plus 500 lb. 2–12–6, plus 50 lb. sulphate of ammonia to grain crop	62·7	3·85
Manure, 20 tons (fresh in spring)	56·6	4·05
Manure, 20 tons (fresh in fall)	55·4	4·36
Check (No treatment)	47·6	3·24

The response of clover to fertilizer applied two years earlier proved very slight and there is little indication of variations in formula having any particular effect. The plots which formerly received 1,000 pounds of fertilizer per acre have outyielded the 500-pound series by only 5 per cent.

The response of oats following manure applied to mangels the previous year is surprisingly uniform. In comparison with the higher rate of fertilizer without manure, the manured plots have given an overall average increase of 19 per cent. Clover yields also tend to be much higher following manure applied two years earlier and there is a fairly clear pattern of response in favour of the higher rates of manure. These data indicate very clearly the importance of generous applications of manure in maintaining fertility under humid conditions. Chemical fertilizers, particularly complete formulas, are benificial to the crop to which they are applied, but the carry-over effect is not great.

Beginning in 1944, silage corn replaced mangels in the long term experiment. A further change was also made, in that the date of applying rotted manure was changed to the spring. The yields of corn for three years are summarized in Table 9.

TABLE 9.—AVERAGE YIELDS OF CORN FOR 1944-46 INCLUSIVE

Treatment	Yield in tons per acre (Green)	
	Fertilizer at 500 lb. per acre	Fertilizer at 1,000 lb. per acre
0-12-6	15·44	18·60
2-12-6	16·51	17·30
4-12-6	15·02	17·44
6-12-6	16·76	17·83
4-0-6	15·06	16·13
4-6-6	16·21	16·59
4-18-6	17·02	18·01
0-12-0	14·72	14·81
4-12-0	14·11	15·64
4-12-12	16·51	17·50
4-8-10	16·44	17·77
4-12-6 plus borax	16·58	–
Check (No treatment)	13·11	13·11

MANURE AND FERTILIZER SERIES

Treatment	Yield in tons per acre (Green)
Manure, 10 tons (rotted)	19·92
Manure, 20 tons (rotted)	21·27
Manure, 30 tons (rotted)	21·91
Manure, 10 tons (rotted) plus 250 lb. superphosphate	19·49
Manure, 10 tons (rotted) plus 500 lb. superphosphate	20·70
Manure, 20 tons (rotted) plus 250 lb. superphosphate	20·90
Manure, 10 tons (rotted) plus 500 lb. 2-12-6	20·07
Manure, 10 tons (rotted) plus 500 lb. 4-12-6	20·52
Manure, 10 tons (rotted) plus 500 lb. 2-12-6, plus 50 lb. sulphate of ammonia for grain crop.	20·24
Manure, 20 tons (fresh) applied in the spring	21·26
Manure, 20 tons (fresh) applied in the fall	20·89
Check (No treatment)	14·53

The averages for corn do not show quite so uniform a response to fertilizers as was evident in the case of mangels. The averages for the latter crop were for a longer period, however. As in the case of mangels, the complete formulas having at least 4 per cent nitrogen and 12 per cent phosphorus are required. There is evidence, too, in favour of potash. In terms of formulas available on the market a 4-10-10 mixture, at 1,000 pounds per acre, would be required without manure.

The response of corn to manure has been quite pronounced as was the case for mangels. However, in the case of corn, the supplementing of the 10-ton rate of manure with either superphosphate or a complete fertilizer has given yields which come quite close to the high rates for manure without fertilizer. On the whole, corn has not been as sensitive to variations in fertility treatment as mangels. On the other hand, the high increase over the untreated checks shows very clearly that manure or manure plus fertilizer are definitely needed.

TABLE 10.—AVERAGE YIELDS OF OATS AND CLOVER AFTER CORN

Treatment (Applied to Corn)	Yield per acre			
	Fertilizer at 500 lb. per acre		Fertilizer at 1,000 lb. per acre	
	Oats	Clover	Oats	Clover
	Bushels	Tons dry matter	Bushels	Tons dry matter
0–12–6	33·9	2·77	37·5	3·19
2–12–6	37·9	3·08	37·1	3·36
4–12–6	36·9	3·15	33·5	3·31
6–12–6	33·7	3·12	39·7	3·35
4–0–6	37·1	2·71	36·2	2·95
4–6–6	33·6	2·80	33·4	3·49
4–18–6	38·2	3·05	35·6	3·27
0–12–0	37·9	2·65	36·0	2·33
4–12–0	34·8	2·59	36·8	3·23
4–12–12	38·1	3·41	34·2	3·85
4–8–10	32·3	2·51	37·9	3·72
4–12–6 plus borax	34·5	2·95	–	–
Check (No treatment)	35·6	2·91	35·6	2·91

MANURE AND FERTILIZER SERIES

Treatment	Yield per acre	
	Oats	Clover
	Bushels	Tons dry matter
Manure, 10 tons (rotted)	43·1	2·91
Manure, 20 tons (rotted)	42·9	3·33
Manure, 30 tons (rotted)	46·4	3·97
Manure, 10 tons (rotted) plus 250 lb. superphosphate	46·8	3·54
Manure, 10 tons (rotted) plus 500 lb. superphosphate	35·0	3·57
Manure, 20 tons (rotted) plus 250 lb. superphosphate	45·3	3·49
Manure, 10 tons (rotted) plus 500 lb. 2–12–6	38·2	3·36
Manure, 10 tons (rotted) plus 500 lb. 4–12–6	40·4	3·41
Manure, 10 tons (rotted) plus 500 lb. 2–12–6, plus 50 lb. sulphate of ammonia for grain	46·1	3·74
Manure, 20 tons (fresh) applied in spring	43·3	3·41
Manure, 20 tons (fresh) applied in fall	40·9	3·57
Check (No treatment)	34·3	2·15

The yields of oats and clover following corn shown in Table 10 are actually a continuation of the data reported in Table 8 which gave the crop yields after mangels. A difference exists, however, in the case of the fertilizer series, in that there is no marked superiority in yield of treated plots over the checks. Corn yields have been heavier than was the case for mangels and these apparently have proved more exhausting of available soil nutrients.

In the manured plots, on the other hand, grain yields are greatly superior to the checks and this is also indicated for clover. It would seem, therefore, that the use of manure in a rotation including corn is more important than in cases where mangels are used. However, in this experiment mangel yields were not high, as a result of unsatisfactory conditions for the crop. This would mean that the mangels had not exhausted soil fertility to the extent that would have occurred were the yields higher.

Taking the experiment as a whole, the results indicate very clearly that the generous use of manure is essential to satisfactory crop yields on a loam soil. Chemical fertilizers are also beneficial in supplementing manure, and complete formulas, or those which supply nitrogen, phosphorus and potash, are required.

With heavy rates of applying manure, superphosphate alone appears sufficient. Where manure is not available other means of returning organic matter to the soil are required, such as ploughing down of cover crops, using a rotation that contains a definite proportion of sod, or applying straw or other organic residues.

FERTLIZER EXPERIMENTS WITH PASTURES

Two experiments were conducted under this project. The first was a replicated plot experiment using a series of six treatments and clipping with a lawn mower to simulate grazing. In the second experiment a somewhat similar arrangement of treatments, except at lighter rates, were applied to a permanent pasture grazed by sheep.

PASTURE FERTILIZER EXPERIMENT—CLIPPING TRIAL

This experiment has been conducted for four years. The plots used were seeded in 1938 and consist of perennial rye grass and wild white clover. They had been carried as a part of a pasture experiment previously. The average yields obtained, together with the treatment applied, are summarized in Table 11.

TABLE 11.—AVERAGE YIELD OF DRY MATTER OF FERTILIZED PASTURE

Treatment per acre Applied in March except where otherwise indicated	Dry matter Pounds per acre
2-16-6 at 300 lb. annually	4495·2
2-16-6 at 300 lb., plus 100 lb. sulphate of ammonia in early spring each year	4760·6
2-16-6 at 300 lb., plus 100 lb. sulphate of ammonia in June each year	4708·8
2-16-6 at 300 lb., plus 100 lb. sulphate of ammonia in spring, plus 100 lb. sulphate of ammonia in June annually	4705·5
2-16-6 at 900 lb. once in 3 years	4607·2
Check (No treatment)	3763·9

It is apparent in Table 11 that all fertilizers have given very sizeable increases over the check areas. The 2-16-6 applied annually has given a very profitable increase over the cost of the fertilizer. Supplementing the annual dressing of 2-16-6 with sulphate of ammonia, either during spring or in early June, has given a small additional profit over the price of the extra fertilizer. Using extra nitrogen at both dates has resulted in a lower net profit as compared to 2-16-6 alone. While supplemental nitrogen increased yields, there was only an increase immediately following application. Later in the season, the extra nitrogen had little effect. Applying 2-16-6 at treble the rate once in three years has not been as profitable in practice as the annual applications. During the two years following fertilization, the yields dropped sharply. This is not fully shown in the table since four years are covered, the three-year plots having received 1,800 pounds of fertilizer as against 1,200 pounds in the yearly dressings.

FERTILIZER EXPERIMENT ON SHEEP PASTURE

This experiment followed a somewhat similar course to that reported above. The highest yields were obtained from a 2-16-6 fertilizer applied at 600 pounds once in three years and supplemented with 100 pounds of sulphate of ammonia per acre each year. Where no extra nitrogen was used the annual dressing of

2-16-6 was better than three times the rate (600 pounds) once in three years. Similar treatments with superphosphate gave very slightly less increase than 2-16-6. In general, it was apparent that the rates used for phosphate or complete fertilizer were rather too low for good returns.

FERTILIZER EXPERIMENTS WITH OATS AND BARLEY

Rod-row tests using commercial fertilizers on cereals were conducted with two objectives in mind. It was hoped that information would be gained on the drilling of commercial fertilizers directly with the grain and also on the comparative efficiency of common formulas available to the farmers. The results from the 1946 tests are typical of a year with adequate moisture and the yields are presented in Table 12. With the exception of the test on Ladner clay good responses were obtained from most of the fertilizer applications.

TABLE 12.—SUMMARY OF THE YIELDS OF FERTILIZER TRIALS ON OATS IN THE FRASER VALLEY—1946

Treatment Pounds per acre	Yield per acre in bushels					Average Bushels per acre
	Agassiz	Chilliwack	Matsqui	Ladner	Cloverdale	
6-30-15 @ 150	134·5	125·1	85·3	93·1	67·9	101·2
6-30-15 @ 300	131·3	125·4	101·1	83·1	82·5	104·7
11-48- 0 @ 100	123·5	104·0	87·6	91·3	68·2	94·9
11-48- 0 @ 200	118·9	103·8	92·0	91·7	72·9	95·9
0-12-20 @ 100	109·4	99·3	83·4	90·4	51·7	86·8
0-12-20 @ 200	108·6	102·3	81·3	89·0	50·4	86·3
20- 0- 0 @ 100	85·4	86·0	75·1	91·7	67·4	81·1
Check	73·0	82·0	78·2	96·2	48·4	75·6

Results from the other four stations show that the complete formula 6-30-15 gave the highest yields, followed by 11-48-0. On the average, the response to 20-0-0 or 0-12-20 was not so great as from the other two formulas. The increase in yield from applications of 0-12-20 was almost negligible at Cloverdale, on a Langley clay loam, whereas nitrogen alone in this test was very effective. At Matsqui, on a Monroe clay, there was no increase in yield when nitrogen was used alone. In the 1946 test it is significant that while the higher rates of application gave increases in yield at Matsqui and Cloverdale, no such response was obtained at Agassiz or Chilliwack, where the lower rates were just as effective. With barley at Agassiz, however, under similar conditions, the higher rates of the three formulas gave significant increases over the lower rates of application.

At the rates of application used in these trials germination was not impaired nor was there any apparent injury to the seed. The use of commercial fertilizer did not increase the lodging and in many cases the bright clean straw of the fertilized plots was more upright at harvest than the unfertilized check. At maturity, the fertilized plots, with the exception of the nitrogen treatment, were ripe approximately two days ahead of the check plot. These plots receiving 20-0-0 were about a day ahead of the check plots in ripening.

Chemical Weed Control

With the introduction of new selective herbicides in recent years preliminary investigations were undertaken to determine the effectiveness of these chemicals in the control of annual weeds in cereal crops, fibre flax, peas and corn. In trial plots of oats and barley applications of 1 to 2 pounds per acre of the sodium salt of 2,4-D gave significant increases in yield over the check. For susceptible weeds, such as wild mustard and wild radish, an application of less than one pound of 2,4-D acid has been found effective. However, when the main weeds are semi-resistant species, such as corn spurrey, lady's thumb and wild buckwheat, higher concentrations are necessary. It has been found highly advantageous to spray when the annual weeds are in the seedling-to-rapid-growth stage.

The use of the dinitro compounds for annual weed control in cereals has been very effective. An advantage of these compounds over 2,4-D is the speed of killing, which eliminates the weed competition immediately. Both 2,4-D, and the dinitros, have been found to injure severely legume mixtures seeded with the cereal crops, and even at the lighter rates of application of these products, approximately one-half to three-quarters of the clover seedlings were killed.

Unfortunately, flax has not been as resistant to the present selective chemicals as oats or barley. Where susceptible weeds were present the sodium salt of 2,4-D was used to advantage at low rates of application. In trials with flax up to the time covered by this report, the dinitro compounds have been more promising than 2,4-D and have been particularly effective when applied while the weeds were at a susceptible stage.

The dinitro product, ammonium dinitro secondary butyl phenate (Dow Selective) has shown considerable promise in the control of annual weeds in peas. Two of the dinitro herbicides tried have also been effective in controlling annual weeds in field corn. Slight to moderate leaf injury was quickly outgrown and no lasting damage was caused to the corn plants. The use of 2,4-D, on the other hand, gave poorer control of annual weeds and in some trials has resulted in a considerable number of plant deformities.

The presence of annual or perennial grasses in the weed cover reduces the usefulness of selective herbicides. Although the broad-leaved annual weeds may be killed the grasses which are immune make a vigorous growth and provide almost as much competition as the original weed cover.

The rates of application and the effectiveness of selective herbicides depend upon the formulation, weed species to be killed, growth stage and weather conditions at the time of application. In the commercial products used up to the time of writing this report the recommended rate of application has been very close to the rate giving maximum results. As products vary in formula and concentration it is important that the manufacturer's instructions be followed for best results.

FORAGE CROPS

During the twelve-year period 1936-1947 inclusive, experimental work with forage crops has been a major line of work at this Farm. For the most part, experiments of a practical nature, to meet specific farm problems, constituted the principal part of the program. Later, the forage plant section was further expanded to permit of the institution of considerable plant breeding work. This is of a special nature but is ultimately of great practical importance in so far as it is directed toward developing superior varieties for local use. Mention might be made of the fact that the war made necessary the performance of certain specialized work such as the supervising of seeding for all airports in Western

Fig. 10.—Field Crops Building at Agassiz.

Air Command, R.C.A.F., and the conduct of extensive tests with rubber-bearing plants, notably Russian dandelion and milkweed. These two latter phases are not dealt with in this report.

Throughout this report no attempt has been made to deal with all experiments in detail. In respect to pastures a number of examples are summarized in some measure of detail. This was deemed necessary in view of the particular importance of these crops to Fraser Valley agriculture and, further, because of the fact that no complete bulletin is at present available on the subject. Wherever possible results are reported briefly in relation to specific findings and recommendations of a practical application.

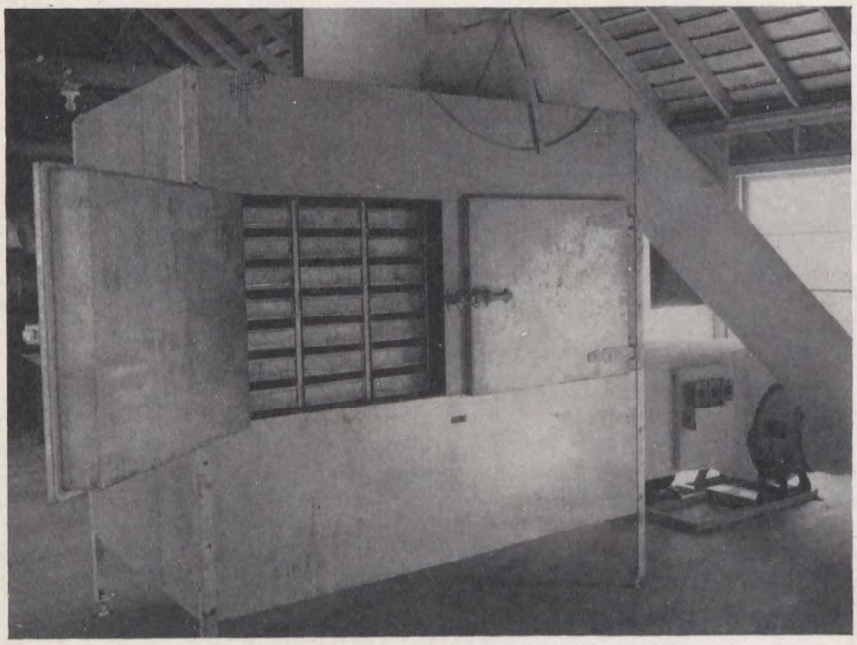


Fig. 11.—Electrical drying oven for moisture determinations of forage material.

Pastures

Experiments relating to pastures have comprised a very large part of the forage crop experimental program at Agassiz since this Farm serves one of the most highly developed dairying districts in the Dominion. In order to interpret the results of experiments conducted to date, a brief explanation of the factors governing pasture production in this area would be in order.

On the whole, the climate of the lower Fraser Valley is well suited to high pasture yields. Soil variability is great, however, ranging from fertile delta soils to very light upland soils of marginal fertility. Peat soils also comprise a sizeable acreage and these constitute a special problem. Superimposed on soil variability is a wide range in precipitation. Annual rainfall varies from more than 60 inches at the eastern end of the valley to less than 40 inches in the southwestern delta sections. Throughout the whole region summer rainfall is very low in relation to the remainder of the year. This condition is particularly acute in the lower rainfall districts. At Agassiz, where the yearly total is quite high, an average of 55 years shows the total precipitation for July and August to be only 6·5 per cent of the yearly total. Moreover, the two months combined barely equal the average for either May or September.

Plant species differ in their reaction to summer drought and the study of species and combinations of species is very important in the development of pastures that will give sustained production with a minimum of supplementary feeding. Coupled with this is the need for high yields of good quality roughage, for winter feeding, which amounts in most years to practically six months. Therefore, pasture management must of necessity be tied in with hay and silage production. On most farms it is not wise to concentrate only on permanent grass. Rather, it is necessary to combine the two to a large degree. Thus, mixtures which will supply a good yield of hay in the first year, followed by pasture for one or more years, are one of the mainstays of Fraser Valley dairying. Permanent pastures have their place, however, as night pasture and as a supplementary source of grazing. The relative acreages of combined hay-pasture versus permanent pasture will be governed by the intensity of stocking practised and the extent to which it is economical to use purchased feeds for the winter feeding period.

Fig. 12.—Ladino clover tests at Agassiz.

Species and Mixtures for Pasture

On the basis of experimental evidence up to the time covered by this report, the grasses and legumes best adapted to the Fraser Valley are listed as follows:—

a. *Grasses:*
- Orchard grass
- Perennial rye grass
- Meadow fescue
- Timothy
- Italian rye grass
- Kentucky blue grass
- Reed canary grass

b. *Bottom Grasses:* (of possible value in rough or semi-developed pasture).
- Rough-stalked meadow grass
- Crested dogstail (of little value)
- Brown top
- Creeping red fescue
- Canada blue grass
- Red top

c. *Legumes:*
- Red clover
- Alsike clover
- Wild white or white Dutch clover
- Ladino clover
- Alfalfa (for hay principally)

Orchard Grass is well adapted to all types of conditions in the Fraser Valley, especially on the lighter soils. As a pasture species it is noted for its early spring growth and high yield. Moreover, it holds up better during the midsummer period than most other grasses and rates high in nutritive value. It is a very aggressive species and unless grazed consistently and uniformly it can readily become coarse and tufty. Heavy seeding is also advantageous in providing a uniform stand of orchard grass free of tufted growth.

Perennial Rye Grass is another highly desirable pasture species. It is very long-lived and is particularly suited to the climatic conditions of the Fraser Valley. It develops very rapidly after sowing, becoming well established during the seeding year and often reaching its maximum yielding capacity in the second season. This characteristic, which is also shared by orchard grass, makes it one of the most useful species in checking the incursion of weeds on newly-sown land. Rich loams or clays are the recommended soil types and on these perennial rye will form a dense turf that withstands drought fairly well. It is also useful on lighter soils, particularly in view of its rapid establishment.

Timothy is a deep-rooted grass and is well suited to the stiffer classes of soil from heavy loams to stiff clays, and is also good on reclaimed peat soils. Like meadow fescue it is relatively slow in becoming established. In mixtures with aggressive species such as orchard grass, timothy frequently is overcome by competition. It still rates highly on heavy soils, however, and is furthermore, a cheap grass in terms of seed cost.

Meadow Fescue develops more slowly after seeding than either perennial rye or orchard grass. Once established it provides a long lasting sod and is useful both as a hay and grazing species. Heavy soils are popularly considered best for this grass but it has quite a wide range of adaptation. Under conditions where orchard grass is very scarce meadow fescue offers a good substitute. It also combines well with other grasses in mixtures.

Italian Rye Grass is a biennial species and is somewhat taller growing than perennial rye. It is primarily a hay grass though it is useful in pasture, particularly in providing quick early growth. Italian rye is frequently an

impurity in commercial perennial rye grass seed and intercrosses readily with the perennial species giving rise to hybrids of intermediate characteristics.

Kentucky Blue Grass is a widely occurring species, usually found in older pastures throughout the Fraser Valley. It is an excellent pasture grass, particularly during the spring months. During the dry midsummer period it will become dormant and does not recover too quickly with the fall rains. Kentucky blue has a very wide range of adaptation and is long lasting. However, it is very slow to establish from seeding. In terms of yield and recovery it would rank below orchard grass and perennial rye. The main use for Kentucky blue is on permanent pastures on lighter soils. In old established pastures on any soil it volunteers readily and, therefore, is often not included in the seeds mixtures.

Reed Canary Grass is primarily recommended for wet, poorly drained locations. Once established it will withstand flooding for considerable periods. It is extremely coarse if allowed to mature, and heavy close grazing is therefore required to maintain it in a palatable condition.

The fine turf or "bottom" grasses are not as widely used in pasture mixtures as formerly. Brown top and creeping red fescue are useful on light upland soils. Rough stalked meadow grass and crested dogstail require a good supply of moisture and will withstand some shading. Canada blue grass can hardly be considered as a fine grass but it serves much the same purpose in a mixture. On very light upland or very sandy soils Canada blue is a valuable species. Red top is a useful constituent of mixtures on wet soils or locations where drainage is not good, though not subject to prolonged flooding.

Red Clover is primarily a hay legume though it is useful in pastures, particularly to provide bulk in the early stages of the seeding. Under constant close grazing it has usually disappeared after one season. When cut for hay red clover provides a very heavy crop the first year and a moderate crop the second year. In the Fraser Valley the double-cut type of red clover predominates.

Alsike Clover also tends to be more valuable as a hay plant though like red clover it is useful in new seedings. At Agassiz, alsike has tended to withstand close grazing slightly better than red clover. Alsike is more tolerant of wet conditions than red clover.

Wild White Clover is the most useful pasture legume under Fraser Valley conditions. There are various strains or forms. The small-leafed, close growing wild white clover is indigenous to practically all Fraser Valley soils. Commercial white Dutch tends to be a mixture of large, short-lived types and small, persistent sorts. Ladino is a giant white clover which does not differ from wild white in the botanical sense except in respect to size of plant. Seed of well selected Ladino is quite long lasting under conditions of ample moisture and good fertility.

Alfalfa is not a particularly good pasture legume under Fraser Valley conditions. It is, however, a very valuable hay plant, particularly on the deeper, well drained soils.

MIXTURES FOR PERMANENT OR LONG TERM PASTURE

During the past twelve years four permanent pasture experiments comprising a total of 28 combinations have been concluded. Two separate experiments dealing with six varieties of white clover were also carried out. Experiments still in progress represent a further 17 mixtures of grasses and clovers. All of these combinations were intended for pasture only and are not regarded as suitable for hay. The average dry-matter production of a number of these experiments is presented in tabular form in the following section of this report. Conclusions and recommendations are summarized later.

PERMANENT PASTURE TRIAL, 1933 SERIES

This experiment contained six mixtures, sown in 1933, and clipped closely for seven successive years. The average total yields of dry matter for the seven-year period are given in Table 13.

TABLE 13.—AVERAGE TOTAL YIELD OF DRY MATTER, 1934–1940 INCLUSIVE, FOR SIX PERMANENT PASTURE MIXTURES SOWN IN 1933

Species and rate of seeding per acre (pounds)	Pounds of dry matter per acre							
	1934	1935	1936	1937	1938	1939	1940	Average 7 years
1. Timothy 20, early red clover, 6, alsike 2, wild white clover 2	3,366	4,000	2,630	4,850	3,558	4,203	4,763	3,910·0
2. Timothy 20, late red clover 6, alsike 2, wild white clover 2....	3,591	4,120	2,440	4,915	3,421	4,392	4,906	3,969·4
3. Timothy 12, orchard grass 10, alsike 2, wild white clover 2....	3,302	3,600	2,260	3,685	3,156	3,635	4,007	3,349·4
4. Perennial rye 16, orchard grass 10, alsike 2, and wild white clover 2.....	3,009	3,720	2,020	4,520	3,490	3,841	4,169	3,538·4
5. Perennial rye 30, wild white clover 2.....	2,750	3,020	2,160	5,025	3,777	4,657	4,581	3,710·0
6. Orchard grass 30, wild white clover 2.....	3,539	3,400	2,500	4,280	3,171	3,768	4,030	3,527·0
Necessary Difference (P = ·05)...	653·4	766·2	*	*	*	633·9	127·2	–

* 1936–1938 inclusive, difference between mixtures are not statistically significant.

In general, the productivity of the experiment as a whole held up over the seven-year period. In terms of the seven-year average, the first two mixtures containing timothy as the sole grass have given the highest yields. Timothy in combination with orchard grass and perennial rye with orchard grass have been lower yielding than either species alone. Perennial rye and wild white clover proved significantly better than orchard grass and wild white clover during the last two years of the experiment though this was not true in the early years.

TABLE 14.—AVERAGE CHEMICAL COMPOSITION OF 1933 SERIES OF PASTURE PLOTS

Mixture Number	Per Cent Composition, Dry Matter Basis Average, 1939–40		
	Crude Protein	Calcium	Phosphorus
1.....	22·67	0·92	0·33
2.....	22·71	0·99	0·33
3.....	21·55	0·87	0·39
4.....	22·27	0·94	0·40
5.....	24·51	1·09	0·37
6.....	21·33	0·95	0·44

The botanical data for this experiment, not shown in Table 13, indicated very high percentage of wild white clover in most mixtures and this more than any other factor accounted for the variation in yields as shown. Wild white clover tended to decrease somewhat in the mixture containing a very heavy rate of seeding for orchard grass. In the first two mixtures timothy did not persist to any marked degree and the high yields in later years are due almost entirely to wild white clover. Red clover and alsike did not persist after one or two years.

The data showing chemical analyses presented in Table 14, indicate a high feeding value for all mixtures, particularly in respect to protein. The higher protein and calcium content of mixture number 5, which consisted of perennial rye grass and wild white clover, is of particular interest.

PERMANENT PASTURE TRIAL, 1938 SERIES

This experiment was laid down to explore further the value of perennial rye grass as a permanent pasture species, and four different strains were sown, each in association with English wild white clover. A further objective was to obtain information on the value of meadow fescue as a pasture species when sown with perennial rye and with timothy. The experiment was clipped as pasture for five successive seasons.

The average total yields of dry matter for the years 1939-1943 inclusive are given in Table 15.

TABLE 15.—AVERAGE TOTAL YIELD OF DRY MATTER, 1939-1943 INCLUSIVE, FOR PERMANENT PASTURE EXPERIMENT SOWN IN 1938

Species and rates of seeding per acre (pounds)	Pounds of dry matter per acre					
	1939	1940	1941	1942	1943	Average 5 years
1. S-23 perennial rye 30, English wild white clover 2	3,409·6	5,834·5	5,183·4	4,533·3	4,282·1	4,648·6
2. S-101 perennial rye 30, English wild white clover 2	3,217·8	5,745·6	4,990·1	4,281·5	4,240·3	4,495·1
3. Hawkes' Bay perennial rye 30, English wild white clover 2	3,760·1	5,918·2	5,179·0	5,382·0	4,609·8	4,969·8
4. Victoria perennial rye 30, English wild white clover 2	3,429·5	6,042·1	5,188·2	4,941·3	4,411·3	4,802·5
5. Victoria perennial rye 20, comm. meadow fescue 10, English wild white clover 2	3,416·2	5,615·5	4,839·0	4·916·6	4,503·2	4,658·1
6. Timothy 20, comm. meadow fescue 10, English wild white clover 2	3,420·9	5,943·5	4,882·8	5,176·4	4,738·4	4,832·4
Necessary Difference (P — ·05)	Not significant			240·1	Not Significant	432·5

An examination of the average dry matter yields in Table 15 indicates that the Hawkes' Bay and Victoria perennial rye strains together with the timothy-meadow fescue combination were highest in yield. Statistical significance was not great, however, and according to the five-year average Hawkes' Bay was better than S-101 only. In 1942 Hawkes' Bay was better than all but the timothy-meadow fescue plots. The Welsh strain S-101 was poorer than all others in 1942. The mixtures containing meadow fescue yielded satisfactorily throughout.

According to results reported previously from this experiment, it was apparent that the superiority of the Hawkes' Bay strain was due to the fact that it developed much more quickly in the spring than any other variety. The leafy strains S-23 and S-101 were quite slow starting while in midseason cuts they frequently ranked highest. The actual differences in yield obtained from them were not sufficient, however, to offset the effect of lower spring yield.

The botanical composition of these plots as recorded during the duration of the experiment indicated that the strains S-23 and S-101 gave a denser stand than either Hawkes' Bay or Victoria. Meadow fescue quickly became the dominant grass species when sown with timothy. In a mixture with perennial rye, meadow fescue held a fairly constant position throughout, neither species dominating the other.

TABLE 16.—AVERAGE CHEMICAL COMPOSITION OF 1938 SERIES OF PASTURE PLOTS

Mixture	Per cent composition on a dry matter basis		
	Protein	Calcium	Phosphorus
1. S-23 perennial rye wild white clover	24·09	0·92	0·52
2. S-101 perennial rye wild white clover	22·13	0·95	0·48
3. Hawkes' Bay per. rye wild white clover	24·35	0·94	0·52
4. Victoria per. rye wild white clover	24·59	1·06	0·47
5. Victoria per. rye meadow fescue wild white clover	24·29	1·04	0·47
6. Timothy meadow fescue wild white clover	23·59	1·05	0·45

The above data in Table 16 showing chemical composition, indicate excellent quality in terms of protein, calcium and phosphorus for all strains and combinations. The small differences that appear between plots can hardly be considered significant. A possible exception is the protein content of the plots containing S-101 perennial rye, which tended to be slightly lower throughout the experiment.

PERMANENT PASTURE TRIAL, 1941 SERIES

This experiment, laid down in 1941, carried a total of eight combinations of grasses and clovers, and was intended to provide information not obtained in previous experiments. The principal species used, with the exception of red clover, are also included in the two experiments reported above. Wider variations in rates of seeding are included, however. In addition, a number of finer bottom grasses, notably crested dogstail, brown top and rough stalked meadow grass, are used in some of the mixtures. A further objective was to obtain additional information on the use of meadow fescue in combination with a wider range of grasses.

This experiment has been clipped closely to simulate pasturing for six successive years to date. The average total yields of dry matter are presented in Table 17.

In the 1941 series of plots from which yields are reported in Table 17, it is quite evident that differences in rates of seeding between species have failed to alter yield to any great degree. The simple combination of perennial rye and wild white clover has compared very favourably with more complex com-

binations. The use of bottom grasses has failed to give any noticeable superiority in yield. Orchard grass and timothy have proved to be good companion species with meadow fescue.

TABLE 17.—AVERAGE TOTAL YIELD OF DRY MATTER, 1942–1947 INCLUSIVE, FROM EIGHT PASTURE MIXTURES SOWN IN 1941

Species and rates of seeding in pounds per acre	lb.	Total yield of dry matter per acre—in pounds						
		1942	1943	1944	1945	1946	1947	Average 6 years
1. Perennial rye	14	4,546·5	6,058·0	7,391·8	6,132·8	5,293·0	3,373·3	4,903·7
Orchard grass	4							
Timothy	4							
Brown top	1							
Crested dogtail	1							
Wild white clover	2							
2. Perennial rye	14	3,815·9	5,408·8	6,761·8	5,628·5	5,123·9	3,239·0	4,996·3
Orchard grass	10							
Timothy	4							
Wild white clover	2							
3. Perennial rye	16	4,299·7	6,010·5	7,365·3	6,759·5	5,135·9	3,218·4	5,464·9
Wild white clover	2							
4. Orchard grass	12	4,268·3	5,705·8	7,472·6	7,086·3	5,626·8	3,533·2	5,615·5
Meadow fescue	6							
Rough stalked meadow grass	2							
Wild white clover	2							
5. Timothy	12	4,985·2	6,214·9	7,003·7	6,545·9	5,213·7	3,215·4	5,529·8
Meadow fescue	6							
Rough stalked meadow grass	2							
Wild white clover	2							
6. Meadow fescue	12	4,207·7	5,513·3	7,336·6	6,191·1	5,402·3	3,605·1	5,376·0
Orchard grass	6							
Rough stalked meadow grass	2							
Wild white clover	2							
7. Kentucky blue grass	3	5,125·5	6,499·3	6,926·5	6,771·9	5,095·5	3,585·7	5,667·4
Canada blue grass	3							
Rough stalked meadow grass	2							
Meadow fescue	6							
Timothy	6							
Wild white clover	2							
8. Kentucky blue grass	3	4,203·5	5,586·7	6,705·0	5,288·5	4,697·3	3,068·8	4,925·0
Canada blue grass	3							
Rough stalked meadow grass	2							
Perennial rye	6							
Orchard grass	6							
Wild white clover	2							

Botanical composition was checked regularly throughout the course of this experiment. The fine bottom grasses, such as brown top and rough stalked meadow grass, became most plentiful in the latter stages of the experiment or when productivity was beginning to lessen. Crested dogstail failed to develop to any significant degree. Kentucky blue grass and Canada blue grass were not sufficiently plentiful to influence yields significantly. From the standpoint of plant composition it was quite evident that yield was determined by the main species, orchard grass, perennial rye, meadow fescue and wild white clover.

Data as to the chemical composition show that all mixtures were of high quality. The mixtures with the highest protein tend also to be higher, in calcium

and phosphorus (*see* Table 18). In every instance samples for chemical analysis were taken in the early fall. This would account for the very high calcium values as shown.

TABLE 18.—AVERAGE CHEMICAL COMPOSITION OF 1941 SERIES PERMANENT PASTURE EXPERIMENT

Mixture	Per cent composition on a dry matter basis		
	Protein	Calcium	Phosphorus
1. Perennial rye, orchard grass, timothy, brown top, crested dogstail, wild white clover	26·23	1·31	0·44
2. Perennial rye, orchard grass, timothy, wild white clover	22·54	0·99	0·36
3. Orchard grass, meadow fescue, rough stalked meadow grass, wild white clover	24·37	1·26	0·44
4. Perennial rye, wild white clover	25·38	1·34	0·40
5. Timothy, meadow fescue, rough stalked meadow grass, wild white clover	26·59	1·35	0·46
6. Meadow fescue, orchard grass, rough stalked meadow grass, wild white clover	23·59	1·08	0·44
7. Kentucky blue grass, Canada blue grass, rough stalked meadow grass, timothy, wild white clover	26·68	1·17	0·45
8. Kentucky blue grass, Canada blue grass, rough stalked meadow grass, perennial rye, orchard grass, perennial rye, orchard grass, wild white clover	22·53	0·99	0·37

TEST OF WHITE CLOVER VARIETIES FOR PASTURE

A replicated experiment containing seven varieties of white clover, each sown at 2 pounds with perennial rye at 16 pounds per acre, was sown in 1933 and carried until 1938. An additional test of five of the seven varieties was laid down in 1934 and clipped up to 1939. The yields from the two experiments are summarized in the following tables.

TABLE 19.—AVERAGE TOTAL YIELDS OF DRY MATTER OF SEVEN VARIETIES OF WHITE CLOVER, 1934 TO 1938 INCLUSIVE

Variety	Pounds per acre dry matter					
	1934	1935	1936	1937	1938	Average years
Commercial white Dutch	1,800	2,580	2,640	4,640	2,680	2,868
English wild white	1,940	3,260	4,120	7,820	3,710	4,170
Mammoth white (Ladino)	2,520	3,280	3,360	7,300	4,075	4,107
Morso	1,500	1,560	2,800	5,640	2,675	2,835
N.Z. wild white, Ott. 785	2,060	2,880	2,660	5,360	2,915	3,175
N.Z. wild white, Ott. 788	1,760	3,460	2,920	5,180	2,905	3,245
Stryno	1,500	2,640	2,360	4,220	2,400	2,624

TABLE 20.—AVERAGE TOTAL YIELDS OF DRY MATTER OF FIVE VARIETIES OF WHITE CLOVER, 1935 TO 1939 INCLUSIVE

Variety	Pounds per acre dry matter					
	1935	1936	1937	1938	1939	Average 5 years
Commercial white Dutch	7,700	3,380	5,040	2,920	5,411	4,890·2
Mammoth white (Ladino)	5,480	4,140	7,200	4,735	8,224	5,955·8
Morso	9,620	3,620	4,860	3,415	5,610	5,425·0
Stryno	8,800	4,240	5,720	3,810	4,714	5,456·8
English wild white	8,260	3,760	5,940	3,965	6,381	5,661·2

In the first trial there is no significant difference between English wild white and Mammoth white. In the second test Mammoth white or Ladino appears better than English wild white. English wild white was slightly more persistent than Ladino in the first series, whereas, in the second trial, both survived equally well. New Zealand wild white clover was very similar to English wild white clover in general appearance and proved equally as persistent.

Experiments currently being conducted, however, indicate a wide margin of superiority in favour of Ladino (Mammoth) white clover over English wild white.

PERMANENT PASTURE EXPERIMENT, 1946 SERIES

Although this experiment is in the initial stages it is deemed worthy of mention, since it tests a number of points not dealt with in the experiments reported previously. A comparison is permitted between four grasses as companion species with Ladino. Wider use is made of meadow fescue than in earlier trials and red clover is included in two combinations with a view to further determining its usefulness in providing bulk in the initial phase of the seeding.

Results to date indicate that Ladino becomes established very quickly and outyields similar mixtures using wild white clover by a wide margin. Perennial rye and orchard grass both show promise as companion species for meadow fescue. Timothy and meadow fescue are proving rather low yielding, chiefly on account of the fact that both are rather slow in becoming established.

CONCLUSION AS TO MIXTURES FOR PERMANENT OR LONG-TERM PASTURE

On the basis of the experiments cited on the preceding pages the following conclusions are drawn.

1. Heavy rates of seeding per acre are justified for long-term pastures.
2. There is surprisingly little difference in yield between mixtures of adapted grasses and white clover provided they are sown on a fertile, well prepared seed-bed and subjected to uniform grazing.
3. The most useful grasses for long-term pastures are orchard grass, perennial rye, and meadow fescue.
4. Timothy is less able to withstand severe grazing than other common grasses but is a useful constituent, particularly on heavy soil.
5. Under conditions of good fertility, Kentucky blue grass and Canada blue grass are of doubtful value in the seeds mixture, except possibly under upland conditions. Kentucky blue is indigenous and tends to creep in voluntarily in later years.

6. Bottom grasses or fine sod grasses such as brown top, crested dogstail and rough stalked meadow grass, have not shown any particular value at Agassiz.
7. Results obtained to date fail to indicate any particular advantage in using a complex mixture of several species for permanent pasture.
8. Ladino clover and wild white clover are the most valuable pasture legumes.
9. Red clover and alsike are useful only in providing added bulk in the first year. Under close grazing both disappear quickly, especially red clover.
10. While orchard grass tends to overcome other grasses in the mixture it remains the most productive species in the dry midsummer period.
11. Perennial rye is an excellent companion species for white clover. Tests with different strains show no advantage in total yield in favour of leafy old country strains, though these held up slightly better in midsummer.

RECOMMENDED LONG-TERM PASTURE MIXTURES FOR THE FRASER VALLEY

Light Upland Soils:

Kentucky blue grass	3 lb. per acre
Orchard grass	6 " " "
Meadow fescue	6 " " "
Red clover	3 " " "
Ladino or wild white clover	2 " " "

Medium to Heavy Soils:

(*a*) Perennial rye grass	20-30 lb. per acre
Ladino or wild white clover	2 lb. per acre
(*b*) Perennial rye grass	14 lb. per acre
Orchard grass	5 " " "
Meadow fescue or timothy	4 " " "
Ladino or wild white clover	2 " " "

RECOMMENDED CULTURAL PRACTICES FOR PERMANENT PASTURE

The importance of high soil fertility cannot be over-emphasized in selecting land for permanent pasture. It is also desirable to choose a field that is comparatively free of weeds in order to obtain quick establishment of grasses and clovers. Generally speaking, at Agassiz the best stands have been obtained where seeding has been without a nurse crop. Seeding of the nurse crop of grain at one-half the normal rate is permissible. A further alternative is to remove the grain crop early for hay. The grazing of permanent pastures during the seeding year is justified provided care is exercised to prevent overgrazing. A more recent practice that is gaining in popularity is to seed with a nurse crop and then graze the nurse crop at the pasture stage.

Spring seeding of mixtures of grasses and clovers has proved most successful at Agassiz. Grasses do well if sown in the fall but the reverse is true of the clovers. The seed-bed should be fine in texture and firmly packed before seeding. Care should be exercised to prevent too deep coverage of seeds. Rolling immediately after seeding is recommended.

During the pasture period, intensive, rapid grazing followed by adequate rest periods, and the use of the harrow and mower immediately after the stock are removed, ensure a thick, even sward of high feeding value.

MIXTURES FOR HAY AND PASTURE

A very large part of the pasture acreage in the Fraser Valley is obtained from dual-purpose mixtures. The first year's crop and occasionally that of the second year is cut for hay or silage. In subsequent years the mixtures are pastured for varying periods, depending on productivity. Under average dairy farming conditions in the Fraser Valley such combinations could well constitute the greater part of the seeded acreage, since the barn feeding period is fully six months.

In general, red clover forms the basis of hay-pasture combinations. Grasses are seeded at much lighter rates than for permanent pasture and the same species are used with the addition of Italian rye grass, a bulky, short-lived grass described earlier in this report. Where pasturing is intended, following the removal of the hay crop, wild white clover or white Dutch is generally included.

HAY-PASTURE TRIAL, 1939 SERIES

This experiment, sown in 1939 with a nurse crop of oats, contained a total of eight combinations. The plots were cut for hay in 1940 and clipped closely at frequent intervals for three successive years commencing in 1941. One mixture was what might be termed a straight hay mixture in that it did not contain white clover. This was included for comparison and further to check on the rapidity with which native white clover would volunteer. Yields of dry matter in pounds per acre, from this 1939 hay-pasture trial, are shown in Table 21 .

The first point of interest in the yields presented in Table 21 is that in each of the three pasture years the production of dry matter has been considerably less than in the first year when all plots were cut for hay. A further examination of the trend in production from year to year shows a rise in the second year of grazing (1942) and a drop in the third year, a course which cannot be explained by comparative rainfall, since 1941 and 1943 were both wetter during the clipping period than was 1942. In 1943, however, fewer cuts were taken and a longer rest period was allowed.

With regard to individual mixtures, differences are significant in three seasons. In the hay year plot number 6 is better than the first four combinations, and 7 and 8 are superior to the first three. For the first year of clipping (1941) the only point of significance is that the hay mixture (No. 7), is poorer than all others. In 1942, mixtures 3, 5 and 8 are better than number 7. The data for 1943 lack significance but on the basis of apparent differences mixture number 6 is outstanding and 5 and 8 have given good yields. According to the five-year average 6, 8 and 5 are the highest three in yield.

On the basis of the species used and comparative rates of seeding, it is quite apparent that the small degree of variation between certain pairs of mixtures is of little consequence. For example, in the first two combinations, alternating the rate of seeding early and late red clover and substituting timothy for Italian rye has had little effect on yield. In mixtures 3 and 4 alternating orchard grass and perennial rye as the dominant species has not given any significant difference. A similar condition also exists for 5 and 6 although the substitution of meadow fescue for timothy has given a higher apparent yield. Mixtures containing Italian rye grass at 4 pounds per acre appear better in the hay year than those using this species at half that rate.

The hay mixture, number 7, has yielded well in the first year but under clipping it is quite evident that volunteer wild white clover has not come in sufficiently to influence production. Combination number 8, containing a blend of rye grass strains, has performed well, but there is nothing to indicate that the strains used were of any importance. Rather, it would appear that the high total rate of seeding is the principal factor. In respect to mixture number 6, there is

TABLE 21.—TOTAL PRODUCTION OF DRY MATTER FOR 1940-1943 INCLUSIVE
1939 SERIES HAY-PASTURE EXPERIMENT

Mixtures and rates of seeding in pounds per acre	lb.	Total yield of dry matter per acre—in pounds				
		Hay	Pasture			
		1940	1941	1942	1943	Average, 3 years pasture
1. Orchard grass	4	8,633·5	4,040·9	4,365·1	3,628·7	4,011·6
Perennial rye	4					
Timothy	2					
Late red clover	6					
Early red clover	3					
Alsike	2					
Wild white clover	1					
2. Orchard grass	4	8,125·5	4,135·0	4,313·3	3,544·0	3,997·4
Perennial rye	4					
Italian rye	2					
Late red clover	3					
Early red clover	6					
Alsike	2					
Wild white clover	1					
3. Orchard grass	8	8,478·5	4,054·7	4,483·1	2,974·7	3,837·5
Perennial rye	4					
Italian rye	2					
Timothy	3					
Late red clover	4					
Early red clover	2					
Alsike	1					
Wild white clover	2					
4. Orchard grass	4	8,921·5	4,204·0	4,419·1	3,502·9	3,042·0
Perennial rye	8					
Italian rye	2					
Timothy	3					
Late red clover	4					
Early red clover	2					
Alsike	1					
Wild white clover	2					
5. Perennial rye	6	9,102·5	4,279·3	4,628·1	3,377·0	4,094·8
Italian rye	4					
Timothy	3					
Late red clover	3					
Wild white clover	2					
6. Perennial rye	6	10,425·5	4,259·5	4,248·4	4,410·9	4,306·3
Italian rye	4					
Meadow fescue	3					
Late red clover	3					
Wild white clover	2					
7. Timothy	3	10,218·5	3,329·1	3,952·9	2,986·0	3,422·7
Orchard grass	2					
Late red clover	9					
Alsike	2					
8. Perennial rye (Com.)	10	10,222·5	3,999·0	4,545·6	3,455·2	3999·99
Per. rye (Ayrshire)	4					
Per. rye (Sutton's P.S.)	2					
Italian rye	4					
Timothy (S-51)	2					
Late red clover	3					
Alsike	1					
Wild white clover	1					
S.E. of Experiment		4·6455	0·657	1·5149	-	-
F (obtained)		3·70	7·59	2·57	-	-
Necessary Difference (P —·05) — pounds		1,364·0	326·9	500·9	-	-

little to indicate the superiority of this mixture other than the fact that it contains meadow fescue. It is, further, not significantly better than the companion mixture with timothy.

The yield data for this experiment listed in Table 21 have thrown little light on the question of the superiority or otherwise of mixtures intended for hay and pasture, as compared with combinations for pasture alone, since a direct comparison was not made. In general, the yields of dry matter have been quite good under simulated close grazing and compare favourably with some permanent pasture experiments. It has been shown that wild white clover should be included in the initial seeding. A further point of possible significance is that mixtures giving the highest yields of hay have produced the highest yields under close clipping.

Botanical analysis of these plots in the spring and fall of each year indicated a rapid disappearance of red clover and alsike. Timothy also disappeared quickly. Wild white clover on the other hand showed fairly consistent increases.

Results from chemical analysis of pasture herbage clipped from this experiment showed calcium and phosphorus content to be almost identical with that obtained in permanent pasture mixtures. Protein content proved slightly lower, however, probably as a result of lower white clover content.

HAY-PASTURE TRIAL, 1946 SERIES

This experiment contains a total of seven mixtures. One objective is to obtain information on the use of Ladino clover as a substitute for both alsike and white clover. Secondly, wider comparisons are permitted between the main species, orchard grass, perennial rye and meadow fescue, than was possible in the 1939 series.

The results up to the time covered by this report must be regarded as preliminary but are of interest, nevertheless. In the first two cuts for hay, mixtures containing both alsike and wild white tended to be superior to Ladino. In the pasture clippings taken in the fall the reverse was true, the Ladino plots being markedly better. Also in the hay crop the substitution of Ladino clover for red and alsike resulted in a very serious drop in yield. It would appear, therefore, that the main justification for including Ladino in a dual-purpose mixture is to provide pasturage following cropping for hay. Red clover and alsike still remain best for hay yield. Ladino, by virtue of its taller growth, becomes established much more readily than wild white clover in a dense hay seeding containing a large amount of red clover.

CONCLUSIONS AS TO MIXTURES FOR HAY AND PASTURE

1. Excellent hay yields have been obtained provided a heavy seeding of red clover (at least 6 pounds per acre) was included.
2. The yield of pasture tended to be below that of the best permanent pastures, though this was not fully established by direct comparison within the same experiment.
3. Moderately heavy seedings of grass are advantageous in the pasture period.
4. The grass species are the same as for permanent pasture except that Italian rye can be used to advantage, particularly in the hay years.
5. The cutting of a heavy hay crop tends to militate against the establishment of wild white clover.
6. Ladino clover, by virtue of its taller growth, is better able to meet the competition of red clover in the early stages of the seeding.

7. Ladino, as a substitute for both alsike and wild white clover, lowers hay yield slightly, but enhances pasture yield considerably.
8. Ladino clover is not a satisfactory substitute for red clover in the hay mixture.
9. As in the permanent pasture experiments, there appears to be considerable latitude in respect to proportions of each species in the mixture.

RECOMMENDED HAY-PASTURE MIXTURES FOR THE FRASER VALLEY

One Year Hay and Three Years Pasture

Light to Medium Soils:

Perennial rye grass	8 lb. per acre
Italian rye grass	3 " " "
Orchard grass	4 " " "
Red clover	6 " " "
Ladino clover	2 " " "

Alsike at 2 pounds and wild white at 1 pound may be substituted for Ladino.

Medium to Heavy Soils:

Timothy (or meadow fescue)	8 lb. per acre
Italian rye grass	3 " " "
Perennial rye grass	3 " " "
Red clover	6 " " "
Ladino	2 " " "

Alsike at 2 pounds and wild white at 1 pound may be used in place of Ladino.

MIXTURES FOR HAY AND SILAGE

Combinations of clover and grasses intended primarily for hay or silage fit well into a short rotation. It must be admitted, of course, that these also provide a certain amount of pasture—for example, after the removal of the grain crop in the year of seeding and in the fall or late summer after the cutting of the hay crop.

Where hay or silage is the main consideration, red clover constitutes the basis of the mixture. Sown alone it will produce very heavy yields for one year. Lodging, however, is a serious drawback. In a mixture with a tall growing grass, lodging is largely overcome and in the following year diminished yield of red clover is offset by increased growth of grass. Timothy, orchard grass and Italian rye are the most widely used grasses. On heavy soils, particularly, timothy is an excellent companion species for red clover. Orchard grass is excellent on the lighter soils and Italian rye grass, a biennial species, is good on both heavy and light soils. Both orchard grass and Italian rye grass are frequently criticized as being rather too early in maturity for first-crop hay, a characteristic which is shared by the common double-cut red clover. In other words, they reach the blooming stage in late May or early June, a period when the weather is generally unsatisfactory for making hay. This objection can be overcome by removing the first crop for silage. Also the cutting of the first crop for silage at the bloom stage ensures a heavier second crop for hay in July than would be the case if the first cutting were delayed to a more mature stage through waiting for favourable hay-making weather.

A further possibility is to pasture hay fields well into May and thus delay blooming until late June or early July. This practice tends to lessen total hay yield for the two cuttings. In addition, pasture is very plentiful in the

spring period and grazing of hay fields at that time may result in neglect of permanent pastures. Timothy is later maturing than either orchard grass or Italian rye. In a mixture with common double-cut red clover, timothy is slower in reaching the bloom stage than the red clover, but this is not a disadvantage since the grass at the early-heading stage is very high in protein. Accordingly, the stage for cutting of a timothy-red clover mixture should be determined by the maturity of the clover. Mammoth or late red clover blooms at about the same time as timothy and the two make an excellent mixture on heavy soils. Mammoth red clover does not develop quite so quickly from seeding as common red clover but holds up better in the second year.

RECOMMENDED MIXTURES FOR HAY AND SILAGE

Light to Medium Soils:

Italian rye grass	3 lb. per acre
Orchard grass	3 " " "
Red clover	9 " " "
Alsike	2 " " "

Medium (clay loams) and Heavy (clays) Soils:

Timothy	8 lb. per acre
Italian rye grass	4 " " "
Red clover	6 " " "
Alsike	2 " " "

In the heavy soil mixture mammoth red clover may be used, or one-half common and one-half mammoth.

ANNUAL SPECIES FOR HAY AND PASTURE

Annual crops such as the cereal grains, annual grass species, and peas, etc., have a limited place in the forage cropping program, principally as a supplementary or emergency source of feed. In experiments up to the time covered by this report, oats have been the most efficient crop for this purpose. Oat varieties differ to some extent in suitability for hay and pasture. Victory and Eagle are almost identical in forage yield at Agassiz. The variety, Beaver, ranks quite high and outyields Victory by a fairly wide margin. Other promising varieties of oats for pasture are Erban or Gopher. For later seeding, say after June first, an early-maturing variety is usually preferable, such as Ajax or Gopher.

A mixture of Victory oats at 2 bushels and peas at 1 bushel has not significantly outyielded Victory alone but gives a better quality of pasture. Up to the time of writing, millets and sudan grass, sown either alone or in mixtures with oats, have not been equal to oats alone. Generally speaking, growing temperatures in the Fraser Valley are too low for the satisfactory development of heat-loving species such as millet or sudan grass. The same holds true of soybeans as an annual hay crop. In addition, soybeans are not ready for cutting until early September, a period that is not suited to hay curing.

For an emergency silage crop or for areas not suited to corn the old standby of oats, peas and vetches (O.P.V.) remains the best choice. This mixture is usually made up as follows: oats 60 pounds, peas 20 pounds, and vetch (spring) 40 pounds per acre.

As an emergency fall or early spring pasture, fall rye is the best cereal crop. For fall pasture, seeding should be prior to September 15 under most conditions. A mixture of fall rye at 80 pounds and winter vetch at 40 pounds per acre has

given good results at Agassiz. Vetches do not make very much growth in the fall, however, and such a mixture produces its heaviest growth the following spring.

In growing cereal crops for pasture heavier rates of seeding than normally used for grain are suggested. In the case of oats the rate of seeding can be increased by one-half bushel, making a total of 3½ bushels or 120 pounds per acre. In the case of fall rye, seeding at 2½ bushels or 140 pounds per acre has given very good yields. Some judgment should also be exercised in pasturing cereals, particularly oats. Once an oat crop has started to head, the recovery after grazing is very poor. Grazing should be started when the crop is approximately 8 inches tall. Rapid, uniform grazing is also advisable. Immediately after removing the animals the mowing of ungrazed plants will lengthen the life of the stand. If used for hay, oats should be cut at the milk stage. For silage, it is preferable to delay cutting until the oats are in the early dough stage.

ALFALFA

Alfalfa is a valuable hay crop in certain areas of the Fraser Valley. The soil types to which it is adapted are those which possess an open, naturally well drained subsoil. On the soil survey map of the lower Fraser Valley, the soils possessing these characteristics are listed as the Everett and Lynden Series. The drained soils, which occur in the Agassiz, Chilliwack, Nicomen Island and Sumas areas, are also well suited for growing alfalfa. The Lynden and Everett series are upland soils and appear principally in the higher portions of the Abbotsford, Aldergrove and Surrey districts. In addition to the physical characteristics of the soil areas listed, it is essential to have a plentiful supply of lime and a high state of fertility. A weed-free location is also desirable, since alfalfa in the early stages of growth is a very poor weed competitor.

VARIETIES OF ALFALFA

Grimm and Ontario and Variegated are both well suited to Fraser Valley conditions. In terms of yield and recovery there has been no significant difference between the two kinds. Seed of Grimm, however, is more readily obtainable. Ladak does quite well but does not equal the yield of Grimm in the second cutting. Conditions are such that the extra hardiness and drought resistance of Ladak are not required. The newly licensed variety Rhizoma, originally developed at the University of British Columbia, has shown promise in preliminary trials, and is expected to receive wide acceptance in the next few years. This variety differs from those mentioned above in that it tends toward a creeping rooted habit and is, therefore, likely to prove a better competitor with sod grasses.

BROADCAST VERSUS ROW SEEDING OF ALFALFA

It has been proved by earlier experiments that under conditions where broadcast stands of alfalfa are difficult to establish good catches can be obtained by seeding in spaced rows 28-36 inches apart. A further argument in favour of row seeding is that the encroachment of sod grasses is readily checked by cultivation.

In order to obtain more complete data on the comparative effectiveness of the two methods of seeding an experiment using four varieties of alfalfa was started in 1939. In this trial each variety was sown broadcast in a pure stand and in rows spaced 28 inches apart. The yield data for the experiment are summarized in Table 22.

TABLE 22.—AVERAGE YIELDS OF DRY MATTER AND HAY FOR 4 VARIETIES OF ALFALFA UNDER TWO SYSTEMS OF PLANTING, 1940-1942

Variety	Yields in tons per acre							
	1940		1941		1942		Average 1940-42	
	Dry Matter	Hay—15% Moisture	Dry Matter	Hay—15% Moisture	Dry Matter	Hay—15% Moisture	Dry Matter	Hay—15% Moisture
	Broadcast Sowing (Total of 2 Cuts)							
Ontario Variegated	2·53	3·02	4·09	4·81	3·51	4·13	3·38	3·99
Grimm	2·00	2·35	3·84	4·51	3·25	3·82	3·03	3·56
Ladak	1·61	1·91	3·43	4·01	2·61	3·07	2·55	3·00
Hybrid Self-Pollinating	1·08	1·27	3·39	3·98	2·71	3·19	2·39	2·81
	Row Sowing (Total of 2 Cuts)							
Ontario Variegated	4·09	4·80	4·75	5·59	3·67	4·31	4·17	4·90
Grimm	4·15	4·87	4·28	5·03	3·35	3·94	3·93	4·61
Ladak	3·99	4·67	4·67	5·49	3·07	3·61	3·91	4·59
Hybrid Self-Pollinating	3·73	4·39	3·96	4·65	2·78	3·27	3·49	4·10
Difference in favour of rows	2·18	2·54	0·72	0·86	0·20	0·23	1·03	1·21

The yield data in Table 22 show a marked advantage in favour of the row method in the first harvest year, followed by a rather sharp drop in relative superiority during subsequent seasons. A further feature was that the hay from the row plots was decidedly lower in quality, being much coarser and rather difficult to cut. In addition, the raking and handling of the alfalfa grown in rows resulted in a very dusty hay. A further practical disadvantage was the added cost of cultivating the row stands which over a few years would readily offset a slight increase in yield.

In view of these considerations and further on account of the decline in superiority of the row seeding in subsequent years, it was concluded that the row method offered no advantage.

Corn Hybrids for Ensilage

During the years 1939-1947 inclusive, 67 different corn hybrids have been tested for silage purposes in replicated experiments at Agassiz. Commencing in 1942 a number of these were tested on a private farm in the Chilliwack district and on Illustration Stations in the North Okanagan area, principally at Armstrong. At the same time these experiments also included a number of the familiar named or open-pollinated varieties.

From these experiments some interesting points have come to light in addition to determining the merits of specific varieties or hybrids. The first matter of importance is the question of the relative superiority of hybrids in general over the open-pollinated varieties. In regard to yield alone there was frequently not very much difference. This was especially true of tests on the highly fertile soil at Chilliwack. However, in respect to a strength of stalk the hybrids were invariably superior. Cob development was also inclined to be better in the hybrids and maturity was definitely more uniform. It was also noted that the

performance of a given open-pollinated variety varied widely from year to year depending on where the seed was obtained. Frequently a so-called early strain of Golden Glow, for example, would prove quite late maturing and vice versa. This factor of variability or uncertainty in respect to open-pollinated varieties is an important objection to their use. The hybrids on the other hand were of known breeding and performed uniformly from year to year. However, there are very large numbers of hybrids on the market and each of these was developed to meet a specific set of conditions. Accordingly, it is necessary to have a knowledge of the performance of each hybrid and of the conditions for which it was developed.

Generally speaking, the Wisconsin group of hybrids has given the most consistent performance. A number of these are now grown for seed in Canada and these are sold under the designation: "Canada". The numbers assigned to these are the same as for the equivalent Wisconsin hybrids. A low number, for example, indicates early maturity, and a high number late maturity. At Agassiz, hybrids of this group tested ranged from 255 to 690. By and large, early and medium-early hybrids are required for Fraser Valley and North Okanagan conditions.

Fig. 13.—Recording information on hybrid corn tests at Agassiz.

RECOMMENDED CORN HYBRIDS FOR SILAGE

Fraser Valley:

Canada 355—Heavy soils and abundant moisture.
Canada 531—General use.
Canada 645 or 676—where corn is grown for green fodder (soiling).

Open-pollinated varieties:

Golden Glow (early strain)
Northwest Dent
Minnesota 13.

North Okanagan:

Canada 355—Early.
Canada 531—Medium maturity.
Canada 625—Green fodder only.

Soybeans

The testing of soybeans has been carried out on an extensive scale at this Farm over a period of several years. For the past ten years the objective has been solely to obtain early-maturing varieties that would yield sufficiently well to be satisfactory as a grain crop, or in other words, provide a home-grown protein concentrate. In earlier years consideration had been given to the possibilities of soybeans as an annual hay crop and the disadvantages have already been mentioned in an earlier section of this report (*see* Annuals for Hay and Pasture, page 45.

In these experiments a total of 93 different varieties and strains have been tested for grain production. In addition, small scale plantings were made on a number of Illustration Stations. Small acreage plantings of three varieties were also grown for seed on the Agassiz Experimental Farm. For the most part the material tested had belonged to the early-and medium-maturing group.

From the results that have been obtained to date, soybeans have not shown any great promise as a grain crop for the Fraser Valley. Early sorts have been

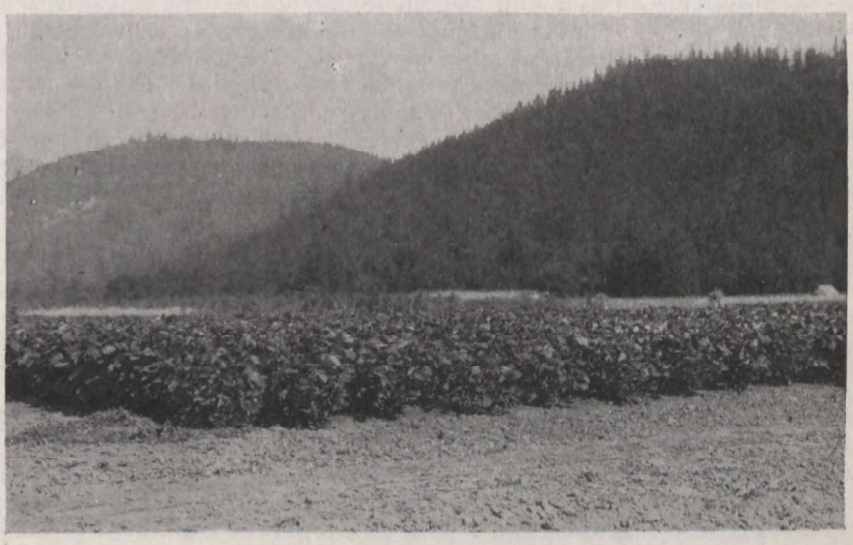


Fig. 14.—A good crop of soybeans at Agassiz.

found which ripen satisfactorily but the yields of seed are rather low, particularly when it is considered that soybeans are a hoed crop and cultural costs are high. In periods of extremely high prices for concentrates, soybeans might have a place; otherwise other types of cash crops would be preferable.

The long-term averages of six named varieties that have been grown fairly successfully at Agassiz are given in Table 23.

TABLE 23.—SUMMARY OF RESULTS OBTAINED WITH SIX VARIETIES OF SOYBEANS, 1939–1942

Variety	Height	Days to mature	Weight per measured	Weight per 1,000 kernels	Average yield per acre
	in.		lb.	gm.	bu.
Pagoda	34·2	126	56·0	142·0	23·5
Kabott	34·6	131	56·5	202·4	23·6
Goldsoy	32·6	133	57·5	177·6	27·2
Manitoba Brown	23·0	117	54·5	191·2	23·2
Wisconsin Black	35·0	124	59·0	137·2	23·7
Mandarin	40·6	145	57·0	198·8	31·0

According to the above table, Mandarin is the highest yielding variety. However, the fact that it requires 145 days to mature makes it rather too late for field production. If planted about May 10 it would not be ready for harvest until early October. Goldsoy, the second highest yielding variety, is also faulted somewhat for late maturity, particularly if grown on a heavy soil. The variety Pagoda ranks with Kabott in yield, but has the advantage of being five days earlier on the average. Manitoba Brown is by far the earliest variety tested but it is faulted on account of its pronounced tendency toward shattering. Under field conditions this would lead to serious losses. Wisconsin Black is faulted for its tendency toward lodging and on account of its coloured seed coat. Owing to their colour and other weaknesses, Manitoba Brown and Wisconsin Black are no longer regarded as commercial varieties. The others mentioned are all yellow-seeded varieties of excellent commercial quality.

With regard to the strains tested, a few of these show some further promise over Pagoda. These, however, require some further selection before being developed into varieties.

Grass Seed Production

Studies with different species of grasses for seed production have been conducted at Agassiz over a period of several years. The first objective was to determine the species offering the most promise as seed crops under Fraser Valley conditions, and, secondly, to compare the relative merits of broadcast or solid seeding over sowing in spaced rows.

From the results to date, the grasses which produce good yields of seed at Agassiz are as follows: Italian rye grass, perennial rye grass, orchard grass, meadow fescue, and tall oat grass. Fair yields of seed were obtained from Chewing's fescue, creeping red fescue, Kentucky blue grass and brown top. In view of climatic conditions and further on account of local demand, orchard grass and perennial rye are the species offering the most promise as a cash

crop in the Fraser Valley. Both of these are species that are widely used and at present seed supplies are almost entirely imported from outside Canada. The other species listed are relatively hardy and large-scale production is the rule in other established seed-growing areas.

Seeding of all grasses in rows spaced 24-36 inches apart has given markedly superior yields over broadcast or close-drilled seedings at Agassiz. Considering the average seed yield of the species mentioned in the preceding paragraph as 100, the average for close drilled plots (7-inch spacing) was 49·5 in three separate experiments over a six-year period. The wide row spacing, moreover, makes it easy to suppress weed growth, especially in the early stages of the stand. Should roguing of undesirable plants be necessary this is also facilitated in a spaced-row seeding.

Under row conditions, yields of perennial rye have ranged from 150-600 pounds per acre with yields occasionally as high as 1,000 pounds. Orchard grass ranges from 150 pounds to as high as 600 pounds, a good average yield being in the neighbourhood of 400 pounds per acre. There are a number of specialized considerations governing grass-seed production and for further information the reader is referred to the circular prepared at this station, entitled "The Production of Orchard and Perennial Rye Grass Seed". Copies of this circular are obtainable by writing to the Superintendent of the Dominion Experimental Farm, Agassiz, B.C.

Seed Production With White Clovers

Limited seed production studies conducted in 1937 and 1938 with the low-growing types of white clover, namely English wild white and New Zealand wild white, indicated that good yields of seed were possible. In this work, yields ranged from 72-227 pounds of seed per acre. In 1941, seed yield was taken from a multiplication block of Agassiz-grown wild white and only 45 pounds of seed per acre were obtained.

More extensive studies have been made with Ladino clover. Up to the time of writing, however, yields have been lower than for the wild white types under Agassiz conditions. The chief difficulty has been the tendency of Ladino clover to maintain heavy vegetative growth continuously during the entire growing season. This has interfered with the set of blossom to some extent, and, more important, has favoured the germination of early set seed or in many instances the rotting of the earlier set heads. Owing to the rank, heavy growth continually moist conditions persist in the bottom of the stand. Blooming of the clover extends over a considerable period, commencing in the latter part of June and extending throughout July. As the early heads ripen the stems tend to die back and the seed heads fall into the bottom of the stand where germination or rotting takes place.

In Ladino seed production it is generally considered good practice to graze the stand closely in the spring up to about three or four weeks of the onset of blooming. The field is then enclosed for seed. In the experiments at Agassiz, different variations were tried in early clipping treatments. In general, the practice of enclosing the stand early in June gave the highest seed yield. Clipping at later periods, with the objective of lessening vegetative growth, actually resulted in lessened seed yield owing to the fact that the blooming period was interfered with. The use of colonies of bees to encourage pollination has not had any particular success at Agassiz. Ladino frequently appears unattractive to bees, possibly as a result of there being a wide range of other plants flowering at the same time. Seed yields obtained so far at this Farm range from 22-51 pounds per acre for Ladino. Other possibilities exist in regard to increasing seed yields and these are currently being investigated.

Sugar Beet Seed Production

The production of sugar beet seed by the overwintering method is an established industry in the Ladner district of the lower Fraser Valley. By this method sugar beets intended for seed production are sown in July in spaced rows, the plants producing a seed crop the following season. This means a great saving is obtained in respect to labour and storage, since lifting and pitting are not required.

Starting in 1940, when this industry was being contemplated, a series of experiments was run to determine if the method was feasible for local conditions. Tests were set out on the Experimental Farm and on private farms in the Chilliwack, Abbotsford and Ladner districts. Seeding dates varied at two-week intervals throughout July and August up to mid-September in the first tests. Winter survival was good with all dates up to August 15. Seed yield data were not reliable, however. In the second series of experiments, seeding started in mid-July, extending to September first. Good survival was obtained with plantings up to August 15. The earlier dates, however, gave much superior yields of seed, as evidenced in the following table.

TABLE 24.—COMPARISON OF SEED YIELD FOR 3 DATES OF SEEDING SUGAR BEETS

Date of sowing	Yield of seed in pounds per acre	
	Agassiz	Ladner
July 14–15	1,865·9	3,237·9
August 1–2	1,222·9	2,259·3
August 15	1,017·9	1,928·3

Production of Forage Seed Stocks

Forage seeds for distribution have been produced on this Farm under three categories, Certified, Registered and Foundation. The policy in respect to seed produced for sale has been very flexible, inasmuch as it has been concerned with seeds for which there was a particular need, and which were not available locally or in ordinary channels. This would apply particularly to new varieties or varieties that were developed here. No effort has been made to continue year after year producing seed of a given variety and in some years no seed was produced. Any material developed at this Farm would be grown consistently as a source of foundation seed. Seeds grown on the Experimental Farm are intended for sale to established seed growers or seed-producing institutions.

Ladino clover seed is at present grown for certification. Formerly, small acreages of Kabott and Mandarin soybeans and Tip Top mangel were grown for certification. Under the category of registered seeds were Pagoda soybean and Tip Top mangel, production of both having been discontinued.

Foundation seed of Pacific perennial rye grass is maintained at Agassiz. This variety was developed at this Farm and licensed in 1942.

Plant Introductions

A plant introduction nursery is maintained for the purpose of providing preliminary tests of new varieties and new importations of forage plants. Plantings are on a small scale. If a particular species shows promise it is included

in larger experiments under one of the established projects. Very frequently plants fail to show much promise in the nursery tests yet are of wide interest to farmers as a result of extensive publicity given to them elsewhere. In view of this circumstance, a few species of this category are mentioned herein.

SUBTERRANEAN CLOVER

This species of clover is an annual that has received very favourable mention in parts of the United States, principally as a legume for very light, gravelly soils and as a pasture plant. It seeds freely and has the peculiar characteristic of partially burying its own seed by means of long, tendril-like seed stalks which grow very close to the ground. By virtue of this characteristic it maintains itself readily. In growth habit, subterranean clover looks somewhat like white clover. The leaves, however, are very hairy.

Tests with this species, both in the nursery and on a gravelly poultry pasture, indicated that it became established very readily and produced a good growth the first season.

Reseeding appeared good but winter-kill of the young seedlings was very heavy, resulting in a poor stand the following year. Poultry grazed subterranean clover quite readily and there seemed to be little preference between it and red clover. Owing to its poor winter survival the strain tested was not regarded as suitable for local conditions.

BIRDSFOOT TREFOIL

Birdsfoot trefoil has been widely recommended as a perennial legume for conditions not particularly suited to alfalfa and red and white clover. In some areas it is also recommended for good classes of soil as both a hay and pasture plant. Nursery tests at Agassiz indicate that it gives fair yields but is certainly not preferable to alfalfa where the latter can be grown successfully. For short rotations it would appear to yield considerably less than red clover. The small scale trials did not include very light or acid soils.

BIG TREFOIL

This species resembles birdsfoot trefoil very closely. It differs principally in the fact that it has creeping underground rhizomes, birdsfoot trefoil being a strictly tap-rooted species. In nursery trials at Agassiz, this legume appeared to become established as readily as birdsfoot trefoil. The presence of rhizomes did not seem to permit more satisfactory competition with volunteer grasses and wild white clover—in fact, both types of trefoil were badly infested within three years after planting. In terms of yield it produced approximately 70 per cent as much as alfalfa.

SWEET LUPIN

The sweet lupins differ from the common lupins in that they are free of the poisonous alkaloid that renders the common varieties unfit or dangerous for feeding. Two varieties, namely, the yellow- and blue-flowered sweet lupins, were tested in comparison with common lupins and soybeans in 1939 and 1940. On the basis of both seed and hay yield, soybeans were superior to the sweet lupin. Also, the common lupins tended to be lower than soybeans in yield. These results, of course, apply to soils of reasonably good fertility. On very poor soils the common lupin would possibly show some measure of superiority over soybeans as a green manuring crop since the latter crop has a high fertility requirement.

BROADBEANS

Broadbeans have been tested both for seed and for forage yield. All the material tried was definitely inferior in respect to yield of seed and green material.

SORGHUMS

Several types of sorghums have been tried in the nursery and without exception have proved unsuitable for local conditions. Sorghums have a relatively high heat requirement in order to attain satisfactory maturity and Fraser Valley conditions do not provide this.

GRASSES

Several hundred varieties and species have been given preliminary tests in the nursery. Space does not permit of citing results in detail. However, mention should be made of the fact that dryland and semi-dryland species do not thrive under Agassiz conditions, although short drought periods are common. In this category are listed such cultivated species as brome, crested wheat grass and western rye.

Plant Breeding

Active plant breeding work is conducted with the following crops at Agassiz: perennial rye grass, orchard grass, alfalfa, mangels and swedes. Most of this work has been started within very recent years and a further period of work is necessary before definite progress can be recorded.

PERENNIAL RYE GRASS

This species is particularly adapted to local conditions. During the early war years selection work was undertaken primarily to provide a variety that could be multiplied locally. At that time, good quality perennial rye grass was in very short supply since imports from overseas were greatly restricted. As a result of this work, the variety, Pacific, was developed and this was licensed for distribution in 1942.

The variety, Pacific, as developed here had a good degree of winter hardiness and was quite leafy. In recent years selection and breeding have been intensified to incorporate still greater yield, quality and disease resistance into the variety.

ORCHARD GRASS

This is one of the most useful grass species for Fraser Valley conditions, particularly in respect to yield and drought resistance. A breeding project was started in 1940 to develop varieties that combined a higher degree of leafiness and general quality that was evident in the generally available commercial material. Other objectives in this breeding program are concerned with obtaining later-heading strains and material possessing a high degree of disease resistance.

ALFALFA

Alfalfa breeding was started in 1945 as a co-operative breeding project in co-operation with plant breeders of the University of British Columbia. The principal objective is to develop creeping rooted varieties of alfalfa that are upright growing, leafy, disease resistant and high yielding in respect to seed and forage.

MANGELS AND SWEDES

Mangels and swedes are grouped together, since the techniques for improvement are very similar for the two crops. Work with mangels is concerned with the Long Red variety. The main objective is to obtain a greater degree of uniformity and smoothness while retaining the very high yield for which the variety is noted. Work with swedes is directed toward developing a distinctive Canadian Gem possessing high quality and yield.

HORTICULTURE

The work of this division is mainly in two sections, vegetable work and small fruit work. There are certain other minor phases of horticultural work being carried out which will be discussed later. In the spring of 1941 the assistant in Horticulture was promoted to be Superintendent of the Dominion Experimental Station, Saanichton, and no replacement was made until the termination of the war in the spring of 1946. The lack of a Horticulturist for five years was partially overcome by the employment of university students of horticulture during the summer months. Nevertheless work in this division suffered severely during the last five years covered by this report.

VEGETABLES

The experimental work conducted on vegetables is dealt with separately under each crop. During the years 1936 to 1945 inclusive, 276 named varieties and 33 crosses of 23 different kinds of vegetables were under test. Mention will only be made of the more important kinds with recommendations as found under Agassiz conditions. Fertilizer and cultural trials made on some kinds are included after the varietal recommendations.

Fig. 15.—A good seed crop of Foundation New York No. 12 Lettuce at Agassiz.

CORN

Several factors have to be considered in placing a merit value on corn. Sweet corn is used for two purposes, table use and canning or freezing. Earliness is a prime requisite for table use, while a medium to large ear, with a uniform ripening period, is required for packing. Other things being equal, a corn producing abundant stalk for ensiling is preferred for the packing trade. Thirty-seven varieties of corn have been tested for both quality and cob yield. General estimates were made on ensilage yield of packing varieties. Of the first earlies, Extra Early Banting, Banting, and Dorinny are good, the first mentioned being preferred. Golden Bantam is still one of the standard second early varieties although Bancross has shown up well and is recommended for trial. Golden Cross Bantam is outstanding for uniformity and size of cob. This hybrid is the major kind grown for late table use. It is also highly recommended for the canning and freezing trade because of its uniformity of ripening and high yield of stalk. Bancross is usually about seven days earlier than Golden Cross Bantam but does not produce as much stalk.

TOMATOES

Attention has been given to the staked garden type of tomato, since no field tomatoes are grown in this area. Thirty-five named varieties and five crosses have been under test and of all these varieties Bonny Best is still regarded as being the standard sort for high production and uniform quality. Pinkie and Bestal are both suitable as early crops. Many of the varieties tested produced large numbers of very small low quality fruits which are considered to be of no value.

Cultural experiments with tomatoes have been continued, the major ones dealing with staked varieties. The summarized results are as follows:

1. Plants severely pruned will produce a larger amount of early fruit than plants less severely pruned, although the total yield is seriously decreased.

2. Where severe pruning is practised it should be delayed until ten trusses have been formed.

3. The maximum number of trusses on a plant that will ripen fruit under conditions found at Agassiz is between eight and ten. It has been found that most fruit is produced by stopping-off after the tenth truss has been formed.

PEAS

As with corn, peas are grown for both the fresh product and the packing trade. Due to lack of packing and freezing equipment no tests were made on the canning and freezing qualities of the thirty-one named and twelve numbered varieties grown. All tests were made under staked conditions which gives the total yield and length of harvesting season. Thomas Laxton and Alderman are considered to be excellent varieties. Of the dwarf kinds Little Marvel is a good variety.

POTATOES

Seventy varieties of potatoes have been under test during all or part of the last ten years. Late blight and tuber flea beetle are the limiting factors in the culture of this crop in the easern part of the Lower Fraser Valley. No varieties so far tested have been resistant to late blight although some are more susceptible than others. Research work on the control of the tuber flea beetle has been conducted by the Dominion Laboratory of Entomology with the co-operation of this Division. Recommendations have been published although

this work is not yet complete. Outside of the standard varieties the only new introduction that has shown up well in these trials has been Katahdin. This variety is worthy of further trial.

POTATO CULTURE

The seed potato production experiments described in the last report (1935) were continued and expanded. The results obtained bore out the findings as presented in this previous report and work along these lines was brought to a conclusion in 1940. It has been shown that potatoes being grown for seed purposes should be lifted prior to being fully mature if a maximum crop is to be obtained the following year. In order to do this the potatoes may either be planted early and dug early or planted late and dug at the normal time. Where late blight control is a factor the early planting is advisable. For early varieties 90 days in the ground is the recommended length of time, and for late or main crop varieties no longer than 120 days. By lifting the seed potatoes early there will, of course, be a reduced yield but this will be more than compensated for by the increased yields the following year. The results of these experiments help to explain the reason for the high productiveness of northern-grown seed.

Other experiments conducted at the same time to determine the best distance apart to plant potatoes being grown for seed, showed that the greatest yield was obtained from the closest planting, but this distance produced the largest weight of sets under two ounces. The hypothesis behind these experiments was that close planting would cause earlier maturity than would be obtained with more distant planting. The various distances used, therefore, were 4, 8, 12, and 16 inches apart. For seed purposes, however, considering the total yield and size of sets produced, the 12-inch planting is recommended as being the most profitable. This applies to both the main crop (Green Mountain) and the earlies (Early Epicure).

POTATO FERTILIZER

During the crop years of 1938 to 1940, inclusive, extensive potato fertilizer experiments were conducted at different localities throughout the lower mainland area to expand those results obtained at this locality as previously reported. Altogether eleven sites were used, each site being on a different soil type. The results can be summarized as follows:

1. Nitrogen is of little benefit other than to aid in the assimilation of phosphorus and potash. Small amounts must, however, be used.

2. Phosphorus is needed in the amounts normally given, that is, 12 per cent of applications of 1,000 to 1,500 pounds per acre.

3. Potash on all but Ladner clay soils is of benefit in increasing yields and might increase returns if more was used. Rates of 10 per cent of applications of 1,000 to 1,500 pounds per acre would be beneficial. On Ladner clays, however, increased amounts of potash tended to reduce the yields under the conditions of these experiments.

Definite recommendations cannot be made for each soil type until such time as fertility experiments now under way have been completed. It would appear, however, that small differences in fertilizer mixtures are not as important in obtaining high yields as is the total amount of fertilizer used.

ASPARAGUS

Four varieties of asparagus have been under trial. Results were taken on the first four cropping years and, therefore, no results of the length of production

of different varieties could be obtained. Mary Washington is the recommended variety and while two of the other varieties produced slightly more cut asparagus their quality was inferior to that of Mary Washington.

In order to determine the best length of time to cut asparagus beds, plots of Mary Washington asparagus were laid out in the spring of 1932. Each plot consisted of one row 30 feet long spaced 5 feet apart (1/290 acre). Two treatments were used, one consisting of cutting the stalks for eight weeks and the other of cutting the stalks for twelve weeks. All other treatments, such as fertilizers and manures used, were the same for both sets of plots. The treatments were replicated twelve times and randomized throughout the whole area. For the first two cutting seasons (1935 and 1936) all plots were cut for only 8 weeks. From 1937 to 1945 inclusive, the plots were cut each year for eight or twelve weeks. Table 25 shows the mean yield of the twelve replicates for the years 1937 to 1945.

TABLE 25.—MEAN YIELD OF ASPARAGUS IN POUNDS PER PLOT* CUT FOR 8 AND 12 WEEKS

Year	1937	1938	1939	1940	1941	1942	1943	1944	1945	Pounds Total 9 years	
										per plot	per acre
Cut for 8 weeks.....	8·8	15·0	19·8	22·6	24·0	26·8	19·5	27·4	26·5	190·4	55,216
Cut for 12 weeks.....	13·9	16·6	18·2	19·9	20·1	17·7	14·9	21·9	16·9	160·1	46,429

* To convert to pounds per acre multiply by 290.

The number of stalks cut from each plot was also recorded and from this the mean weight per stalk was calculated. It was found that the stalks cut for the last four weeks from the twelve-week plot were smaller than those cut for the first eight weeks.

It will be observed from the above results that it is most important not to over-cut asparagus beds. In the first nine years of cutting there were over 8,700 pounds more per acre cut from the eight-week plots than were cut from the twelve-week plots. Not only did the twelve-week cutting period produce less asparagus but the peak production years were fewer than with the eight-week cutting period. Note how the yields rapidly drop off after 1941 in the twelve-week plots while they remained high in the eight-week plots.

Under different climatic and soil conditions than those found at this Farm it might be economically possible to cut for a period of nine or ten weeks as has been found in California. The above results, however, apply to the coastal area of British Columbia.

A small trial of forcing asparagus in the greenhouse was made. Mature plants of the varieties Perfection and Argenteuil were brought into the greenhouse on January 6 and packed into a ground-bed as closely as possible. They were covered with approximately three inches of soil which was well worked in among the roots. The air and soil temperatures were kept at about 60° F. The first stems were cut on February 6 and cutting continued until April 22. An average of 3·5 pounds of cut asparagus was produced per square yard. The Argenteuil variety produced fewer and coarser shoots than the Perfection variety. From these limited experiments it would appear that this is not a commercially sound scheme but is well worthy of trial on a limited scale. Only strong, healthy, and high producing plants (four or more years old) should be used.

SEED PRODUCTION

This phase of the work demands careful attention and since one crop or at the most two crops (with the use of the greenhouse) can be grown in a year, progress in improving strains tends to be slow. Seven different kinds of vegetables are being processed, six of which have been granted foundation status. These include New York 12 lettuce, Flat Egyptian beet, Danvers Half Long carrot, Copenhagen Market cabbage, Masterpiece bean, and Long Green Trailing vegetable marrow. Although foundation status has been granted to these crops processing still continues. The seed from these crops is distributed to certified seed growers throughout the Dominion from the Central Experimental Farm, Ottawa. Italian Green Sprouting broccoli which has been under process for the past seven years is still not considered of high enough quality or sufficient uniformity for foundation seed.

CULTIVATION OF VEGETABLES

During the past seven years experiments have been conducted with a view to determining the actual effect of cultivation on vegetables. It has frequently been shown that control of weeds is necessary in order that the maximum production of domesticated plants may be approached. Weed control has been developed by cultivation methods—methods that have been followed in the past and still are being practised today. In fact these methods (the use of the hoe and cultivator) have become so customary in agriculture that frequently they are used to a greater extent than is needed to control weeds. By cultivating deeper than is necessary to control weed growth more power is used. Is this power wasted? The experiments conducted at this Farm have shown that no greater yield is obtained from carrots, beets, onions, lettuce, spinach, cabbage or beans by cultivating so that a soil mulch of two to three inches is maintained than when no mulch whatsoever is maintained. In both cases all weeds were kept under control. The moisture content of the mulched soil was higher throughout the season but this had no effect on the yield of the crop. With corn, and possibly tomatoes, on the other hand, the yield of the mulched plots was significantly lower than the yield from plots on which no mulch was maintained, even though the moisture content of the soil remained at a higher level. The decrease in yield from over-cultivating corn and tomatoes was brought about by damaging the surface feeding roots of these plants. Where soil moisture conservation is not a serious problem, that is, where the soil moisture never approaches the wilting point, there is no benefit derived from maintaining a soil mulch to conserve moisture. Cultivation, then, should be sufficient to control weeds; more is a waste of time and may result in lower yields.

PLANT PROTECTORS

Trials have also been made using plant protectors for the production of early vegetables. Two types were used, the glass cloche and paper hot-cap. Although the glass cloches are much more expensive, their use gave far better results than the use of the paper hot-caps. The greatest advantage was found when used on cucurbit crops (particularly watermelons) which produced fruit up to three weeks earlier when the cloches were used during the first four to six weeks of the plant's life. Cloches were also of some value in producing earlier root and leafy vegetable crops.

Small Fruits

As previously reported a great deal of attention had been paid to raspberry growing by this Experimental Farm. Experiments have been conducted both at Agassiz and at the substation at Hatzic on fertilizer and cultural practices. A good

deal of time has been spent on testing new varieties. Work with strawberries and grapes has consisted largely of testing varieties.

RASPBERRIES

Twenty-eight named and five numbered varieties as well as several hundred seedlings grown at this Farm have been tested during the past ten years. Although the Cuthbert variety cannot now be grown in this district for numerous reasons, the quality of this variety is still used as a guide in rating other varieties. Washington variety has proved to be most nearly like the Cuthbert although this berry is not quite so sweet and is a little more difficult to pick. Newburgh, although a very heavy producer in many soils, is not recommended because of its poor shipping and packing qualities. Lloyd George is a heavy yielder but crumbles badly and is difficult to pick because of the large spines. New varieties from the Central Experimental Farm, Ottawa, are all very susceptible to virus disease and therefore cannot be recommended.

RASPBERRY FERTILIZER

Experiments conducted from 1937 to 1941 on different dates of applying fertilizer showed that March applications produced more fruit than either June or September applications. The fertilizer was applied at the rate of 750 pounds per acre of a 5-10-6 mixture. During the first two years of the experiment there was no difference noted. In the third and subsequent years, however, the March applications gave the highest yields while the June applications gave yields significantly lower than the check plots receiving no fertilizer.

Two large experiments run at the same time using different kinds of fertilizer, manure, and cover crops, showed that in most cases fertilizer and manure were of distinct benefit but, under the conditions prevailing at the time, winter injury had a greater effect on yields than soil treatment. In fact, the manured and fertilized plots suffered worse from winter injury during severe cold and windy spells than the unfertilized plots. Potassium sulphate gave higher yields than the chloride form. There was no difference found from the type of nitrogen used, nor could any difference be found when the phosphorus and potash were doubled.

STRAWBERRIES

Thirty named and thirteen numbered varieties of strawberries have been tested during the period under review. The numbered seedlings were obtained from the Central Experimental Farm, Ottawa, and Oregon State College, Corvallis, Oregon. None of the varieties tested had as many of the desirable qualities as did British Sovereign. Of the everbearing varieties under test, the Rockhill proved to be the best, although it did not compare with the June-bearing British Sovereign in either yield or quality.

BREEDING

In order that the high production of quality raspberries and strawberries may be maintained it is realized that a steady flow of new varieties and seedlings must be tested. To increase this flow of seedlings the breeding program of both fruits is being greatly expanded. A search is also being conducted for a suitable strawberry variety which is resistant to red stele root-rot.

GRAPES

To bring the information on new grape introductions up to date (1947) a trial of thirty different varieties was set out in 1937. Over one hundred varieties had previously been tested at this Farm. In testing grape varieties,

two important characteristics must be considered, earliness of maturity and resistance to mildew. Blue varieties which have shown promise are Fredonia, Campbell's Early, Erie and Ontario. The last two mentioned are usually the first to ripen. Niagara was found to be a good green grape in these trials.

Maple Syrup Production

Since many enquiries are received from time to time on the possibilities of producing maple syrup in British Columbia, several sugar maple trees which have been growing on this Farm since 1892 were tapped. Twenty-one trees in all were used in this experiment and great variability was found in both the amount and quality of sap produced. All trees were tapped with a $\frac{5}{16}$ inch bit and the usual can hung below for collecting sap. A cover is advised for this locality because of the frequent rains. The time of tapping varies from year to year but it should be done in the very early spring, preferably when the weather is still clear and cold. Although some trees produced a fair quantity (up to 194 fluid ounces) of good quality sap, none produced as much as would be expected from eastern trees. Many trees produced very little sap. The average for the twenty-one trees was 80 fluid ounces. The sap was rendered down to sugar, samples of which were sent east for grading. All samples were graded as Canada Fancy, with a slightly higher specific gravity than necessary. Maple syrup can be produced here, although the yields per tree are very low.

Arboretum

For many years the beauty and size of the specimens in the arboretum planted some sixty years ago has attracted the attention of all visitors. David Fairchild in "The World Was My Garden" comments on the interesting way in which some of the foreign species have grown under Agassiz conditions. The majority of trees and shrubs are not native to this climate and were originally planted to determine their suitability for shade and ornamental purposes. One of the most graceful and well matured specimens is the European Cut Leaf Beech (*Fagus sylvatica* var. *asplendilolia* Lodd.) which has grown to a height of sixty feet with a foliage diameter of fifty feet. Other species worthy of note are the Florida dogwoods (*Cornus florida*), the pink flowering variety being most interesting; the various magnolia species which produce an early profusion of colour and have survived remarkably well; the tulip tree (*Liriodendron tulipifera*) and the oriental plane tree (*Platanus orientalus*) both of which make exceptionally fine large shade trees; the Chinese apple (*Malus prunifolia* var. *Rinki*) which produces a mass of red blossom in the early spring; and many different types of coniferous trees including the Nordman fir (*Abies Nordmanniana*), and species of arbor-vitae.

Twenty-three different species of evergreen and deciduous hedges have been grown, some of which have proved very successful. The only species under test which was not completely satisfactory was the laurel (*Laurus nobilis*) which, during most winters, kills back very severely. Other species not recommended are many of the deciduous types such as willow (*Salix laurifolia*) which does not fill out to the ground and caragana (*Caragana arborescens*) which is rather open and unsightly during the winter months. In general, evergreen hedges are recommended, although the deciduous hedge maple (*Acer campestre*) and American beech (*Fagus grandifolia*) have both made large tight hedges. Of the evergreens under trial the yews (both *Taxus baccata and T. baccata fastigata*) have made exceptionally fine hedges. Common box (*Buxus sempervirens*) is of course very suitable although it is slow in growth. Both hemlock (*Tsuga canadensis*) and spruce (*Picea canadensis*) have made good hedges and may be easily grown to nearly any size desired.

CEREALS

Variety testing with cereals has undergone considerable expansion during the period covered by this report. Each year promising new and hybrid lines produced by the Central Experimental Farm, Ottawa, and other plant breeding institutions have been tested at the Agassiz Farm. It was felt that a more complete coverage of the area served by this Farm was desirable and so in 1937 three co-operative variety trials were conducted at representative points in the Fraser Valley. These outside trials were increased in number until 1940, when with the co-operation of the Division of Illustration Stations, 21 varietal tests were placed in the Fraser Valley, North Okanagan, Revelstoke, Creston and Central Interior areas. This number was slightly reduced following the opening of the Prince George Station, which now supervises variety testing in Central British Columbia.

Oats

The varieties shown in the following table are some of the more important named oat varieties, arranged in descending order of average yield. These data have been weighted in order that comparisons may be made between varieties grown in different numbers of tests.

Victory has long been the standby of farmers in the Fraser Valley and it continues to yield well in comparison with the newer varieties. Eagle, a shorter variety with slightly stronger straw than Victory, is high yielding and especially valuable under lodging conditions. Of the early varieties, Ajax seems to be the most suitable for the Fraser Valley. In many respects Exeter is similar to Victory and, although it has a higher apparent yield in the tests conducted

Fig. 16.—Planting rod-row cereal tests at Agassiz.

up to time of writing, it should be faulted for a high percentage of hull. Roxton, on the other hand, has a very thin hull and often has a high percentage of hulless kernels. This variety is very tall and is inclined under certain conditions to have coarse straw. Ripon, which is among the highest yielding varieties, has a low percentage of hull, and with its long kernels it usually has a comparatively low bushel weight. The new stem-rust-resistant variety, Garry, has given disappointing yields in two years of testing. Furthermore, the susceptibility of Garry and Beacon to a new disease of oats caused by *Helminthosporium victoriæ* will also limit the distribution of these varieties. Of the hulless varieties tested, Brighton, which is resistant to smut, has considerably outyielded Laurel in a limited number of tests. These results are also typical of those that have been obtained from tests in the North Okanagan area where the leading varieties have been Eagle, Victory, Ajax and Gopher.

TABLE 26.—SUMMARY OF THE RESULTS OF OAT VARIETY TESTS CONDUCTED IN THE FRASER VALLEY, 1936-1947 INCLUSIVE

Variety	Yield per acre	Number of tests	Growth period	Height	Straw strength	Weight per bushel	Hull	*Number of tests
	bu.		days	in.	(1-10)	lb.	%	
Ripon	90·7	17	107	46·4	8·3	37·0	25·6	7
Exeter	89·3	22	110	46·7	8·3	39·8	30·0	5
Eagle	88·0	47	111	43·4	8·9	39·0	27·9	11
Roxton	87·5	25	111	53·9	8·3	38·1	22·4	7
Victory	85·0	47	110	48·2	8·4	40·2	29·5	11
Abegweit	83·9	12	109	44·1	8·2	36·2	29·7	2
Ajax	82·8	30	103	46·7	8·6	38·9	29·0	7
Dasix	81·3	20	104	46·8	7·4	38·9	27·9	6
Brighton**	81·0	3	107	49·5	8·0	43·5	0·0	3
Bambu	80·9	18	107	45·3	8·4	39·3	29·6	7
Erban	80·2	35	105	46·4	8·5	37·9	27·5	11
Vanguard 7	80·2	21	106	45·6	8·8	37·9	26·7	6
Gopher	78·5	28	101	41·3	9·1	38·5	25·0	10
Beaver	75·3	18	104	46·9	8·4	38·9	26·7	6
Beacon	72·1	5	105	41·8	8·4	39·3	31·1	5
Acton	71·7	14	110	50·1	9·4	39·7	24·3	5
Alaska	66·2	3	99	42·8	8·4	39·7	23·5	1
Larain	66·1	7	101	46·4	8·9	42·5	26·5	2
Garry	65·8	7	104	44·8	8·2	39·5	29·4	2
Laurel**	63·9	3	106	42·8	8·2	46·5	0·0	3

All averages are weighted in comparison to the variety, Victory.
* These tests were conducted at Agassiz only.
** Hulless varieties, the yields of which were calculated assuming 25% hull.

Barley

In the barley variety testing, many new smooth-awned varieties were grown, and although none have, on the average, excelled rough-awned Trebi in yield, many farmers prefer the smooth-awned sorts. Of these, Byng has been consistently near the top. However, this variety has a tendency to be weak in the straw. Plush combines yield with fairly good straw strength and, therefore, it is recommended for the Fraser Valley and North Okanagan areas.

For several years Titan has been the most promising variety for strength of straw. This smooth-awned variety is resistant to loose smut. However, at times it may be criticized for its persistent awns. Vantage, one of the recent varieties released from the Brandon Experimental Farm, has in one year of testing shown considerable resistance to lodging. For those who desire a two-rowed variety, Sanalta is an excellent choice. Although this variety is very tall and medium late it has comparatively good strength of straw.

Of the varieties acceptable in the malting trade, Montcalm has in four years of testing given higher yields than O.A.C. 21. Montcalm is also smooth-awned and has stronger straw than O.A.C. 21, but it has not been quite the equal of Plush in strength of straw.

TABLE 27.—SUMMARY OF THE RESULTS OF BARLEY VARIETY TESTS CONDUCTED IN THE FRASER VALLEY, 1938–1947 INCLUSIVE

Variety	Yield per acre	Number of tests	Growth period	Height	Straw strength	Weight per bushel	*Number of tests
	bu.		days	in.	(1–10)	lb.	
Trebi	53·9	17	100	30·6	7·6	46·8	8
Byng	52·1	17	100	37·9	6·3	48·1	9
Plush	51·2	20	101	37·4	7·6	47·1	9
Montcalm	51·0	5	101	41·5	7·1	48·8	4
Olli	50·8	20	92	33·8	7·8	46·9	9
Peatland	50·5	9	99	44·4	8·2	49·1	8
Nobarb	50·4	8	102	40·7	6·8	50·3	7
Titan	50·2	14	96	33·6	8·9	47·0	8
Wis. Ped. 38	50·1	7	101	41·5	7·3	47·4	6
Sanalta	49·6	16	104	43·1	7·7	50·7	8
Regal	48·3	11	99	38·8	7·7	47·6	7
Vantage	47·0	3	100	37·0	9·2	48·1	1
O.A.C. 21	45·4	8	100	42·8	5·9	48·4	4
Tregal	44·1	5	98	36·3	8·1	47·1	3
Glacier	43·2	7	99	30·4	9·1	44·4	3

* Tests conducted at Agassiz only.
All averages are weighted in comparison to the variety Plush.

Fig. 17.—Rod-row thresher used in connection with cereal variety test work at Agassiz.

Winter barley varieties have been grown since 1940 and it is apparent that there is considerable risk of winter-killing under local conditions. During the severe winter of 1942-43, with a minimum temperature of —4° F., all winter barleys were killed. Fall-sown spring varieties such as Trebi will survive most winters but their yields have not been superior to the same varieties spring sown.

Olympia, the best winter barley on trial, matures early in July and has yields during four years of testing which slightly exceed that of spring-sown varieties.

Wheat

Of the winter wheat varieties under test, Dawson's Golden Chaff continues to give good results. During the last three years, however, Cornell 595, a soft white variety which carries considerable resistance to loose smut, has outyielded Dawson's Golden Chaff. The high yielding Sun variety was not sufficiently hardy and is often winter-killed when grown under lower mainland conditions. For the North Okanagan area, Ridit, a hard red variety, and Albit, a soft white wheat, have given good yields in variety tests and are generally recommended. Hussar has been a very high yielder. However, its weak straw is a definite handicap under most harvesting conditions.

Results at Agassiz show that of the well-known spring wheat varieties under test, Thatcher and Garnet are the highest yielding, followed closely by Red Bobs. Cascade and Saunders, two new varieties produced at the Central Experimental Farm, Ottawa, have, as an average of four years' results, slightly outyielded the above-mentioned varieties. Cascade is a semi-hard white wheat while Saunders is a hard, red wheat which approaches Garnet in earliness.

Flax

The interest in linseed varieties of flax for the Fraser Valley has not been sufficient to warrant extensive testing with this crop. Over a period of six years three common varieties have been tested and average results show Royal to outyield Bison, while Redwing, an early small-seeded variety, is lowest of the three in yield.

Peas

The activities of the pea moth and the pea weevil have seriously reduced the production of dry peas in the Lower Fraser Valley. However, parasites released by the Entomological Laboratory at Agassiz have made considerable progress in the control of the pea moth. Among the early varieties Early Blue has given the highest yields of field peas. Chancellor, a small yellow variety, has given fair yields but hardly as great as Bluebell, which matures at approximately the same time. Of the late maturing varieties, Green Wrinkled and an Ottawa selection, 1187C, have topped all varieties in yield.

Rye

Storm has for some years led all fall rye varieties tested, in yield of seed, and this variety has also given good yields of green material when used as a cover crop. In comparison to Storm, the seed yields of Dakold and Rosen have been very disappointing. A new variety, Balbo, was particularly outstanding in the 1946-47. Following a quick vigorous growth in the spring this variety not only matured almost two weeks ahead of Storm but outyielded it by 7·8 bushels per acre.

FIBRE FLAX

From 1936 to 1939 inclusive, work with fibre flax was confined to variety testing on a limited scale. More intensive work was not required at that time since there was no fibre flax industry in the Fraser Valley. With the start of the war, however, the supply situation quickly became acute and fibre flax production was rapidly expanded in Canada generally. During the years 1941 to 1945 the staff of this Farm spent a great deal of time advising in regard to the establishment of fibre flax growing in the Fraser Valley. A processing plant was built by a farmer's co-operative company in the Cloverdale district in 1942 and as this went into production the demand for added information was great. To meet this demand, fibre flax variety tests were set out in all of the flax-growing districts, notably Cloverdale, Ladner and Matsqi, and experiments related to cultural treatments were conducted at Agassiz. A survey of the fibre flax industry of Oregon was also made, in order to provide further information of value to growers in British Columbia.

Cultural Experiments With Fibre Flax

RATES OF SEEDING

Experiments with rates of seeding ranging from one to two bushels per acre indicated very definitely that one and one-half bushels (84 pounds) per acre produced the best yield of fibre and gave the most uniform stand. Heavier rates resulted in fine straw which lodged readily. Light rates of seeding gave a lower yield of fibre and quality suffered somewhat as a result of excessive branching.

METHOD OF SEEDING

According to the average of three years of testing it was found that there was no significant difference in yield between broadcasting, double drilling at approximately a three-inch spacing and single drilling with a seven-inch spacing. In general, the close or double drilling produced a slightly more uniform crop than either broadcast or seven-inch drills. Drilling eliminated the difficulty of lack of uniformity in seed coverage. Double drilling to provide close spacing adds to the seeding cost but this is not serious on fields of 10 acres or less.

DEPTH OF SEEDING

The data obtained indicated that a depth of one-half inch was ideal for fibre flax but no serious loss of stand occurred when seeding was at a depth of one-inch. Increasing depth beyond one-inch lessened the stand considerably and caused considerable lack of uniformity.

Variety Tests With Fibre Flax

In 1944 the variety testing was expanded to include tests at three outside stations which were representative of the flax-growing areas in the Fraser Valley. Of the varieties tested, Liral Dominion has been high in all-around performance. It has given a good yield of fibre and seed with a fairly good length of straw. Liral Prince, which matures approximately four days earlier than Liral Dominion, has given, on the average, a slightly higher yield of fibre. Liral Prince, however, is more susceptible to flax rust than Liral Dominion and, therefore, it is not generally recommended. Of the newer varieties under test, Cascade is the most promising for yield of fibre. This variety is slightly taller and later than Liral Dominion and gives, on the average, a slightly lower yield of seed.

POULTRY

Poultry has been kept continuously on this Farm for over fifty years. At first, several breeds were kept. In 1900, the first Barred Plymouth Rocks were secured and this breed has been kept ever since. For a number of years they were compared with several different breeds, particularly White Leghorns and Rhode Island Reds. In 1914, the last of the Reds were disposed of and in 1925 the White Leghorns were sold. Since then a specialty has been made of Barred Rocks. As far back as 1922, ten pullets bred here and entered in the Agassiz Egg-Laying Contest produced 2,568 eggs in a year. Hen F.400, also in Contest trial, produced 326 eggs, averaging 28 ounces per dozen in weight.

The chief poultry work during the 1936-1947 period has been breeding good birds, from which hatching eggs and breeding males have been distributed at nominal prices to farmers throughout British Columbia. During this period, some 200 male birds have gone out to help increase production in the area.

Records on incubation of eggs were kept during this period. The average for the twelve years was as follows: Per cent fertile eggs, 88·8; per cent total eggs hatched, 50·8; per cent fertile eggs hatched, 57·1; total eggs required for one chick hatched, 2·02. A steady improvement took place every year in these percentages.

Interesting records were kept on the monthly and yearly production of laying pullets. In nine years the average was 209 eggs per year per pullet or 57·3 per cent. The monthly averages steadily increased from nine eggs per pullet per month in October to 23·2 eggs per pullet per month in March, and receded to 16·8 in July and August. All production was without artificial lighting and no culling was done until September.

Egg-Laying Contests

November 1, 1920, saw the commencement at this Farm of a series of nineteen annual laying contests. The production results were so satisfactory that British Columbia poultry raising as well as Canadian poultry in general received world-wide publicity through the medium of these contests. Invariably, the results obtained in the Agassiz contests were higher than elsewhere in Canada and on several occasions world records were made. Starting with 26 pens in the

Fig. 18.—White Leghorn Pen owned by C. Vroom of Cloverdale, B.C. Winners of 1938 Egg-Laying Contest. Score 3,334 points with 3,157 eggs.

initial contest, space was eventually provided for 46 pens and usually entries were greater than the accommodation would accept.

When war was declared in 1939, egg-laying contests were discontinued, so that the period covered by this report is only concerned with four contests, that is to say those completed annually in the four years 1936-1939, inclusive.

On the completion of the first of these, in 1936, it was found that the top three pens at Agassiz—all White Leghorns—were also the top for all Canada. The two top pens were owned by newcomers, Messrs. R. B. Sangster of New Westminster, and W. J. Scheibler of Burnaby. The top score was 2,751 points. The winning individual—a Leghorn—was owned by Darby & Son, Hammond, B.C.

The contest completed in 1937 was won by a pen owned by A. W. Schofield, New Westminster, with 2,941 points from 2,541 eggs. This Leghorn pen was also high for all Canada for the year and contained the high individual bird of the contest, with 319 eggs. There were nine 300-egg hens in the contest.

The next contest was one of the best completed in nineteen years at Agassiz. The two top pens, both White Leghorns, made the highest all-time point scores at Agassiz. These honours went to C. Vroom, Cloverdale, 3,334 points, and F. C. Evans, Abbotsford, 3,157 points. After the sixth week of the contest, the winning pen led throughout. The highest individual for egg production was No. 3 in Evans' pen, with 328 eggs. Fifteen birds produced 300 eggs or better. The Barred Plymouth Rock pen owned by the Agassiz Farm, besides being the highest heavy pen, and finishing in fourth position (all breeds), made a new heavy-breed all-Canadian record with 2,715 eggs and 2,949 points.

C. Headey and Sons, Cloverdale, B.C., had the honour of winning the last contest with their White Leghorn pen, which produced 2,643 eggs worth 2,971 points. Bird No. 8 in the pen of G. Pollock, Hammond, was high individual with 322 eggs and 356 points. Miss A. G. Brown of New Westminster had second high bird, a Barred Rock, with 311 eggs but U. Henke's Leghorn was second high in points with 353.

Skim-Milk Versus Beef Scrap

With the close of the egg-laying contests in September, 1939, the contest houses were available for nutritional experiments. An experiment was set up, using two groups of 75 Barred Rock pullets each, with a view to testing the suitability of substituting skim-milk for beef scrap in poultry rations. The following rations were fed:

Group 1—75 Pullets

Skim-milk to drink, no water; 5 per cent beef scrap in mash. Mash in front of birds at all times consisted of:

Bran	100 pounds	Alfalfa meal	25 pounds
Shorts	100 "	Beef scrap	25 "
Cornmeal	100 "	Oilcake meal	20 "
Crushed oats	75 "	Charcoal	10 "

Scratch grain—equal parts of cracked corn, wheat, and oats—9 pounds daily, 75 birds.

Group 2—75 Pullets

No milk, water only to drink; 15 per cent beef scrap in mash. Mash in front of birds all the time consisted of the above ingredients, but beef scrap was increased to 75 pounds instead of 25. Scratch grains were identical.

The same experiment was repeated during 1941 using the same number of birds. The average results are shown in the following data.

TABLE 28.—SKIM-MILK, NO WATER, FIVE PER CENT BEEF SCRAP, VS. NO MILK, WATER, FIFTEEN PER CENT BEEF SCRAP

Experimental data		Milk plus 5% Beef Scrap	No milk 15% Beef Scrap
Number of bird days		22,398	22,339
Percentage mortality		8	10
Average body weight to maintain	lb.	6·05	5·82
Total weight gain per bird	lb.	0·935	0·58
Scratch grain consumed per bird	lb.	36·465	36·45
Mash consumed per bird	lb.	33·45	47·88
Grit consumed per bird	lb.	2·26	2·23
Shell consumed per bird	lb.	2·83	2·92
Milk consumed per bird (dry matter)	lb.	17·31	–
Total feed consumed per bird	lb.	86·30	84·33
Value of feed consumed per bird	$	1·59	1·52
Total weight of eggs produced per bird	lb.	24·78	24·48
Value of eggs produced per bird	$	2·905	2·99
Pounds of eggs per pound of feed consumed		0·287	0·290
Feed cost per pound of eggs produced	cts.	6·42	6·215
Profit over cost of feed per bird	$	1·315	1·475
Value of weight gained per bird	$	0·143	0·088
Total profit over cost of feed per bird	$	1·455	1·56

It seems apparent from the results of two years that beef scrap in poultry rations can be cut down by two-thirds if skim-milk is available at all times, without any loss in productive capacities in laying hens. The calculated protein contents of the total ration of the two groups were 15·1 per cent for the milk group, and 17·3 per cent for the high beef scrap group. Two per cent or greater difference in protein is a considerable difference and would represent a saving for a season's production which would be really worth while.

During 1941-42 and 1942-43 the same experiment was conducted but skim-milk replaced all of the beef scrap in group 1.

The following results are the average of two years' work.

TABLE 29.—SKIM-MILK VS. BEEFSCRAP FOR LAYING PULLETS

Experimental data		Milk Only, No Beef Scrap	No Milk 15% Beef Scrap
Number of bird days		20,787	19,978
Percentage mortality		19·01	28·28
Average body weight to maintain	lb.	5·925	5·615
Total weight gain per bird	lb.	0·46	0·40
Scratch grain consumed per bird	lb.	37·25	37·13
Mash consumed per bird	lb.	28·21	33·85
Grit consumed per bird	lb.	1·21	1·125
Shell consumed per bird	lb.	2·495	2·485
Milk consumed per bird, dry weight	lb.	17·22	–
Total feed consumed per bird	lb.	84·52	76·00
Value of feed consumed per bird	$	1·605	1·56
Total weight of eggs produced per bird	lb.	19·92	18·61
Value of eggs produced per bird	$	4·475	4·205
Pounds of eggs per pound of feed produced		0·232	0·227
Feed cost per pound of eggs produced	cts.	7·975	8·674
Profit over cost of feed per bird	$	2·87	2·71
Value of weight gained, total	$	10·54	6·92
Total profit over cost of feed per bird	$	2·975	2·785

The skim-milk produced significantly heavier eggs and significantly greater body weight than the beef scrap. The total weight production of eggs was also greater on skim-milk. The birds with their large consumption of skim-milk took less mash and gave better production. These results, along with those of the previous experiment, make it obvious that if laying hens have skim-milk to drink in sufficient quantities without water, they will consume enough to provide sufficient protein for normal laying when the mash contains 4 to 5 per cent oilmeal.

APIARY

Some farmers of the Fraser Valley have for many years supplemented their farm income with the sale of honey. They have been aided greatly by the experimental work conducted and field days held at the Agassiz Experimental Farm, where an apiary of about forty colonies has been kept for a number of years. Recently this work has been curtailed due to the retirement of the beekeeper and lack of other competent help.

The average yearly yield of honey per colony from 1930 to 1940 inclusive, at the Agassiz Farm, has been 73·2 pounds. European foul brood has been present only once since 1936. Previous to this record it was present every year, appearing around the middle of April and "cleaning-up" between June 15-30. With several exceptions, European foul brood has not been found in single brood chamber colonies. Of the infected colonies, about twenty-five per cent occurred in one-and-a-half chamber colonies and seventy-five per cent in double full-depth colonies.

Information, gathered during a seven-year period, on the suitability of size of colonies for wintering, gave some conclusive results. Double cases gave the most satisfactory outdoor wintering, followed by four-colony cases and then one-colony cases.

Middle entrances appeared to have no distinct advantage except that field mice are not as bothersome. Consequently this system has not been recommended for this area. There was no significant difference found between upper and lower entrances after a number of investigations into their merits.

Consumption of stores has been less in colonies facing south or east. These differences were greatest during winters of extreme temperatures. The consumption was higher in Kootenay cases than in double cases.

In a study to determine the best queen breeding method, the top entrance method averaged 83·33 per cent matings, the super clearer 77·77, and the mating box 53·84 per cent.

The brood area of a double chamber or a Langstroth plus a shallow super seems to be the size to recommend for this area. The lowest production has been in colonies where the queens were confined to a single brood chamber, which are not large enough for maximum production. However, too much space is conducive to European foul brood.

The average production of honey per frame of bee strength during the months of production is as follows, in pounds: April, 2·06; May, ·45; June, ·89; July, 1·58; and August, ·95.

Swarm Detection

The object of this experiment is to ascertain if preparations for swarming can be detected by the use of double brood chambers, thereby reducing the time required to examine the colony.

The bees were wintered in single brood chambers. In the early spring as soon as the colonies had increased in strength so as to fill this brood chamber with

bees and brood, a second chamber was added without a queen excluder. The queen soon occupied this chamber as part of her brood nest. If preparations for swarming were made it was thought that some of the queen cells will be built along the lower edges of the upper set of combs and that these could be detected by merely tipping the upper super instead of having to remove and examine every individual comb in the colony.

Over the ten-year period, some 160 colonies were included in this project and the results show that in over 95 per cent of the cases where swarming preparations were made, they were detected by the tipping method either by using a deep or shallow super as the second chamber. This appears to be a quick, easy and safe method to detect swarming preparations enabling the beekeeper to examine many more colonies in any given length of time.

Dual Queen System

During the last two years of the period under review, twenty-seven colonies were included in this project to determine if larger crops of honey could be secured by using two queens in one colony. These were checked with an equal number of colonies having single queens. At time of writing, little or no advantage had been secured by the use of the two queens. Further work is necessary, however, before definite conclusions can be drawn.

DIVISION OF ILLUSTRATION STATIONS

On the Illustration Stations farm problems are studied in their local environment representing an extension of the comprehensive work carried on at the Experimental Farms and Stations. Illustration Stations are operated on privately-owned farms on the basis of a co-operative agreement entered into between the owner and the Dominion Experimental Farms Service. In British Columbia the present organization comprises 16 Illustration Stations serving the outlying areas surrounding the Dominion Experimental Farm at Agassiz and the Experimental Stations at Saanichton, Prince George and Summerland. The work conducted on Illustration Stations has been consistently broadened in scope and has progressed from the original purpose of disseminating experimental information by field and cultural demonstration to include crop testing and experiments of a fact-finding nature.

The production of adapted varieties of cereals and forage is promoted on Illustration Stations in order that these farms may serve as sources of pure seed for farmers in surrounding districts. Livestock policies which are designed to promote the development of improved herds of cattle and swine as well as flocks of sheep and poultry from which neighbouring farmers may procure breeding stock are an integral part of Illustration Station activities. Farm management studies including farm planning and organization as well as farm home beautification are other projects designed to acquire information on the most economical methods of production and promote those features which contribute to financial effectiveness and also those which enhance the comfort and attractiveness of farm living.

The sixteen Illustration Station farms which constitute the district supervised from the Agassiz Experimental Farm are located throughout the southern part of the province including Vancouver Island as well as the Central Interior areas. Soil types range from the more productive valley soils to the less fertile and more intractable soils of the grey wooded associations in the Vanderhoof and Fort Fraser districts. Throughout this report reference will be made to certain

districts and where this is done it will relate to the work being developed in co-operation with the farmers listed below as operators of Illustration Stations.

Station	*District*	*Operator*
Alberni	Vancouver Island	Charles Chase
Courtenay	Vancouver Island	James Casanave
Duncan	Vancouver Island	Bert Young
Cloverdale	Fraser Valley	Theodore Kuhn
Hatzic	Fraser Valley	R. H. Owen
Armstrong	Southern Interior	W. B. McKechnie (Dr.)
Armstrong	Southern Interior	L. A. Johnston
Salmon Arm	Southern Interior	James Woodburn
Revelstoke	Southern Interior	Roley Hold
Lumby	Southern Interior	H. C. Catt
Osoyoos	South Okanagan	Walter Graf
Australian	Cariboo	Gordon Beath
Quesnel	Cariboo	Charles L. Ellison
Vanderhoof	Central Interior	J. H. Andros
Fort Fraser	Central Interior	William F. Clarke
McBride	Central Interior	A. E. Long

Two stations, Hatzic and Osoyoos are studying special horticultural problems the nature of which, and the results obtained, are briefly surveyed in the following summaries.

Hatzic-Fraser Valley

R. H. Owen, Operator

Raspberry production studies were started for the purpose of observing to what extent it is possible to revive land long in raspberries to its original yield levels. The failure of certain soils to sustain maximum cane growth and yields has seriously hampered the small fruit industry. Then, too, the Cuthbert variety has tended to kill back much more readily than prior to 1924. Green manure crops of red clover and fall rye were extensively used to plough down to increase the organic supply previous to replanting. Continuous clean cultivation was followed as a check. Yields of fruit were equal from both areas.

Experiments conducted with various chemical fertilizers and trace elements have not solved the problem of sustaining yields. Of the several used, however, sulphate of ammonia has promoted the most satisfactory cane growth. Application is made annually commencing with the new planting and covering the entire area between the rows at a rate of 250 pounds per acre. The Washington variety has been the only one used in these particular trials since 1940. Maximum yields were attained the third year after planting after which yields levelled off in the fourth and fifth years and unfortunately the canes entered a decline in vigour and yield of fruit beginning the sixth season.

A section of the experimental area was given over in 1941 to annual applications of farm manure at 20 tons per acre. Cuthberts were taken out in 1944, due to their failure to develop viable canes. Tahoma maintained a vigorous cane growth until 1945 and then entered a decline. The Washington variety continues healthy, and produces at a rate ranging from 7·56 to 9·61 tons per acre annually. It is worthy of note that no satisfactory stand of canes was obtained on this area prior to using farm manure.

The overall results obtained to date indicate the necessity of first, planting disease-free stock; secondly, of improving the organic supply in the soil through applications of barnyard manure supplemented by green manure crops and the judicious use of sulphate of ammonia should the supply of manure be limited.

Osoyoos—South Okanagan

Walter Graf—Operator

This station is demonstrating practical methods of soil building and maintaining soil fertility. The soil is light textured, inclined to be generally shallow and with the small amount of native organic matter confined to the surface 4 inches. This area is recognized as one of the earliest truck-crop districts in Canada. This fact has encouraged growers to follow planting and cultural practices designed to promote early maturity of the crops grown of which the sales of tomatoes, canteloupes and latterly Zucca melons have formed a large portion of the revenue received.

SOIL BUILDING

On the Illustration Station where green manuring crops such as sweet clover and fall rye have been used consistently over a period of years, tomato plants came through the hot weather experienced in July in good condition due to the improved moisture-holding capacity of the soil. The cropping rotation practised is one of alternate green manure crops and such truck crops as previously mentioned. This two-year rotation proved its merits in 1939 when the month of June was cool and July was unusually hot and dry. Sun scalding was very severe, particularly in fields low in humus where the tomato plants had been forced for extreme earliness and the crop matured with but slight vine growth affording protection from the hot sun.

The practice of frequent green manuring, especially with legumes, has a tendency to retard maturity of the crop but the tonnage harvested is much greater. Sweet clover seeded at 20 pounds per acre proved a superior green manure crop to vetch as it provided an excellent second growth to plough down after the first had been removed for hay. Tomato yields were stepped up from 13·5 to an average of 20·0 tons per acre due to green-manuring practices.

Fig. 19.—Lawn and shrubs. L. A. Johnston Farm, Armstrong, B.C.

TOMATOES

The problem with tomatoes is to devise some method of building up the fertility and moisture-holding capacity of the soils in the Osoyoos area while at the same time maintaining early maturity of the crop. The treatment which plants receive in the propagating beds and the date at which they are set in the field have definite bearings on this problem. Observations indicate that tomato plants have stood brief periods with temperatures as low as 29°F on the ground without being killed. Tests have shown that plants should be well developed in the greenhouse before setting out for the semi-ripe trade. An arbitrary rule is to plant when April minimum temperatures have been above 40°F on three successive days. A reserve of plants is recommended for replanting in case of killing by frost.

When growing for the cannery the procedure is quite different as it is important that smoothness be attained in the main crop rather than in the first three trusses of fruit. With this in mind better success was achieved by starting the plants later than for the semi-ripe trade. Planting out should also be delayed until there is little danger of the temperature at ground level falling below 40°F.

VARIETIES

Of the several varieties tested Morse's special Early 498 and John Baer are the two that have given the best satisfaction in both quality and yield.

IRRIGATION

Experiments with light and heavy applications of water indicates that lower water costs are possible through good management practices. Weekly applications of 1 inch were made during May and June and 2 inches weekly during July. Plots receiving double these rates gave no increase yield of tomatoes. It is evident from the experiments that where the length of the row is doubled more than twice the amount of water is necessary. Where the layer of soil containing humus is shallow very large amounts of water are wasted and seepage basins form on the lower slopes. It was found at Osoyoos that rows 240 feet long required a minimum of three-quarters of an inch of water every five days during June, July and August to prevent tomato plants from wilting. In comparison, on the Summerland station, with rows 105 feet long, the best results were obtained with one-half inch of water per week.

FERTILIZERS

Farm manure is limited in supply in the Osoyoos area due to the low number of animal units carried per farm. It is necessary, therefore, to use chemical fertilizers in quantities that will assure maximum yields. Fortunately, the native soils are relatively high in nitrogen, phosphates and potash. Nitrogen is, however, the lowest of these three plant food elements. Field experiments have been conducted on tomatoes using sulphate of ammonia at 100 pounds per acre with and without copper sulphate 50, magnesium sulphate 100 and boracic acid 20 pounds per acre. A comparison of results with ammonium phosphate 16-20 at 300 pounds per acre indicated no difference in yield or in the quality of the tomatoes harvested.

Sulphate of ammonia 100 to 200 or ammonium phosphate 200 to 300 pounds per acre is recommended for truck crops. Best results have been obtained from top dressing the green manure crop before ploughing.

GRAPE CULTURE

A variety experiment is conducted on half an acre using nine European varieties. One set-back was sustained by frost during the winter of 1942-43.

Only the vines were killed and new growth from the roots was strong. In pruning, the low cordon system is recommended to reduce this hazard. European varieties were found susceptible to powdery mildew whereas American grape varieties are quite resistant to this disease. Two and three dustings with sulphur were necessary in seasons when mildew was prevalent to secure effective control.

Riesling × Sylvaner, and Blue Burgunder are two of the most satisfactory European varieties from the standpoint of winter hardiness, vigour, productivity and suitability for wine-making. Pearl of Csaba matures early and yields well. The sugar content is quite good in all the varieties tested which fact is of major importance in growing grapes for wine-making. The Hungarian variety known locally as Excellent is a heavy yielder but in years when rain falls near the harvest period it is subject to heavy wastage from splitting.

Systematic Layout, The Basis of Illustration Station Work

ROTATIONS

Rotations are planned to meet the requirements for cereals and forage in livestock production and, where desirable, to allow for cash crops such as potatoes and seed crops. Soil building and the maintenance of soil fertility are more than catch phrases in the program mapped out to follow in a systematic rotation. Soils are generally low in organic matter whether of light or heavy texture. This fact makes it necessary to give thought to soil improvement, the first step of which is to maintain a high proportion of the farm in sod crops. The average area thus cropped is over fifty per cent of the total that is under the plough on the fourteen stations for which records are available.

A farm map drawn to scale is the basis for planning the work. The necessary number of fields, more or less equal in size, are measured off. These should lie advantageously to the buildings for carrying out efficient operations. An extra field is allowed for on some stations over and above the number required for rotation work. This may be an extra pasture or hay field which can be swung into the rotation cycle if desired, replacing one that is taken out to be used for a similar purpose.

THREE-YEAR ROTATION

The shortest rotation is one of three years now in operation on the grey wooded soil portion of the Vanderhoof station. The sequence is coarse grain, coarse grain (seeded), and sweet clover. Sweet clover hay may be cured or the entire crop may be ploughed under for soil improvement. A six-year rotation is followed on the rest of the same farm, where more black soil is prevalent. Sod is down two years (broken and seeded to fall wheat), fall wheat, oats, fallow and in the sixth year barley and seeded to a mixture of alsike 8 and brome grass 6 pounds per acre.

SIX-YEAR ROTATION

A modified six-year plan similar to the foregoing is practised at McBride, Quesnel and Fort Fraser. Sod is left down three years, followed by coarse grain, hoed crops or partial fallow and in the sixth year coarse grain and seeded with a mixture of alfalfa 4, altaswede red clover 4, timothy 4, and brome grass 4 pounds per acre. Farm manure is applied as a top dressing on first-year hay at 8 tons per acre. This is supplemented by broadcasting ammonium phosphate 16-20 at 100 pounds per acre on the third-year hay. Yields have been well maintained and but for a severe frost in August grain yields at Quesnel and Fort Fraser would have been much higher than are shown in the following table.

TABLE 30.—SIX-YEAR ROTATION

Crop		Quesnel		McBride		Vanderhoof		Fort Fraser	
		Years grown	Yield per acre Average	Years grown	Yield per acre Average	Years grown	Yield per acre Average	Years grown	Yield per acre Average
Wheat (spring)	bu.	8	21·7	14	26·7	8	21·4	2	11·5
Wheat (fall)	bu.	1	27·0	–	–	2	31·5	–	–
Oats	bu.	8	52·9	22	64·2	12	51·7	2	41·3
Barley	bu.	2	17·5	8	41·2	4	26·0	2	26·5
Cereal hay	tons	7	2·28	5	2·02	5	1·26	1	1·33
Sweet clover hay	tons	1	1·41	7	1·96	11	1·11	–	–
Mixed hay (1st yr.)	tons	11	2·29	14	1·52	5	0·56	1	1·00
Mixed hay (2nd yr.)	tons	2	1·30	18	1·84	3	0·82	2	0·79
Alfalfa (2nd yr.)	tons	10	2·11	3	2·53	9	1·64	2	1·54
Potatoes	tons	14	6·44	–	–	–	–	2	4·00
Turnips	tons	10	12·33	–	–	–	–	2	12·00
Alsike seed	lb.	–	–	3	132	–	–	–	–

EIGHT-YEAR ROTATION

Operators at Australian and Lumby extend their respective rotations to eight years' duration. A heavy livestock program requires the maximum production of coarse grains and alfalfa. The sequence is hoed crop or fallow, grain and seeded to alfalfa 12, timothy 2 pounds per acre. There follows four years' hay, and grain, grain. Potatoes do well after fallow at Australian, the sale of which has brought in greatly appreciated revenue the last few years. Certified seed is featured with the Warba variety. The nine-year average yield for potatoes on this station is 10·06 tons per acre. Alfalfa reaches its maximum yield in the second year. Manure is applied at 8 tons on the potato crop or first-year hay if potatoes are left out.

TEN-YEAR ROTATION

Alfalfa does exceedingly well on the stiff clay soil found on the McKechnie farm at Armstrong, where it remains down for six years. The best stands are obtained by seeding alone at 12 pounds per acre on corn stubble that has not been ploughed but only surface worked as a preparatory measure. The sixth year alfalfa sod is ploughed and seeded to fall wheat at 100 pounds per acre. The seventh and eighth are grain years, followed by field corn in the ninth and seeded back to alfalfa in the tenth season. Manure is applied to the corn crop at 16 tons per acre. All forage and cereal crops are fed to livestock, of which the registered Jersey herd is the heaviest consumer. Yield records go back over twenty years on this station, a few of which are as follows: Fall wheat, 21 years with an average yield of 36·2 bushels; barley, 12 years, 51·1 bushels; oats, 11 years, 55·3 bushels; ensilage corn, 19 years, 10·64 tons; first-year alfalfa, 21 years, 2·09 tons; second-year alfalfa, 20 years, 2·18 tons; third-year alfalfa, 18 years, 2·00 tons per acre. The tough sub-soil has been successfully penetrated by the alfalfa roots. Soil texture has improved and the yields of both grain and forage crops have gradually increased over the years on this farm.

Weed Control Studies

A special study is being made on the Armstrong station (Johnston) in controlling hoary cress (*Lepidium draba*) and field bindweed (*Convolvulus arvensis*). Experiments were designed to control these weeds by employing clean cultivation, smother crops, and various herbicides, alone and in combination of all three methods. Three years of continuous fallow while offering a large measure of control was too expensive in cultural costs and in the soil organic reserve thus dissipated.

The practice latterly of summerfallowing one year, sowing to fall wheat and spot treating the weed patches in the grain crop offers a partial solution to this problem. Spot treatments with dry sodium chlorate using five pounds per square rod effectively killed all growth and sterilized the soil for several seasons. The new chemical, 2,4-D has been used for two years with excellent results in carrying out spot treatments on hoary cress in grain crops at Armstrong. The grain crop is not injured while the hoary cress is killed back to ground level.

In addition to cultural and chemical methods of control the smothering effect of competitive crops is being studied. Crested wheat grass seeded in the fall in hoary cress infested areas has become successfully established and withstood 2,4-D the following season in carrying out spot treatment. Other sod grasses are also in the test, such as reed canary and meadow fescue. This phase of the study in controlling hoary cress has been possible for only two years and is not conclusive as yet.

Field bindweed is likewise susceptible to 2,4-D treatments. Growth, however, is much later in starting each spring than with hoary cress. Spot treatments for bindweed in alfalfa stands have killed the alfalfa outright and only retarded the bindweed for the season concerned. Annual follow-up treatments are carried out which is comparable to a chemical fallow. A field seeded to alfalfa in 1941 was infested in parts with bindweed. Succeeding seasons, however, showed a progressive reduction of the weed until in 1946 no further bindweed plants were found. Alfalfa, on the other hand, offers no competition whatsoever to hoary cress. Observations indicate that hoary cress makes an early start each spring keeping pace with, or even ahead of, the alfalfa.

Summary

Results of investigations to date in the control of hoary cress and field bindweed indicate that with the former weed the vigour of the stand can be weakened by annual spot treatments with 2,4-D in growing grain and grass without injury to the crops. It has not been possible to continue these tests long enough to determine fully how many seasons it will require to eradicate

Fig. 20.—Field bindweed battling with crested wheat grass, Armstrong, B.C.

the weed patches by this method. Sodium chlorate is effective in killing both weeds but the soil is left sterile to productive crops for several seasons, whereas no adverse residual effect is left by the 2,4-D. A limited test of the smothering effect of certain crops on the two weeds in question shows that alfalfa will successfully compete with and overcome field bindweed when left down for five years.

Continuous fallow up to three years has been practised but this method is too costly. The recommended procedure is to fallow one year only and sow to fall wheat and pratice spot treatments with 2,4-D in the standing crop the following spring when the hoary cress is approaching the bud stage or the field bindweed is in full leaf. Crested wheat, Reed canary and other sod-forming grasses show promise in producing a smothering effect against both weeds. This tendency can be assisted and promoted by spot treatments when necessary with 2,4-D.

Soil Fertility Studies

Chemical fertilizers are used in the broad approach to soil fertility studies as supplementary to the use of farm manure in maintaining a satisfactory level of fertility and in such quantities as to make good the original or acquired deficiencies of the most important elements, such as nitrogen, phosphorus and potassium. Every crop that is harvested removes permanently a certain portion of the total supply of these plant food elements. It follows that it is just as important to feed crops as it is to feed livestock and equally detrimental to starve either.

Cereals are widely used as indicator crops in chemical fertilizer trials. Preliminary results from broadcast applications were disappointing, especially in low rainfall areas. A start was made in 1942 in drilling the fertilizer in with the seed through a special attachment. This method not only resulted in increased yields but also hastened maturity from five to seven days when mixtures carrying phosphates were used. This latter fact alone is a worthwhile consideration in short crop season areas. The following table shows the treatments and the average yields obtained.

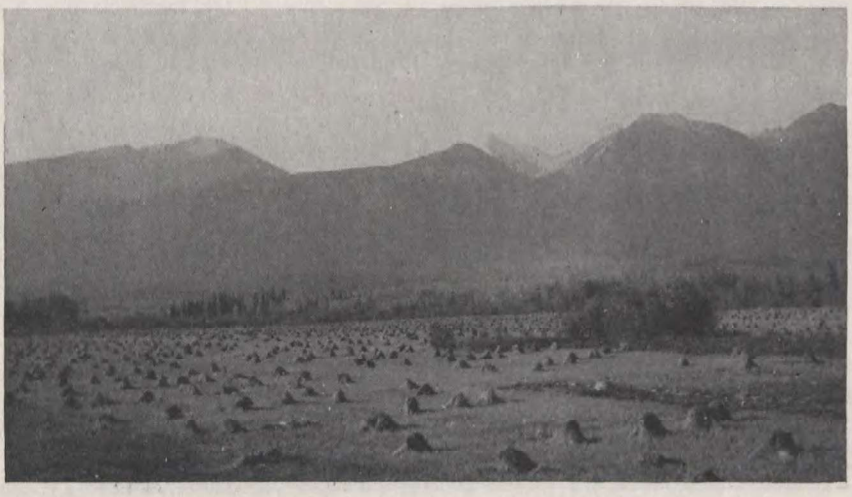


Fig. 21.—Cereal crop production, McBride, B.C.

TABLE 31.—CHEMICAL FERTILIZER TRIALS ON BARLEY ON ILLUSTRATION STATIONS IN CENTRAL INTERIOR

Treatment per Acre	lb.	Australian	McBride	Vanderhoof	Quesnel	Fort Fraser	Average for five stations
		4-year average	4-year average	4-year average	2-year average	2-year average	
		bu.	bu.	bu.	bu.	bu.	bu.
Ammonium Sulphate	40	43·4 *(45·6)	50·4 (55·0)	48·2 (42·9)	81·6 (86·1)	47·0 (52·9)	54·1 (56·5)
Triple Superphosphate	26	50·3 (51·4)	45·7 (50·1)	45·7 (49·0)	75·5 (83·0)	43·4 (40·4)	52·1 (54·8)
11–48–0	21	48·0 (50·8)	47·8 (50·4)	46·2 (48·5)	86·4 (72·1)	40·2 (44·1)	53·7 (53·2)
16–20–0	50	46·0 (53·3)	54·5 (56·2)	52·7 (52·0)	84·6 (79·7)	44·2 (48·8)	56·4 (58·0)
13–16–12	63	47·4 (48·5)	56·4 (60·5)	54·4 (53·0)	84·3 (75·3)	48·0 (54·8)	58·1 (58·4)
Check	–	46·0 –	45·3 –	44·2 –	75·5 –	34·4 –	49·3 –
Average increase over check	–	1·0 (3·9)	5·7 (9·2)	5·2 (4·9)	7·0 (3·7)	10·1 (13·8)	– –

* Figures in brackets represent the average yields obtained when treatment rates were doubled.

A combination of nitrogen and phosporus in a narrow ratio has given the greatest increase in yield at all points excepting Australian, where phosphate alone appears superior. This particular station has been cropped for a number of years to alfalfa, which would provide a potential and natural source of nitrogen. The influence that previous cropping exerts is an important factor in deciding which mixture will be the best to apply. It is noteworthy to observe that the light and heavy rates of application give practically equal results. The complete mixture at McBride, where potash was included, consistently hastens maturity over and above the impetus given in this direction as previously mentioned.

HAY LAND

A sharp response was obtained at Fort Fraser from applications of sulphate of ammonia on timothy sod, broadcast in the spring at 200 pounds per acre. The treated area yielded 1·80 compared with 0·54 tons of hay from the check. This was the residual effect as the treatment was made the previous season.

Boron broadcast on alfalfa at Vanderhoof restored the normal healthy colour and increased the yield. The rate used was 20 pounds per acre. Gypsum applied to alfalfa and sweet clover at McBride at 400 pounds per acre increased the yields from check, 0·75, to 1·88 tons per acre.

The following recommendations in respect to using chemical fertilizers to supplement farm manure in rotational practices are based on the knowledge acquired up to the time of writing from tests conducted on Illustration Stations in the districts served.

A. PRINCE GEORGE, MCBRIDE, VANDERHOOF, FORT FRASER, LUMBY AND SALMON ARM

Grain Crops:

Ammonium Phosphate 16-20	at 50 to 100 lb. per acre
or	
10-20-10	at 50 to 100 lb. per acre

Hay Crops:

Sulphate of Ammonia	at 150 to 200 lb. per acre
or	
Ammonium Phosphate 16-20	at 100 to 200 lb. per acre
or	
Gypsum*	at 100 to 200 lb. per acre

*Where increased yields are obtained.

Seed Crops:

Ammonium Phosphate 16-20	at 50 to 100 lb. per acre
or	
Ammonium Prosphate 2-20	at 100 to 150 lb. per acre

B. AUSTRALIAN, QUESNEL AND REVELSTOKE

Grain Crops:

Ammonium Phosphate 11-48	at 20 to 40 lb. per acre
or	
10-20-10	at 50 to 100 lb. per acre
or	
Triple Superphosphate*	at 25 to 50 lb. per acre

*After alfalfa or fallow.

C. CARIBOO REGION

Potatoes:

6-30-15*	at 400 lb. per acre
or	
6-30-15	at 400 lb. per acre
plus	
Rotted manure**	at 8 to 12 tons per acre

*After clover, alfalfa or fallow.

**After stubble where scabbing does not occur.

Hay Crops:

Sulphate of Ammonia	at 150 to 200 lb. per acre
or	
Ammonium Phosphate 16-20	at 100 to 150 lb. per acre

Cereal Variety Tests—Central British Columbia

These variety trials including oats, barley, spring and fall wheats and flax were conducted in close co-operation with the staffs at the Dominion Experimental Farm, Agassiz, and the Dominion Experimental Station, Prince George. For Central British Columbia, where short crop seasons generally prevail the early sorts have assumed a definite place in the farm economy.

OATS

Nineteen varieties of oats have been tested in replicated plots since 1938. The average yields of the more promising varieties were as follows, with the number of tests in brackets:

Eagle 71·4 (24); Victory 66·0 (24); Vanguard 63·4 (8); Dasix 61·3 (19); Beaver 60·7 (13); Ajax 58·6 (19); and Gopher 57·8 (21) bushels per acre.

Eagle, a late variety, is not recommended. Victory, a medium late oat, may be replaced also to advantage by earlier sorts in those areas subject to frosts. Vanguard, Dasix, Beaver and Ajax are medium early varieties of which Dasix and Ajax are recommended for general cropping. Gopher, the earliest one tested, matures on an average in 100 days and yields very well after fallow or a legume sod. It is short strawed and only binds a satisfactory sheaf when grown on soil above average in fertility.

BARLEY

Olli barley is short in the straw and requires above-average soil fertility to mature a good crop. After fallow, or a legume, sod affords ideal conditions for a satisfactory yield. Of the smooth-awned varieties that have been tested since 1940, Plush has given an average yield of 51·2 bushels in 22 tests, and Montcalm 50·0 bushels in 15 trials. Trebi, a rough-awned sort, has given an average yield of 50·1 bushels in 7 tests.

SPRING WHEAT

Of the six varieties tested, Garnet is the earliest and heaviest yielding.

FALL WHEAT

Kharkov, a bearded variety, is the hardiest but weak in the straw. Riddit, a hard red winter variety is heaver yielding, of stronger straw and has proven generally hardy in tests at Vanderhoof and Strathnaver.

Bison, Royal, Crown, Argentine 1025 and Red Wing have all been tested and Red Wing is the only one recommended for Central British Columbia.

Livestock on Illustration Stations

The number of dairy cows in 1947 showed an increase of 21·0 per cent over the 1943-47 average. Eleven of the fourteen stations have dairy herds, five of which are fully registered. Breeding beef cattle is the active concern of three operators with an average basic herd of twenty-four females. The calf crop for 1943-47 averaged 86 per cent for the beef herds.

In swine, the number of brood sows increased 119 per cent from 1943 to 1947. Mortality in young pigs decreased from 20·4 to 13·0 per cent in the same period. Improved management and sanitation is reflected in these statistics.

The flocks of sheep have dwindled to three in number on Illustration Stations. Predatory animals and lack of labour are two main reasons for this condition.

Gross receipts from poultry have increased from a total of $2,962.16 in 1939 to $7,938.08 in 1947. This healthy condition was only partly due to the higher prices received. There was also an increase in the average size of the laying flock from 70 in 1939 to 89 in 1947. The average production likewise was stepped up over the same period from 41·0 to 43·4 per cent.

One of the yardsticks whereby the usefulness of Illustration Stations may be measured is the contribution made to each community served in the way of seeds and breeding stock. The following figures show the total numbers of animals sold for breeding purposes from the district Illustration Stations during the five years ending 1947: cattle 167, swine 117, sheep 81, and poultry 800.

Farm Organization and Business Studies

Preliminary studies were first undertaken in 1937 to ascertain the sources of revenue on farms operated as Illustration Stations in British Columbia.

Fig. 22.—Killearn Norseman 22nd Registered Shorthorn herd sire owned by H. C. Catt, Operator at Lumby, B.C.

This initial step has been since expanded to determine the financial progress made on each station annually in terms of Labour Earnings. The weekly report of farm revenue and expenditure filed by each operator is the basis for this study. An annual inventory is also taken, listing the acreage, kinds of crops grown and their yields, livestock, feeds and supplies, capital investment, and liabilities.

Land Utilization

A summary of inventory records show that the operators of Illustration Stations in this supervisory district own and operate 3,810 acres, 1,150 of which is cropland and the balance of 2,660 acres spread over rough pastures, woods, roads and farmsteads. Thus, roughly 30 per cent of the combined acreage is under crop each year. This figure may be broken down into cereals 34, forage 56, summerfallow and hoed crops 6 and improved pasture 4 per cent. It is thus to be observed that 70 per cent of the average combined area is in the non-productive category, apart from the rough pasture and the supply of fuel wood that is available therein. The high proportion of non-revenue-producing acreage throws an extra burden on the areas cropped, from which all cash receipts must come to meet the full load of operational costs including taxes, depreciation and interest charges. Two operators of station farms at Vanderhoof and McBride have undertaken to extend their cropland area under land clearing arrangement. More effective use of present machinery is thus possible thereby materially lowering the cost of production of the crops concerned.

Fibre flax is an annual crop on the station at Cloverdale, also red clover seed. Alfalfa constitutes approximately 50 per cent of the total acreage devoted to forage crops most of which is utilized on the farm in pursuing an active livestock policy. Improved pastures have gained in importance on those stations carrying livestock. Seven operators have set apart and seeded down permanent pastures since 1941 for a total of 43 acres. They remain down as long as they are productive after which they are cropped one year and reseeded. Fallow practices are kept to the minimum, running but 2·1 per cent of the total cropland area for all stations in the Agassiz supervisory district.

Farm Capital

Inventory records show that the average investment in land and buildings is 65·5 per cent of the total farm capital, livestock 20·0, and equipment 14·5 per cent. The average investment per acre of crop land is $184.12, and the average gross receipts per acre for the five-year period 1943-47 were $68.21. Soil types, distance from market, and personal inclination all have a direct bearing on the nature of the program followed. The Alberni operator is adjacent to a good pay-roll city and finds butter, cream, and poultry products in strong demand the year round. Fluid milk demands have caused a slight expansion in dairying, especially at Quesnel, McBride, and Armstrong. The lack of adequate labour in recent years has reduced the returns on capital investment to some extent. Even with this handicap the five-year average gross revenue per labour unit for fourteen stations amounted to $2,291.23. A survey of the results at time of writing indicate that the annual gross receipts per acre of crop land should equal at least one-third of the investment per acre in order to provide a reasonable margin with which to meet living expenses.

A summary showing the average capital investment and gross revenue is given in Table 32, as applied to fourteen stations in this supervisory district.

TABLE 32.—AVERAGE CAPITAL INVESTMENT AND GROSS REVENUE PER ACRE OF CROPLAND, 1943-1947

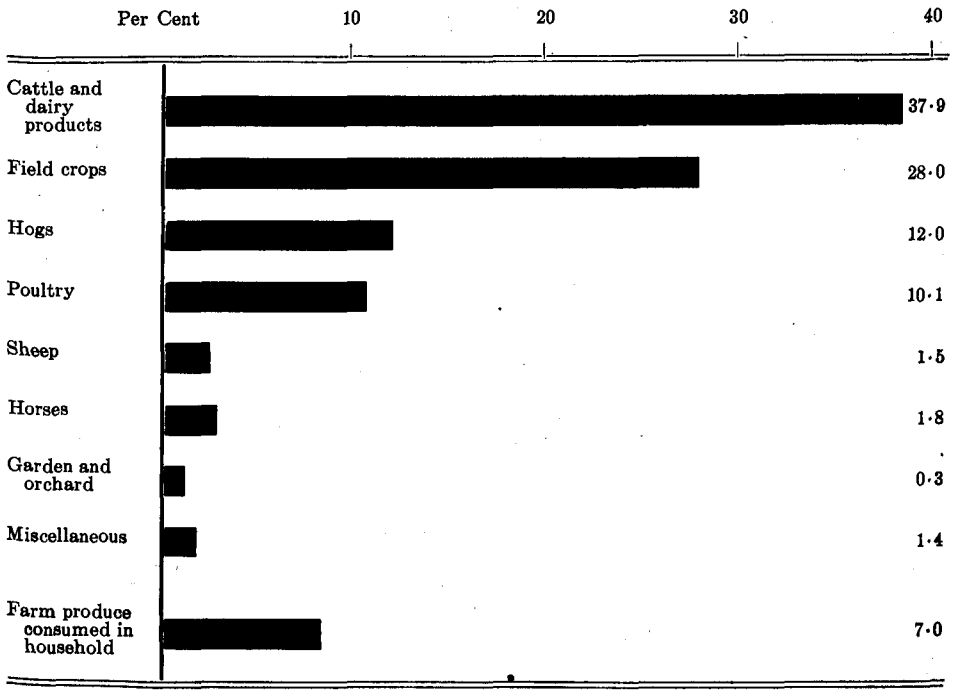
Station	Land and buildings		Livestock		Machinery and equipment		Total Capital	Investment per acre cropland	Gross receipts per acre cropland
	Amount	Percent of total	Amount	Percent of total	Amount	Percent of total			
	$ cts.	%	$ cts.	%	$ cts.	%	$ cts.	$ cts.	$ cts.
Alberni	8,256 00	69·4	2,016 20	17·0	1,626 40	13·6	11,898 60	383 83	226 89
Courtenay	17,470 00	72·8	2,879 40	12 0	3,632 60	15·2	23,982 00	399 70	80 34
Duncan	8,712 00	68·9	1,805 50	14·4	2,112 25	16·7	12,629 75	168 40	101 05
Cloverdale	27,420 00	79·6	2,750 00	8·0	4,251 10	12·4	34,431 10	253 10	*51 44
Armstrong[1]	13,371 00	66·0	3,702 40	18·3	3,172 20	15·7	20,245 60	168 71	46 95
Armstrong[2]	3,925 00	52·2	2,912 00	38·8	677 00	9·0	7,514 00	187 85	*102 46
Salmon Arm	4,980 00	73·3	1,174 20	17·3	644 80	9·4	6,799 00	212 47	71 29
Revelstoke	6,945 00	74·3	1,062 60	11·4	1,318 60	14·3	9,326 20	274 30	83 13
Lumby	8,632 60	45·9	8,285 40	44·1	1,886 20	10·0	18,804 20	208 93	34 37
Australian	8,413 20	49·2	5,399 60	31·6	3,261 80	19·2	17,074 60	148 47	32 75
Quesnel	5,598 40	68·0	1,195 00	14·5	1,436 20	17·5	8,229 60	164 59	49 22
Vanderhoof	11,695 00	69·3	2,560 20	15·2	2,612 40	15·5	16,867 60	120 48	18 90
Fort Fraser	5,170 00	61·8	2,022 00	24·2	1,170 00	14·0	8,362 00	116 14	*27 65
McBride	7,556 00	51·4	4,417 60	30·0	2,723 80	18·6	14,697 40	97 98	28 55
Total	138,144 20	–	42,182 10	–	30,525 35	–	210,851 65	–	–
Average	9,867 44	65·5	3,013 01	20·0	2,180 38	14·5	15,060 83	184 12	68 21

[1] McKechnie
[2] Johnston

* Two years only.

Sources of Revenue on Illustration Stations in British Columbia

Five-year Average



A summary statement of the sources of revenue is prepared each year as of December 31. The foregoing graph shows this data as a five-year average.

Sales of cattle and dairy produce constituted the chief source of revenue during the five-year period contributing upwards of 37·9 per cent. Field crops afforded the second highest source of farm revenue or 28·0 per cent. This was made up largely from clover seed crops, potatoes, alfalfa hay and seed grain. The year 1946 saw the highest revenue from cattle, 43·2 per cent, and the lowest field crop returns, 18·6 per cent. The same year was also the peak period for both hogs and poultry of 13·7 and 11·3 per cent, respectively. All livestock and poultry sources contributed 63·3 per cent of the average total revenue during the period under review. The interest in livestock is sustained only where adequate labour is available or where local outlets make livestock ventures attractive. Farm produce consumed in the household is considered as a source of revenue in this study and through the five-year period rendered an average contribution of 7·0 per cent. Farm and labour incomes and labour earnings are also ascertained. These studies permit a check on the production efficiency on the various station farms, each one of which has its own type of organization and management problems.

Field Days

The public are invited to attend the Annual Field Day held on their local Illustration Station sometime during each growing season. These are for the most part afternoon meetings, the programs of which are shared equally between field and livestock demonstrations. Splendid co-operation is given by both the

Provincial Department of Agriculture officials and staff members of the University of British Columbia in making these events as informative as possible. A total of 89 Field Days have been held on the Illustration Stations in the Agassiz Supervisory District from 1939 to 1947. Prominent women speakers have taken part when possible, leading discussions and giving demonstrations on some phase of Home Economics. This has proven to be an attractive feature and one that has always enhanced the value and broadened the contacts on these occasions.

LIST OF PROJECTS

Dominion Experiment Farm, Agassiz, B.C.

ANIMAL HUSBANDRY

No. A 1	Corn Silage versus Clover Silage
No. A 7	Corn Silage versus Mangels for Milch Cows
No. A 14	Dried Beet Pulp versus Roots
No. A 58	R.O.P. Records
No. A 59	Periodic Cost of Rearing Dairy Females
No. A 93	Control of Tuberculosis in Cattle
No. A 94	Treatment and Control of Contagious Abortion in Dairy Cattle
No. A 208	Skim-Milk versus Whole Milk for Dairy Calf Rearing
No. A 211	Corn Silage versus Pasture
No. A 217	Cost of Maintaining Dairy Herd Sires
No. A 380	Testing Commercial Mixed Feeds for Milk Production
No. A 456	Periodic Costs of Rearing Dairy Males
No. A 502	Breeding Holstein Cattle
No. A 648	Comparison of Fishmeal and Oilmeal
No. A 660	Serum Test for Contagious Abortion
No. A 813	Feed Cost of Milk and Butterfat Production
No. A 293	Cost of Horse Labour
No. A 294	Periodic Cost of Raising Draft Horses
No. A 331	Cost of Maintaining Work Horses
No. A 336	Cost of Maintaining Purebred Clydesdale Mares
No. A 509	Breeding Clydesdale Horses
No. A 322	To Determine the Most Profitable Season for Lambing
No. A 324	Co-operative Marketing of Wool
No. A 326	Bran and Whole Oats versus Bran and Crushed Oats
No. A 327	Spring Shearing versus Fall Shearing
No. A 328	Breeding Ewe Lambs versus Breeding as Shearling
No. A 386	Value of Corn Silage for Sheep
No. A 408	Economy of Early versus Late Lambs for Market
No. A 544	Breeding Dorset Sheep
No. A 765	Improvement Plan in Breeding Purebred Sheep
A 143	Value of Skim-Milk as a Supplement to the Meal Rations for Hogs
A 146	Inside versus Outside Feeding of Bacon Hogs in Summer
A 158	Cost of Feeding Brood Sows
A 160	Cost of Raising Litters to Time of Weaning
A 162	Economy of Spring versus Fall Litters
A 164	Age to Breed Gilts
A 166	Cost of Maintaining Herd Boar
A 462	Winter Quarters for Brood Sows
A 496	Mineral Supplements in Indoor Feeding of Hogs
A 513	Breeding Yorkshire Swine
A 571	Skim-Milk versus Fishmeal for Market Hogs
A 630	Value of Cod Liver Oil for Hog Feeding
A 679	Advanced Registry Policy for Purebred Swine
A 736	Value of Pilchard Oil for Hog Feeding
A 778	Meal Mixtures Suitable for Bacon Production
A 786	Oats—Optimum Proportion in the Ration of Bacon Hogs
A 851	Various Grades of Fishmeal for Market Hogs, Comparison of,
No. A 858	Fecundity and Nursing Capacity in Swine, Study of,
No. A 918	Relative Value of Proteins of Animal and Vegetable Origin for Hogs

POULTRY

No. P 47	Milk Substitutes for Fattening
No. P 65	Record of Performance
Nos. P 76 and No. P 79	Standard Grain and Mash versus Commercial Grain and Mash
Nos. P 55 and No. P 120	Confinement versus Range for Egg Production; Confinement versus Range in breeding
No. P 262	A Study of the Economies of Early Hatching and of Methods of Maintaining Egg Production in Early Hatched Pullets
No. P 82	Skim-Milk versus Beef Scrap

HORTICULTURE

No. H 13	Strawberry Breeding
No. H 21	Strawberry Variety Test
No. H 955	Strawberry Propagation
No. H 391	Strawberry Fertilizer
No. H 745	Raspberry Breeding
No. H 702	Raspberry Culture (Mission-Hatzic)
No. H 793	Bush Fruits, Variety Test (Raspberries and Grapes)
No. H 840	Nuts, Variety Test
No. H 652	Foundation Seed Production
No. H 713	Potatoes—Uniform Production
No. H 806	Solanaceous Vegetables, Variety Test
No. H 795	Leguminous Vegetables, Variety Test
No. H 102	Corn, Variety Test
No. H 803	Root Vegetables, Variety Test
No. H 804	Leafy Vegetables, Variety Test
No. H 805	Vegetable Vine Crops, Variety Test
No. H 698	Weed Control in Lawns and Vegetables

FORAGE CROPS

No. Ag 1	Corn Varieties for Ensilage
No. Ag 17	Root Breding—Mangels
No. Ag 52	Root Breeding—Swedes
No. Ag 96	Perennial Rye Grass—Breeding
No. Ag 97	Miscellaneous Grasses—Breeding
No. Ag 101	Seed Production—Ladino Clover
No. Ag 111	Alfalfa Breeding
No. Ag 181	Soybeans—Variety Test for Seed
No. Ag 255	Plant Introduction Series
No. Ag 264	Perennial and Biennial Grasses and Legumes for Hay
No. Ag 267	Perennial and Biennial Grasses and Legumes for Pasture

CEREALS

No. Ce 1	Spring Wheat—Variety Test
No. Ce 4	Winter Wheat—Variety Test
No. Ce 5	Oats—Variety Test
No. Ce 6	Barley—Variety Test
No. Ce 7	Field Peas—Variety Test
No. Ce 9	Flax, Variety Test
No. Ce 11	Winter Rye—Variety Test
No. Ce 50	Registered Seed
No. Ce 59	Evaluation of Mixtures of Peas and Oats
No. Ce 60	Evaluation of Mixtures of Barley and Oats
No. Ce 136	Elite Stock Seed

FIELD HUSBANDRY

No. F 90	Cost of Operating Tractor
No. F 302	Hay Curing Experiments
No. F 351	Rate of Applying Commercial Fertilizer for Barley
No. F 364	Commercial Fertilizer and Manure for Corn
No. F 369	Commercial Fertilizer Formulas for Pasture
No. F 370	Date of Applying Commercial Fertilizer for Pasture
No. F 383	Selected Herbicide Trials
No. F 396	Rate of Applying Commercial Fertilizer for Oats
No. F 415	Commercial Fertilizer Formulas for Oats
No. F 455	Commercial Fertilizer Formulas for Corn
No. F 468	Commercial Fertilizer Formulas for Barley

FIBRE PLANTS

No. E 3 Flax Variety Testing

ACTIVE PROJECTS

Agassiz Supervisory District

division of illustration stations

IS-E1.35: Three-Year Rotation
IS-E1.42: Four-Year Rotation
IS-E1.52: Five-Year Rotation
IS-E1.66: Six-Year Rotation
IS-W1.69: Six-Year Rotation
IS-W1.70: Six-Year Rotation
IS-E1.81: Eight-Year Rotation
IS-E1.101: Ten-Year Rotation
IS-02.01: Plant Food Deficiency Studies (eastern)
IS-02.02: Plant Food Deficiency in Grey Wooded Soils
IS-02.03: Chemical Fertilizer as a Supplement to Farm Manure. (Formulae test)
IS-02.03B: Chemical Fertilizer as a Supplement to Farm Manure. (Rate of application)
IS-02.03C: Chemical Fertilizer as a Supplement to Farm Manure. (Place in hoed crop rotation)
IS-02.03C2: Chemical Fertilizer as a Supplement to Farm Manure. (Place in grain rotation)
IS-02.09: Nitrogenous Fertilizers for Hay Lands
IS-02.10: The Effect of Chemical Fertilizers on Cereals
IS-02.12: Root Fibre and Crop Residue in Soil Improvement
IS-03.01: Control of Weeds by Cultural Methods
IS-03.02: Control of Weeds by Chemicals
IS-04.04: Planning New Farm Buildings
IS-04.08: Whitewashing and Painting of Farm Buildings
IS-05.01: Study of Regional Climatic Conditions as Related to Crop Growth
IS-06.05: Testing Cereal Varieties
IS-06.06: Production of Registered and Pure Seed Grain
IS-06.07: Testing Grain Mixtures
IS-06.10: Winter Hardiness of Fall Seeded Grain
IS-07.01: Testing Mixtures for Hay or Pasture
IS-07.08: Methods of Producing Seed of Leguminous Plants
IS-07.11: Adaptation of Different Grass and Clover Species Sown on the Slough Lands
IS-07.12: Leguminous and Non-leguminous Hay Crops on Peat Soil
IS-08.02: Chemical Fertilizers for Pasture; Study of Formula
IS-09.02: Variety Experiment on Field Corn
IS-09.06: Methods of Controlling Brown Heart in Turnips
IS-10.06: Potato Disease and Insect Control
IS-11.02: Stimulating Interest in the Development of the Farm Garden
IS-11.03: The Establishment of a Farm Orchard
IS-11.09: Growing Suitable Varieties of Small Fruits
IS-11.17: Farm Home Beautification
IS-11.20: Growing Bulbs
IS-12.01: Soybean Variety Test
IS-12.02: Flax Variety Test
IS-13.01: Dairy Cattle Production
IS-13.05: Sales of Livestock for Breeding Purposes
IS-13.06: Beef Production
IS-13.07: Swine Production
IS-13.08: Sheep Production
IS-14.01: Poultry Production
IS-17.02: Cost of Producing Milk
IS-17.03: Study of Farm Productivity and Progress
IS-17.04: Study of Farm Business
IS-17.09: Management of the Farm Wood Lot

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
KING'S PRINTER AND CONTROLLER OF STATIONERY
1949

10M-12049—1:49