Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

ARCHIVED - Archiving Content

ARCHIVÉE - Contenu archivé

Archived Content	Contenu archive
Information identified as archived is provided for reference, research or recordkeeping purposes. It is not subject to the Government of Canada Web Standards and has not been altered or updated since it was archived. Please contact us to request a format other than those available.	L'information dont il est indiqué qu'elle est archivée est fournie à des fins de référence, de recherche ou de tenue de documents. Elle n'est pas assujettie aux normes Web du gouvernement du Canada et elle n'a pas été modifiée ou mise à jour depuis son archivage. Pour obtenir cette information dans un autre format, veuillez communiquer avec nous.

This document is archival in nature and is intended for those who wish to consult archival documents made available from the collection of Agriculture and Agri-Food Canada.

Some of these documents are available in only one official language. Translation, to be provided by Agriculture and Agri-Food Canada, is available upon request.

Le présent document a une valeur archivistique et fait partie des documents d'archives rendus disponibles par Agriculture et Agroalimentaire Canada à ceux qui souhaitent consulter ces documents issus de sa collection.

Certains de ces documents ne sont disponibles que dans une langue officielle. Agriculture et Agroalimentaire Canada fournira une traduction sur demande.

Canada

CANADA

DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS SERVICE

DOMINION EXPERIMENTAL STATION

LENNOXVILLE

QUE.

J. A. STE-MARIE, B.S.A., SUPERINTENDENT

PROGRESS REPORT
1936-1946

VIEW OF DOMINION EXPERIMENTAL STATION, LENNOXVILLE, QUE., SHOWING MAIN BUILDINGS.

Published by authority of the RT. HON. JAMES G. GARDINER, Minister of Agriculture, Ottawa, Canada.

TECHNICAL STAFF

J. A. Ste-Marie, B.S.A.
Superintendent.

Paul Gervais, B.S.A., M.Sc.
Assistant, Cereals and Forage Crops.

W. S. Richardson, B.S.A.
Assistant, Field Husbandry.

G. Lalande, B.S.A.
Assistant, Animal Husbandry.

A. E. Ouellette, B.S.A.
Assistant, Cereals and Forage Crops.

B. J. Finn, B.S.A., M.Sc.
Assistant, Soil Fertility.

Omer Allard, B.S.A.
Supervisor, Illustration Stations.

L. A. Gnaedinger,
Poultryman.

CONTENTS

INTRODUCTION

The Experimental Station is situated on the St. Francis River, a mile east of Lennoxville and four miles southeast of Sherbrooke. Established in 1914, the Station, with the eleven Illustration Stations administered from it, serves the Eastern Townships and southeastern Quebec.

The area of land at the Station is 690 acres. While the soils on the Station property are variable, the two main types are Coaticook sandy loam and Coaticook silty loam, and most of the experimental work with field crops is conducted on these two types of soil. The soils in the region served by the Lennoxville Station vary from light sandy loams to heavy clays, and in most cases they need liming and fertilization.

As the Station is located in a noted livestock and general farming district, its activities embrace mainly phases of work with livestock and field crops including pastures. Jersey and Shorthorn herds of cattle are maintained, a herd of Yorkshire pigs and a flock of Oxford Down sheep. Belgian horses are raised on the farm and Barred Plymouth Rock hens are kept.

The previous progress report of the Lennoxville Station, published in 1937, covered the results of experiments in the years 1931 to 1935 inclusive. This report, covering the eleven years 1936 to 1946 inclusive, presents the accomplishments and activities of the Experimental Station and a statement of work done on the eleven Illustration Stations of the district.

J. A. McClary, former Superintendent, retired in 1937 and was succeeded by J. A. Ste. Marie, previously Superintendent at Ste. Anne de la Pocatiere. F. S. Browne, in charge of investigations on cereals and forage plants, was transferred to Ottawa in 1937 and replaced by Paul Gervais in 1939. D. A. Finlayson, who was appointed Assistant in Animal Husbandry in 1937, resigned in 1942. He was succeeded in 1943 by H. L. Lessard who resigned in 1946 and was replaced by G. Lalande the same year. In 1938, O. Allard was appointed Supervisor of Illustration Stations. B. J. Finn was engaged as Assistant in Soil Fertility Studies in 1946.

47579—2

METEOROLOGICAL RECORDS

Temperature

The records show that the mean temperature for the years 1936-1946 is 40·81 deg. F. which is only ·30 degrees higher than the average for 32 years. The lowest temperature recorded at this Station in 32 years, 48 degrees below zero, occurred on January 28, 1925, and again on December 30, 1933. During the 32-year period, below-zero temperatures were recorded in the first four and the last two months of the year. The average frost-free period was 98 days ranging from 57 days in 1918 to 137 days in 1940. Frosts have occurred as late as June 29 and as early as August 16. During the 32-year period the average date on which freeze-up occurred was November 19 with the earliest date being October 26, 1936, and the latest November 30, 1937. Although extremely hot weather is the exception, the thermometer recorded 99 degrees on July 8, 1921, and 97 degrees on August 18, 1935.

Precipitation

The annual average precipitation for the years 1936-1946 was 42·27 inches compared with the 32-year average of 40·16 inches. In general, precipitation is well distributed throughout the year. The wettest month is July with a 32-year average rainfall of 4·23 inches. The snowfall for 32 winters averaged 93·6 inches. The driest year was 1921 with only 26·09 inches of precipitation and the wettest year 1945 when 47·59 inches of moisture fell. In calculating precipitation, 10 inches of snow are considered as the equivalent of one inch of rain.

Fig. 1.—View of location of some weather instruments showing experimental hedges in the background.

Sunshine

The annual average amount of bright sunshine for the years 1936-1946 was 1,735·9 hours, slightly less than the 32-year average of 1,748·4 hours. The variation was from only 1,599·2 hours in 1917 to 1,947·1 hours in 1921. Thus, the year 1921 established two records: the most sunshine and the least moisture.

Meteorological records are taken in co-operation with the Meteorological Division of the Department of Transport.

Complete data on temperature, precipitation and sunshine will be found in Tables 1, 2 and 3 for the years 1915 to 1946 inclusive.

TABLE 1.—METEOROLOGICAL RECORDS, 1915-1946 INCLUSIVE

Month	Temperature F.			Precipitation			Bright Sun
	Highest	Lowest	Mean	Rain (in.)	Snow (in.)	Total precip. (in.)	(hrs.)
January	57	−48	12·43	0·98	22·0	3·18	79·4
February	53	−47	13·37	0·57	18·7	2·44	94·1
March	77	−40	25·25	1·31	17·0	3·01	134·8
April	87	−5	39·60	2·21	6·2	2·84	156·5
May	89	19	51·76	2·94	.....	2·94	200·8
June	93	25	61·39	4·09	.....	4·09	211·7
July	99	34	66·40	4·23	.....	4·23	237·7
August	97	30	64·04	3·51	.....	3·51	221·9
September	93	16	56·32	3·84	0·1	3·85	158·5
October	85	12	45·05	3·59	1·4	3·73	127·0
November	75	−16	32·69	2·44	8·9	3·32	68·8
December	66	−48	17·77	1·09	19·3	3·02	57·2
2-year average	99	−48	40·51	30·80	93·6	40·16	1,748·4

TABLE 2.—ANNUAL PRECIPITATION, 1915-1946 INCLUSIVE
(Inches)

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

TABLE 3.—THE OCCURRENCE OF FROST AND FROST-FREE PERIODS, 1915-1946 INCL.
(Freezing Temperature 32 deg. 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
1915	June 3	August 27	84
1916	May 15	September 4	111
1917	May 28	September 8	102
1918	June 21	August 18	57
1919	June 29	September 5	67
1920	May 17	September 19	124
1921	June 16	August 16	60
1922	May 28	September 8	102
1923	June 16	August 16	60
1924	June 2	September 4	93
1925	May 29	September 9	103
1926	June 6	September 3	88
1927	June 4	September 9	96
1928	May 17	September 10	115
1929	May 23	September 19	118
1930	May 19	September 11	114
1931	May 18	September 19	123
1932	May 24	September 11	109
1933	June 2	September 12	101
1934	June 8	August 31	83
1935	May 26	September 3	99
1936	May 22	September 14	114
1937	May 12	September 9	119
1938	May 18	September 6	110
1939	May 27	September 18	113
1940	May 15	September 30	137
1941	June 25	August 29	64
1942	June 1	August 25	84
1943	June 6	September 18	103
1944	June 4	September 24	111
1945	June 3	September 17	105
1946	June 19	September 4	76
Average	May 31	September 7	98

Date of the latest spring frost on record:—June 29, 1919. Date of the earliest fall frost on record:—August 16, 1921 and 1923. Shortest frost-free period on record:—June 21–August 18, 1918, 57 days. Longest frost-free period on record:—May 15–September 30, 1940, 137 days.

ANIMAL HUSBANDRY

(Paul Gervais)

The activities in the Animal Husbandry Division include work with cattle, sheep, swine and horses. Investigations involve mainly methods of breeding, feeding trials and costs of feeding. The animals also are used in pasture studies. The production and the dissemination of good breeding stock to breeders and farmers are two important contributions towards the improvement of herds and flocks of the district.

DAIRY CATTLE

Jerseys are the breed of dairy cattle kept at the Station. For the period of 1936 to 1946 inclusive, the herd averaged 62 head, all purebred. The herd is accredited and free from Bang's disease.

General Management

In the management of the Jerseys, an effort is made to maintain the herd in a good standard of type and, at the same time, to keep the milk production on a satisfactory basis.

The heifers are bred at the age of 16 to 19 months. They are entered under the R.O.P. test in their first lactation which generally extends to 305 days. The outstanding heifers are kept in the herd for replacements. Surplus females and males are disposed of for breeding purposes to breeders of the district.

The cows are milked twice daily and kept in the R.O.P. test as long as they remain at the Station.

Jersey cows are used in the carrying of experiments on feeding and pasture.

Classification of the Herd

In 1942, the dairy herd was classified as to type for the first time. Of the twenty-three cows classified, two were "very good", twelve "good plus", eight "good" and one "fair". In 1945, the herd again was classified with the following results: one "excellent", eleven "very good", ten "good plus" and eight "good". One bull was classified "excellent" and one "very good".

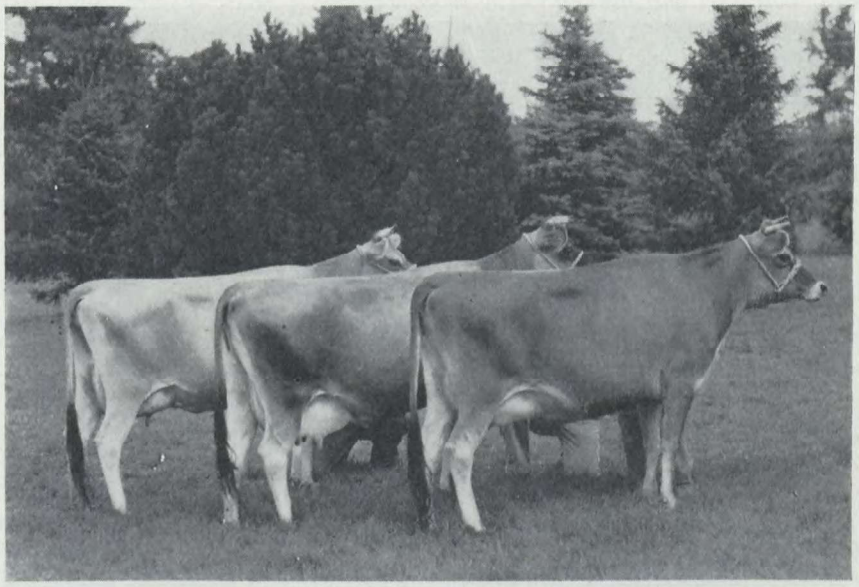


Fig. 2.—Three daughters of Brampton Sporting Design 87361. From left to right: Lennoxville Dream 7th 122811, Lennoxville Cowslip 6th 131581, and Lennoxville Silence 3rd 122815.

Sires

Brief notes on four of the sires used from 1936 to 1946 are given below.

Brampton Forward's Success –38295– C.R. of P. No. 442, A.R. No. 164, Class "AA", Three Star Preferential Sire. Silver Medal.

Sire: Forward (Imp.) –25738– C.R. of P. No. 135, A.R. No. 19, Class "AA", Three Star Preferential Sire. Gold Medal.

Dam: Successor's Maid –30873– C.R. of P. No. 5020. Mature Class: 8,889 lb. milk, 465 lb. fat.

Brampton Sporting Design –87361– C.R. of P. No. 1127, A.R. 1012, Class "A".

Sire: Avondale Standard Design –51067– C.R. of P. No. 433, A.R. No. 124, Class "AA", Three Star Preferential Sire. Silver Medal.

Dam: Brampton Sporting Peggie –53783– C.R. of P. 4133. Three-year old class: 7,223 lb. milk, 455 lb. fat.

Lennoxville Forward 19th –101286– A.R. No. 297, Class "AA".

Sire: Brampton Forward's Success –38295– C.R. of P. No. 442 A.R. No. 164, Class "AA", Three Star Preferential Sire. Silver Medal.

Dam: Brampton Jim's Silence –53755– C.R. of P. 4370A. Four-year old class: 9,414 lb. milk, 548 lb. fat.

Summerland Stella's Leader –97524– A.R. 217, Class "AA". Excellent.

Sire: Brampton Standard Leader –61582– C.R. of P. 731. One Star Preferential Sire. Silver Medal.

Dam: Summerland Standard Stella –70860– C.R. of P. No. 7062A. Three-year old class: 10,321 lb. milk, 589 lb. fat.

The last two sires are still in the herd.

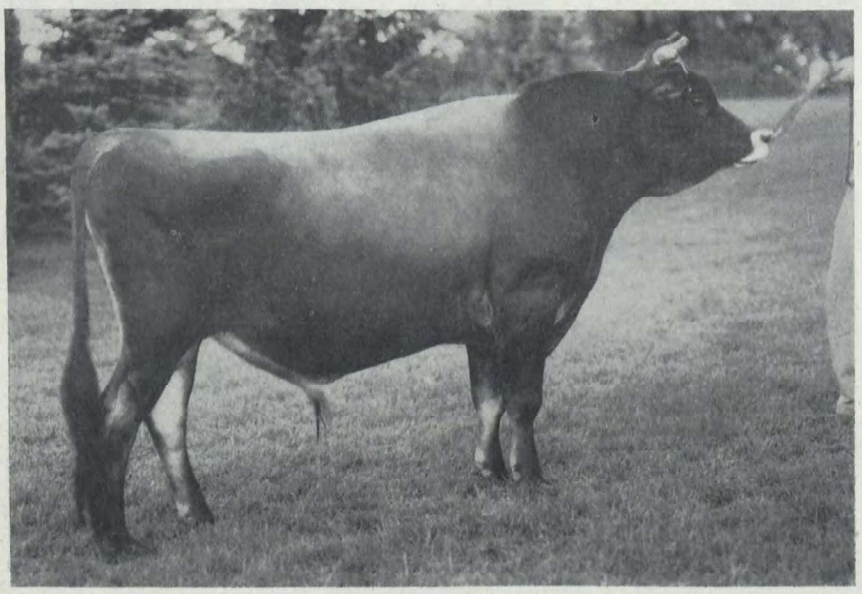


Fig. 3.—Jersey Bull "Brampton Sporting Design 87361", herd sire at the Dominion Experimental Station, Lennoxville, Que., from 1936 to 1943.

Milk Production

Each year, records were kept on the milk production of each cow. Table 4 gives the average annual production of cows that have completed their lactation each year, from 1936 to 1946 inclusive.

An examination of Table 4 shows that an average production of 6,445 lb. of milk and 358·1 lb. of fat was recorded during a 338-day period. The average per cent fat was 5·56 for the eleven years. Cows at the beginning of their lactation had an average age of 3 years 8 months for the period reported.

TABLE 4.—AVERAGE ANNUAL MILK PRODUCTION OF JERSEY COWS WITH COMPLETED LACTATIONS, 1936-1946 INCLUSIVE

Year	Number of cows	Average age at commencement of lactation		Days in milk	Milk	Fat	Per cent fat
		year	month		lb.	lb.	
1936	20	4	2	324	6,633	361·7	5·45
1937	30	4	9	339	6,175	336·9	5·48
1938	19	3	7	360	6,251	336·0	5·43
1939	19	3	8	329	6,735	356·0	5·35
1940	22	3	1	345	6,798	371·5	5·47
1941	22	3	3	351	6,803	366·1	5·40
1942	26	3	6	362	6,945	390·9	5·69
1943	20	3	8	332	6,794	398·1	5·88
1944	22	3	10	316	5,930	351·1	5·93
1945	26	4	4	327	5,885	330·6	5·60
1946	19	4	6	334	6,058	346·1	5·65
Average	22	3	8	338	6,445	358·1	5·56

It will be noted that the per cent fat has gone up to some extent from 1942 on, while a decrease in milk production was recorded towards the end of the period.

Cows which are used for feeding and pasture experiments, in many cases, are not given the opportunity to make high records. As the number of cows needed for such investigations varies from year to year, this may account for some of the differences noted in Table 4. And also the influence of the sires is reflected in the quantity and quality of the milk produced.

Feed Cost of Milk Production

The feed cost of producing 100 lb. of milk and one pound of butterfat was determined for the Jersey herd from 1936 to 1946 inclusive. The amount of feeds consumed was also recorded. All the cows, whether in milk or dry, were listed. Hay, silage and roots were charged at farm value and the meal at current market price for each year.

The yearly summary of feed cost of milk production for the Jersey herd from 1936 to 1946 inclusive is given in Table 5 while the monthly summary is presented in Table 6.

An examination of Tables 5 and 6 shows that large variations occurred in the feed cost of producing 100 lb. of milk and 1 lb. of butterfat from year to year and from season to season within a year. Factors responsible for such variations are the number of cows in milk or dry, the age of cows, their stage of lactation, the amount of milk produced, the price of feeds, the quality of hay and silage fed, the utilization of pasture, etc.

The feed cost varied from $0.67 to $1.42 per 100 lb. of milk with an average of $1.00 for the eleven years and from $0.12 to $0.25 per pound of butterfat, the average being $0.18. As shown in Table 6, quite an economy is realized in the feed cost of milk production during the pasture season. In the summer months, the feed cost is approximately half that of the winter months.

On the average, the Jersey cows have produced, during a lactation period of 308 days, 5,977 lb. of milk and 330·9 lb. of butterfat being an average fat test of 5·5 per cent. For such a production, 1,912 lb. of meal, 7,284 lb. of silage, 1,673 lb. of hay, 67 lb. of roots and 258 lb. of green feed were consumed. The pasture season had a duration of 138 days.

47579—3½

TABLE 5.—YEARLY SUMMARY OF FEED COST OF MILK PRODUCTION PER COW—JERSEY HERD, 1936-1946 INCLUSIVE

Year	Number of cows		Age of cows	Total cow-days		Total milk produced	Av. % fat	Total fat produced	Meal eaten	Silage eaten	Hay eaten	Roots eaten	Green feed eaten	Pasture	Total cost of feed	Feed cost per		Feed consumed per 100 lb. milk					
	in milk	dry		Milking	Dry											100 lb. milk	1 lb. butter fat	Meal	Silage	Hay	Roots	Green feed	Pasture
			yr. mo.	days	days	lb.		lb.	lb.	lb.	lb.	lb.	lb.	days	$ cts.	$ cts.	$ cts.	lb.	lb.	lb.	lb.	lb.	days
1936	24	4	5 1	307	59	5,973	5·5	328·7	1,481	5,244	1,658	.....	62	159	40 08	67	12	24·8	87·8	27·8	.....	1·0	2·7
1937	29	3	5 2	304	61	5,338	5·4	288·4	1,184	6,133	1,815	.....	25	137	41 76	78	14	22·2	114·9	34·0	.....	·5	2·6
1938	22	3	4 6	318	47	5,902	5·2	309·0	1,840	6,109	1,870	286	.....	138	49 80	84	16	31·2	103·5	31·7	4·8	.....	2·3
1939	24	3	3 10	306	59	6,548	5·4	352·7	1,937	5,803	1,763	258	260	140	53 64	82	15	29·6	88·6	26·9	3·9	4·0	2·1
1940	25	3	3 8	310	56	6,212	5·3	326·4	2,050	6,666	1,879	.....	.....	133	54 96	89	17	33·0	107·3	30·3	.....	.....	2·1
1941	27	3	3 9	306	59	5,969	5·5	325·8	2,113	6,473	1,876	38	1,136	136	63 48	1 06	19	35·4	108·4	31·4	·7	19·0	2·3
1942	23	1	4 2	329	36	6,252	5·7	356·4	2,626	10,303	1,345	.....	.....	154	89 04	1 42	25	42·0	164·8	21·5	.....	.....	2·5
1943	22	2	4 4	311	54	6,196	5·8	360·1	2,080	9,450	1,601	.....	.....	110	71 76	1 16	20	33·6	152·5	25·8	.....	.....	1·8
1944	25	3	4 4	303	63	5,833	6·1	353·0	2,112	9,407	1,392	182	167	127	71 04	1 22	20	36·2	161·2	23·9	3·1	2·9	2·2
1945	26	3	4 10	306	59	5,442	5·5	301·4	1,670	7,418	1,426	.....	451	139	57 24	1 05	19	30·7	136·3	26·2	.....	8·3	2·5
1946	26	3	5 5	297	68	6,307	5·5	353·3	2,160	7,920	1,740	.....	605	142	72 74	1 15	21	34·4	125·3	27·5	.....	9·6	2·2
Average	25	3	4 5	308	57	5,977	5·5	330·9	1,912	7,284	1,673	67	258	138	59 91	1 00	18	32·0	121·9	28·0	1·1	4·3	2·3

TABLE 6.—MONTHLY SUMMARY OF FEED COST OF MILK PRODUCTION PER COW—JERSEY HERD, 1936-1946 INCLUSIVE

Month	Number of cows		Age of cows	Cow-day		Milk produced	% Fat	Fat Produced	Meal eaten	Silage eaten	Hay eaten	Roots eaten	Green feed eaten	Pasture	Cost	Feed cost per		Feed consumed per 100 lb. milk					
	in milk	Dry		Milking	Dry											100 lb. milk	1 lb. butter fat	Meal	Silage	Hay	Roots	Green feed	Pasture
			Yr. mo.	days	days	lb.		lb.	lb.	lb.	lb.	lb.	lb.	days	$ cts.	$ cts.	$ cts.	lb.	lb.	lb.	lb.	lb.	days
January	23	3	4 4	25·4	5·6	463·3	5·67	26·28	192·6	1,061·5	219·7	29·3	5·9	.....	5 93	1 28	23	41·6	229·1	47·4	6·3	1·3	.....
February	24	3	4 4	23·0	5·0	455·9	5·64	25·71	179·9	975·9	200·1	4·1	13·4	.....	5 59	1 23	22	39·5	214·1	43·9	0·9	2·9	.....
March	24	4	4 3	24·7	6·3	502·5	5·60	28·15	204·0	1,037·0	219·9	5·6	5·4	.....	6 14	1 22	22	40·6	206·4	43·8	1·1	1·1	.....
April	26	3	4 4	24·7	5·3	510·1	5·51	28·13	191·6	935·7	223·4	4·4	6·3	.....	5 77	1 13	21	37·6	183·4	43·8	0·9	1·2	.....
May	26	1	4 4	28·1	2·9	633·5	5·49	34·78	198·9	703·0	171·1	.....	4·8	9·8	5 98	94	17	31·4	111·0	27·0	.....	0·8	1·5
June	26	2	4 5	27·7	2·3	646·8	5·45	35·22	125·2	.....	.....	.....	0·5	30·0	3 85	60	11	19·4	.....	.....	.....	0·08	4·6
July	26	2	4 5	28·0	3·0	595·1	5·42	32·23	128·6	.....	.....	.....	0·5	30·9	4 03	68	13	21·6	.....	.....	.....	0·08	5·2
August	25	3	4 6	26·7	4·3	539·8	5·37	29·01	121·9	.....	.....	.....	48·5	30·7	3 97	74	14	22·6	.....	.....	.....	9·0	5·7
September	25	3	4 6	24·5	5·5	443·7	5·50	24·42	119·4	57·3	0·4	2·5	152·5	30·0	4 04	91	17	26·9	12·9	·09	·06	34·6	6·8
October	25	3	4 7	25·8	5·2	407·2	5·71	23·24	144·2	612·3	201·3	0·4	15·1	5·0	4 57	1 12	20	35·4	150·4	49·4	0·1	3·7	1·2
November	24	3	4 5	24·7	5·3	386·3	5·69	21·99	150·8	919·3	229·8	7·0	.....	.....	4 95	1 28	23	39·0	238·0	59·5	1·8	.....	.....
December	24	3	4 5	25·8	5·2	433·7	5·61	24·35	174·3	1,076·7	218·3	19·7	.....	.....	5 54	1 28	23	40·2	248·3	50·3	4·5	.....	.....

Record of Performance

All the cows of the Jersey herd were entered under the R.O.P. test with the object of having official records on their milk and fat production and to be able to evaluate the worth of sires used.

Table 7 gives the number of cows that qualified in the record of performance.

TABLE 7.—NUMBER OF COWS QUALIFYING IN RECORD OF PERFORMANCE 1936-1946 INCLUSIVE

Year	Number entered	Number qualified	Per cent qualified
1936	20	9	45
1937	30	7	23
1938	19	8	42
1939	19	11	58
1940	22	15	68
1941	22	14	64
1942	26	16	62
1943	20	11	55
1944	22	7	32
1945	26	8	31
1946	19	8	42
Total	245	114	47

As shown in Table 7, there is a considerable variation in the percentage of cows qualifying from year to year. Factors responsible for this variation include management, quality of roughages, breeding, etc. The use of the cows in feeding and pasture investigations is one of the management factors which affects milk production on an Experimental Station.

Silage Feeding

Two kinds of silage are produced at the Experimental Station. Their chemical composition is given in Table 8 for a five-year average. The grass and legume silage was treated with about 40 lb. of molasses per ton of green material.

TABLE 8.—CHEMICAL COMPOSITION OF GRASS AND LEGUME SILAGE AND OF CORN SILAGE. FIVE-YEAR RESULTS

Kind of silage	Moisture	Computed on dry matter basis				
		Protein	Crude fibre	N. Free extract	Fat	Ash
	%	%	%	%	%	%
Grass and Legume Silage	69·31	11·52	32·37	46·06	2·34	7·71
Corn Silage	76·30	7·60	27·67	55·98	1·63	7·12

The moisture content in both silages was quite satisfactory. The grass and legume silage had 3·92 per cent more protein than corn silage. It also contained slightly more fat and minerals. However, there was less crude fibre in the corn silage and much more nitrogen-free extract than in the grass and legume silage.

From 1942 to 1946 inclusive, an experiment was carried on with a view to determining the relative feeding value and economy of corn silage and of grass and legume silage, and the possibility of using grass and legume silage as the sole roughage.

Each year, a number of Jersey cows were selected for this experiment and divided in three groups according to their age, weight, milk production and lactation period. The cows were fed as follows:

Group "A"—Molasses-treated grass and legume silage.

Group "B"—Molasses-treated grass and legume silage and hay.

Group "C"—Corn silage and hay.

The silage and the hay were fed ad libitum, but the quantities consumed by each group were recorded. The meal feeding was based on the milk production of each cow, i.e. one pound of meal for every 3 to 3·5 lb. of milk produced. Daily milk records were kept and the R.O.P. test for butterfat was used to calculate the total fat produced.

Each year the experiment started at the end of November or early in December to be concluded by the end of April or early in May. The cows were weighed at the start of the experiment and at the end of each period of 28 days.

The results obtained are summarized in Table 9.

TABLE 9.—SILAGE FEEDING EXPERIMENT WITH JERSEY COWS, 1942-1946 INCLUSIVE

Item	Group "A" Grass and legume silage	Group "B" Grass and legume silage + hay	Group "C" Corn silage + hay
Number of cows	7	7	7
Age of cows	4 yr.	3 yr.	3 yr.
	156 days	338 days	351 days
Number of animal days	146	146	146
Weight of cows at beginning of experiment	864 lb.	845 lb.	859 lb.
Weight of cows at finish of experiment	864 "	865 "	868 "
Gain in weight per head	0 "	20 "	9 "
Butterfat produced per head	152·8 "	144·5 "	142·2 "
Fat corrected milk produced per head	3,334 "	3,125 "	3,119 "
Consumption of silage per head	9,350 "	5,264 "	5,108 "
Consumption of meal per head	1,061 "	1,034 "	1,075 "
Consumption of hay per head	0 "	1,121 "	1,111 "
Cost of feed per head	$34·15	$34·45	$34·93

From the results obtained, it can be stated that:

(1) The grass and legume silage may successfully replace the corn silage in dairy cattle feeding.

(2) The feeding of grass and legume silage as the sole roughage appears promising and offers great possibilities for the future.

(3) Each year, at the end of the experiment, the condition of the cows compared favourably for the three groups.

(4) The cows fed with silage as the sole roughage produced slightly more milk and butterfat than the cows of the other cow groups.

(5) The cows in Group "A" maintained their weight while those in Groups "B" and "C" gained a little. It must be noted that the cows in Group "A" were slightly older than those in Groups "B" and "C".

(6) When silage is the sole roughage fed, it has to be of excellent quality and palatable if one wants the cows to eat silage to the limit of their appetite.

(7) The cost of feed was practically the same for the three groups.

Dissemination of breeding Stock

From 1936 to 1946 inclusive, 29 bulls, 33 heifers and 75 cows were sold to farmers and breeders of the district for breeding purposes, and 7 bulls were loaned.

BEEF CATTLE

Beef production is an important enterprise in the Eastern Townships of Quebec. It has been demonstrated in the past that the production of beef, if well organized, can be exploited satisfactorily. The annual Sherbrooke Winter Fair and sale of beef cattle has definitely shown that beef of excellent quality can be produced in the district and can secure a price higher than the general market level.

From 1936 to 1946 inclusive, the Shorthorn herd at the Station numbered, on the average, 116 head.

General Management

The program outlined for the Shorthorn breed is to develop animals of good beef type and at the same time to maintain the milk production on a satisfactory basis.

Most of the calves are born in the stable. They nurse their dams until fall with the exception of those from cows under R.O.P. test. These calves are given a foster dam when possible or are pail-fed. The steer calves are used for feeding experiments while the good heifers are raised for replacement in the herd.

The heifers are bred to calve at the age of 30 to 36 months. These females are tested as early as possible for milk production in the Record of Performance. If found to be good milkers, they are retained in the main breeding herd. Those that do not qualify in the R.O.P. but are of good type, are transferred to the section of the herd kept for straight beef production. This part of the Shorthorn herd is used for experimental feeding and pasture experimental work.

Sires

Brief notes on five of the sires used in the herd since 1936 are given below. All the listed sires are beef bred with the exception of Glenmount Rosewood Lad which is a dual-purpose bull.

Cruggleton Polunius (Imp.) –219901– (263084).
Sire: Bridgebank Rosedene –213883–
Dam: Princess Crissy –110582–

Glenmount Rosewood Lad –235509–
Sire:Red Laddie –229331–
Dam: Athelstane Rosewood 28th –241475–
First prize junior bull calf at the 1938 Royal Fair.

O.A.C. Ransom 132nd –257157–
Sire: O.A.C. Ransom 13th –234803–
Dam: O.A.C. Mayflower –292039–
Paternal and maternal grandson of the famous imported bull, Millhills Ransom –226197– which was Supreme Champion at Perth, Scotland, in 1935.

King's Ransom –242493–
Sire: Robinwood Reward –234862–
Dam: Robinwood Lavender 9th –283779–
King's Ransom is also a paternal grandson of Millhills Ransom (Imp.) –226197–.

Scotsdale Ventura –271300–
Sire: Klaymor Escort –248386–
Dam: Scotsdale Broadhooks 2nd –310879–
Klaymor Escort is the son of Collynie Royal Barrage (Imp.) –215802– (256402) and Scotsdale Ventura issued from those two outstanding sires is of a very good strain. He is still used in the herd.

Fig. 4.—Shorthorn Bull "O.A.C. Ransom 132nd 257157, herd sire at the Dominion Experimental Station, Lennoxville, Que., from 1943 on.

Milk Production

The average yearly milk production of the Shorthorn cows that have completed their lactation period each year from 1936 to 1946 inclusive is given in Table 10.

TABLE 10.—AVERAGE YEARLY MILK PRODUCTION OF SHORTHORN COWS WITH COMPLETED LACTATIONS, 1936-1946 INCLUSIVE

Year	Number of cows	Age at commencement of lactation		Days in milk	Milk	Fat	Per cent fat
		Year	Month		lb.	lb.	
1936	14	4	8	319	6,486	263·6	4·06
1937	18	4	7	311	5,905	239·2	4·05
1938	17	4	8	325	5,666	236·9	4·18
1939	13	5	5	304	5,815	235·4	4·05
1940	6	5	1	347	5,305	202·8	3·82
1941	6	5	6	297	6,739	243·5	3·61
1942	12	3	10	353	5,916	233·4	3·95
1943	7	4	0	364	6,747	271·4	4·02
1944	4	3	10	277	4,982	211·4	4·24
1945	12	3	6	255	4,183	167·5	4·00
1946	6	4	5	282	4,980	216·3	4·30
Av.	10·5	4	5	313	5,735	231·4	4·03

Table 10 shows that the average annual production of the Shorthorn cows that completed their lactation was 5,735 lb. of milk, 231·4 lb. of fat for a 313 day-period. The average age of the cows at commencement of lactation was 4 years 5 months. The average percentage of fat for the eleven years is 4·03.

TABLE 11.—YEARLY SUMMARY OF FEED COST OF MILK PRODUCTION PER COW—SHORTHORN HERD, 1936-1946 INCLUSIVE

Year	Number of cows		Age of cows	Total cow-days		Total milk produced	Av. % fat	Total fat produced	Meal eaten	Silage eaten	Hay eaten	Roots eaten	Green feed eaten	Pasture	Total cost of feed	Feed cost per		Feed consumed per 100 lb. milk					
	in milk	dry		Milking	Dry											100 lb. milk	1 lb. butter fat	Meal	Silage	Hay	Roots	Green feed	Pasture
			yr. mo.	days	days	lb.		lb.	lb.	lb.	lb.	lb.	lb.	days	$ cts.	$ cts.	$ cts.	lb.	lb.	lb.	lb.	lb.	days
1936	14	4	5 0	293	73	5,555	4·05	224·9	1,379	5,481	1,642	.....	37	163	38 88	70	17	24·8	98·7	29·6	.....	0·7	2·9
1937	17	3	5 3	299	66	5.612	4·13	231·8	1,147	6,185	1,869	.....	31	131	39 96	71	17	20·4	110·2	33·3	.....	0·6	2·3
1938	17	3	5 2	298	67	5,554	4·00	222·4	1,564	6,467	1,931	333	.....	130	45 60	82	21	28·2	116·5	34·8	6·0	.....	2·3
1939	14	2	5 7	284	81	5,227	3·99	208·6	1,308	6,977	1,895	211	71	122	42 00	80	20	25·0	133·5	36·2	4·0	1·3	2·3
1940	8	1	5 0	308	58	6,479	3·72	241·3	1,594	7,906	2,196	.....	.....	112	49 92	77	21	24·6	122·0	33·9	.....	.....	1·7
1941	7	1	4 5	283	82	6,035	3·83	231·1	2,139	6,662	2,150	92	1,188	133	66 24	1 10	29	35·4	110·4	35·6	.....	19·7	2·2
1942	6	1	4 3	308	57	5,912	4·02	237·7	1,882	10,468	1,572	.....	.....	144	73 80	1 25	31	31·8	177·0	26·6	1·5	.....	2·5
1943	7	1	4 5	302	63	6,337	4·10	259·8	1,999	8,533	1,596	.....	.....	128	69 84	1 10	27	31·6	134·7	25·2	.....	.....	2·0
1944	5	0	4 0	326	40	5,064	4·26	215·9	990	6,294	1,879	.....	.....	151	46 44	92	22	19·6	124·3	37·1	.....	.....	3·0
1945	9	1	4 0	292	73	4,878	3·95	192·6	982	4,493	1,850	.....	838	174	45 48	93	23	20·1	92·1	37·9	.....	17·2	3·6
1946	6	1	4 6	287	78	4,787	4·30	207·5	1,495	6,866	1,550	.....	584	150	54 87	1 13	26	31·2	143·5	32·4	.....	12·2	3·1
Average	10	2	4 7	296	69	5,578	4·02	224·3	1,450	6,664	1,858	84	160	139	48 41	87	22	26·0	119·4	33·3	1·5	2·8	2·4

An examination of the data reveals a decrease in the length of lactation towards the end of the period covered by this report accompanied by a decrease in the milk production. With one exception, younger cows were tested at that time. Just previous to the period under review, there had been a swing from dual-purpose sires to beef-bred sires. The older cows of the herd are dairy-bred and through the influence of the sires, the younger cows are of better type from a beef standpoint but somewhat lower in milk production.

Feed Cost of Milk Production

To establish the feed cost of producing milk from the Shorthorn herd, all the cows, whether in milk or dry, were taken into consideration. Hay, silage and roots were charged at farm value and the meal at current market price for each year.

Table 11 summarizes the annual feed cost of milk production from the Shorthorn herd for the period under review.

It will be noted that large variations occurred in the feed cost per 100 lb. of milk or per pound of fat produced during the eleven-year period. Factors responsible for such variations include the number of cows in milk or dry, the age of cows, their stage of lactation, the amount of milk produced, the price of feeds, the quality of hay and silage, etc. The feed cost varied from $0.70 to $1.25 per 100 lb. of milk and from $0.17 to $0.31 per pound of butterfat.

The table shows that for an average of eleven years, the Shorthorn cows in the dairy stable produced in an average lactation period of 296 days, 5,578 lb. of milk and 224·3 lb. of butterfat being an average fat test of 4·02 per cent. This production required an average per cow of 1,450 lb. of meal, 6,664 lb. of ensilage, 1,858 lb. of hay, 84 lb. of roots, 160 lb. of green feed and 139 days of pasture.

Feed Cost of Maintaining Herd Bull

For two years, 1936 and 1937, records were kept on the amounts of hay, silage and meal fed to the bulls. The number of pasture days were also noted. Hay and silage were charged at farm value and the meal at current market price for each year and the cost calculated. Three bulls were kept in 1936 and two in 1937. At the beginning of the year 1936, the bulls averaged 3 years 8 months of age while in 1937 the average was 3 years 5 months.

The average feed consumption and the average feed cost for maintaining the herd bull for both years is set forth in Table 12.

TABLE 12.—AVERAGE FEED CONSUMPTION AND AVERAGE FEED COST FOR MAINTAINING HERD BULL IN 1936 AND 1937

Year	Meal mixture	Silage	Hay	Pasture	Cost
	lb.	lb.	lb.	days	$
1936	1,338	4,138	1,823	138	35 06
1937	1,736	5,180	2,434	61	46 87
Average	1,537	4,659	2,128·5	99·5	40 96

The average feed cost of maintaining a herd bull amounted to $40.96. The higher cost recorded in 1937 is explained by the fact that the bulls had a shorter pasture season that year than in 1936.

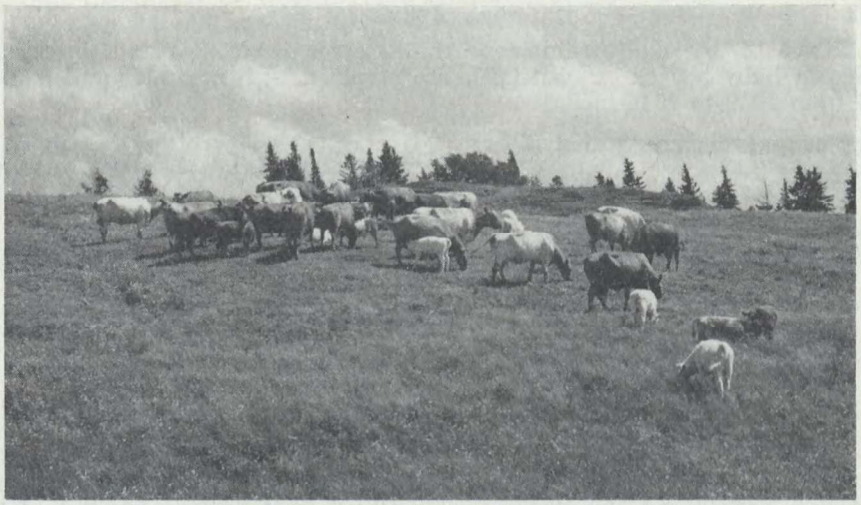


Fig. 5.—Part of the Shorthorn herd on pasture at the Dominion Experimental Station, Lennoxville, Que.

Feed Cost of Producing Baby Beeves and Steers

An experiment on beef production was started in 1939 with a view to determining the most suitable age and weight to market cattle. Thirteen trials were conducted including in all 46 head of cattle.

All the steers used were born during the stabling period and were fed meal, hay and silage as soon as they could eat, in addition to the milk they received from their dams. In the spring, they went on pasture nursing their dams and in the fall, they were weaned and brought back to the stable.

Those intended to be marketed at the age of 12 to 18 months were put on a fattening ration as soon as they were stabled and sold whenever they were ready. The rest of the steers were fed with a growing ration during the winter and turned out to pasture again the following spring. When removed from pasture in the fall, these steers were fattened so as to be ready for the market at the age of one year and half to two years, according to their date of birth.

The total feed chargeable to a beef animal includes: (*a*) the feed consumed by the dam from the time she was stabled prior to calving up to the weaning of her calf; (*b*) the feed consumed by the steer up to market time.

Hay, silage and roots were charged at farm value and the meal at current market price for each year and the animals sold on the open market.

The following are the periods involved in the rearing and the finishing of baby beeves and steers.

(*a*) Baby beeves:
- 1st Period: from stabling of dam in fall to weaning of calf (approximately one year).
- 2nd Period: Finishing of baby beeves (from weaning to market).

(*b*) Steers:
- 1st Period: from stabling of dam in fall to weaning of calf (approximately one year).
- 2nd Period: wintering of calf.
- 3rd Period: pasturing of steer.
- 4th Period: finishing of steer.

The results obtained will be discussed period by period and a summary presented at the end for each group.

BABY BEEVES

Tables 13, 14 and 15 summarize the data on the feeding and the cost of feeding of baby beeves. Seven trials are involved with a total number of 27 head from 1940 to 1946 inclusive.

TABLE 13.—FEEDS CONSUMED BY AND COST OF FEEDS FOR DAM AND CALF FROM STABLING OF DAM IN FALL TO WEANING OF CALF, 1940-46 INCLUSIVE

Stabling of dam—		
No. of days		199 days
Total feed consumed	Hay	2,182 lb.
	Silage	5,590 "
	Roots	105 "
	Grain	714 "
Cost of feed		$28·83
Pasturing of dam and calf—		
No. of pasture days		166 days
Cost of pasture		$ 9·92
Weight of calf at weaning		579·3 lb.
Age of calf at weaning		9 months
Total feed cost for dam and calf up to weaning of calf		$38·75

The total feed consumption during the stabling period includes all that the cow has eaten and also the amount fed to the calf towards the end of the spring.

Table 13 shows that the total cost of feed from the stabling of the dam to the weaning of calf (a period of one year) amounted to $38.75. At 9 months of age, a calf weighed 579·3 lb. when weaned.

Table 14 gives the data covering the finishing period of baby beeves, from weaning to market.

TABLE 14.—CONSUMPTION OF FEEDS, GAIN IN WEIGHT AND COST OF FEEDS FOR BABY BEEVES, FROM WEANING TO MARKET, 1940-1946 INCLUSIVE

No. of days	166	days
Weight of calf when stabled	579·3	lb.
Final weight of calf	832·5	"
Total gain	253·2	"
Daily gain	1·53	"
Total feed consumed: Hay	1,282	"
Silage	2,259	"
Roots	628	"
Grain	1,457	"
Feed consumed per pound of gain: Hay	5·1	"
Silage	8·9	"
Roots	2·5	"
Grain	5·8	"
Cost of feed	$ 37·73	

The finishing period had a duration of 5½ months and a gain of 253·2 lb. in weight was recorded. For each pound of gain, 5·1 lb. of hay, 8·9 lb. of silage, 2·5 lb. of roots and 5·8 lb. of grain were consumed. The cost of feed for the finishing period amounted to $37.73. Thus each pound of gain cost 14·9 cents for feed alone.

In Table 15, a summary is presented on the production of baby beeves from 1940 to 1946 inclusive.

TABLE 15.—SUMMARY ON THE PRODUCTION OF BABY BEEVES, 1940-1946 INCLUSIVE

Average age at market time	14·5	months
Total feed chargeable to a beef animal: Hay	3,464	lb.
Silage	7,489	"
Roots	733	"
Grain	2,171	"
Pasture	166	days
Total cost of feed	$ 76·48	
Selling value per animal	$ 89·21	
Net return over feed cost	$ 12·73	

For the period of 1940 to 1946 inclusive, 27 baby beeves were fattened and sold at the average age of 14·5 months. It cost $76.48 for feed alone. The animals sold for an average price of $89.21, leaving a net return over feed cost of $12.73 per head.

STEERS

In this group, five trials were carried on involving 21 head in all. Tables 16 to 19 summarize the data obtained on the production of beef with steers.

TABLE 16.—FEEDS CONSUMED BY AND COST OF FEEDS FOR DAM AND CALF FROM STABLING OF DAM IN FALL TO WEANING OF CALF, 1940-1946 INCLUSIVE

Stabling of dam—		
No. of days	200	days
Total feed consumed: Hay	1,879	lb.
Silage	4,921	"
Roots	156	"
Grain	402	"
Cost of feed	$ 22·82	
Pasturing of dam and calf—		
No. of pasture days	166	days
Cost of pasture	$ 8·29	
Weight of calf at weaning	438·8	lb.
Age of calf at weaning	7	months
Total feed cost of dam and calf up to weaning of calf	$ 31·11	

The total consumption of feed during the stabling period includes all that the cow has eaten and also the amount fed to the calf towards the end of the spring.

The cost of feed from the date the dam was stabled up to the weaning of the calf totalled $31.11. Weaned at 7 months of age, a calf weighed 438·8 lb.

In Table 17, the data covering the wintering of calf are set forth.

TABLE 17.—FEEDS CONSUMED AND COST OF FEEDS FOR WINTERING CALF, 1940-1946 INCLUSIVE

No. of days	192	days
Weight of calf when stabled	438·8	lb
Weight of calf when going to pasture	603·6	"
Total gain	164·8	"
Daily gain	0·86	"
Total feed consumed: Hay	1,568	"
Silage	3,149	"
Roots	504	"
Grain	597	"
Cost of feed	$ 24·62	

During a wintering period of 192 days, a gain of 164·8 lb. was recorded. The cost of feed for the period amounted to $24.62.

The data on the pasturing of steers are given in Table 18.

TABLE 18.—PASTURING OF STEERS, 1940-1946 INCLUSIVE

No. of days	161	days
Weight of steer when going to pasture	603·6	lb.
Weight of steer when stabled	777·2	"
Total gain	173·6	"
Daily gain	1·07	"
Cost of pasture	$ 8·05	

The steers during a pasture season of 161 days made an average gain of 173·6 lb. each. The pasture cost an average of $8.05 per head per season.

The results obtained with steers during the finishing period are presented in Table 19.

TABLE 19.—CONSUMPTION OF FEEDS, GAIN IN WEIGHT AND COST OF FEEDS FOR STEERS IN THE FINISHING PERIOD, 1940-1946 INCLUSIVE

No. of days	133	days
Weight of steer when stabled	777·2	lb.
Final weight of steer	986·3	"
Total gain	209·1	"
Daily gain	1·6	"
Feed consumed per head: Hay	1,070	"
Silage	1,476	"
Roots	876	"
Grain	1,302	"
Pasture	6	days
Feed consumed per pound of gain: Hay	5·1	lb.
Silage	7·0	"
Roots	4·1	"
Grain	6·2	"
Cost of feed	$ 35·13	

In one year, the finishing period commenced on pasture and the steers were fed meal from a hopper.

The finishing period lasted approximately 4½ months and an average gain of 209·1 lb. was recorded. For each pound of gain, the feed consumed was 5·1 lb. of hay, 7·0 lb. of silage, 4·1 lb. of roots and 6·2 lb. of grain. It cost an average of $35.13 to feed one steer during the finishing period or 16·8 cents per pound of gain.

A summary is presented in Table 20 on the production of beef with steers from 1940 to 1946 inclusive.

TABLE 20.—SUMMARY ON THE PRODUCTION OF BEEF WITH STEERS, 1940-1946 INCLUSIVE

Average age at market time	23	months
Total feed chargeable to a beef animal: Hay	4,517	lb.
Silage	9,546	"
Roots	1,536	"
Grain	2,301	"
Pasture	333	days
Total cost of feed	$ 98·91	
Selling value per steer	$ 109·06	
Net return over feed cost	$ 10·15	

Twenty-one steers were fattened and sold at the average age of 23 months from 1940 to 1946 inclusive. The selling value per steer averaged $109.06, leaving a net return over feed cost of $10.15.

In comparing the results obtained with the two groups, it should be remembered that the trials included seven lots of baby beeves and five lots of steers only. In the case of baby beeves, the calves were born during the winter while, with the steers, the calves came along towards spring. In the former group, the dams were, therefore, fed heavier and the calves ate more meal before being turned out to pasture than those of the latter group. Consequently, the amount of feeds consumed by and the cost of feeds for dam and calf from stabling of dam to weaning of calf were higher with the baby beeves than with the steers.

Both the yearlings and the steers supplied a market for the roughages and the grains produced on the farm and looked after the large area of land devoted to pasture. They also left on the farm, a certain amount of manure which has helped in keeping the soil in a better state of fertility.

Dissemination of Breeding Stock

During the period of 1936 to 1946, quite a number of head were disposed of to farmers and breeders of the district. Included were 50 bulls, 58 cows and 28 heifers sold and 8 bulls loaned for breeding purposes.

SHEEP

Oxford Down is the breed of sheep kept at the Station. From 1936 to 1946, an average of 34 head, ewes and rams, was maintained in the flock. Due to lack of accommodation, the size of the flock was small. In the fall of 1946, a new sheep barn was built with capacity for 100 ewes. Increased work with sheep is now contemplated.

General Management

In the management of the sheep flock, it is aimed to keep the wool qualities and the mutton conformation on a good standard. Each year, a number of ewe lambs are kept for breeding replacements. Surplus ewe lambs and promising ram lambs are disposed of for breeding purposes. The rest are sold as market lambs.

Early born and well developed ewe lambs are bred in the fall at which time they are approximately eight months old. The others are bred the following year. The lambs are weaned before September 1, and both lambs and ewes are turned on to good aftermath, which gives the ewes sufficient time to put on flesh before the breeding season.

Fig. 6.—Part of the sheep flock on pasture at the Dominion Experimental Station, Lennoxville, Que.

Fleeces

For the period covered by this report, an average of 33 sheep were clipped yearly and the fleeces averaged 9·3 lb. The weights varied from 8·5 lb. to 9·9 lb.

Cross Breeding vs. Pure Breeding

In the fall of 1940, an experiment on cross breeding of sheep was started in order to determine the value of cross breeding compared with pure breeding for the production of:

(*a*) Ewes for reproductive purposes;
(*b*) Market lambs.

TABLE 21.—PURE BREEDING VS. CROSS BREEDING OF SHEEP, 1941-1946 INCLUSIVE

Item	Pure Breeding						Cross Breeding (first cross)					
	Oxford Down ram × Oxford Down ewe						Leicester ram × Oxford Down ewe					
	1941	1942	1943	1945	1946	Total	1941	1942	1943	1945	1946	Total
1. Prolificacy and birth weight—												
No. of ewes lambed	13	14	14	15	12	68·0	11	10	6	12	16	55·0
No. of lambs born	16	21	22	27	16	102·0	14	15	9	18	25	81·0
No. of lambs born per ewe	1·2	1·5	1·6	1·8	1·3	1·5	1·3	1·5	1·5	1·5	1·6	1·5
No. of lambs weaned per ewe	0·9	1·3	1·4	1·3	0·9	1·2	0·9	1·4	1·5	1·3	1·2	1·2
Average weight of lamb (lb.)	10·6	10·5	10·1	9·6	9·7	10·1	9·7	11·9	11·7	10·2	9·3	10·3
2. Weaning weight and growth rate—												
No. of lambs at weaning	14	18	19	20	11	82·0	10	14	9	15	19	67·0
Av. live weight at weaning (lb.)	85·4	78·2	76·1	94·0	93·8	84·7	83·8	88·5	80·4	93·8	93·0	89·2
Av. age at weaning (days)	127	128	135	153	148	138·0	128	132	132	143	144	137·0
Av. daily gain (lb.)	0·67	0·61	0·56	0·62	0·63	0·55	0·65	0·67	0·62	0·66	0·64	0·57

The following matings were involved:

(1) Pure breeding: Oxford Down ram × Oxford Down ewes.
(2) Cross breeding: Leicester ram × Oxford Down ewes.

The purebred ewe lambs were retained in the flock for breeding while the crossbred ewe lambs were sent to the Central Experimental Farm, Ottawa, to be used for a second cross. All the crossbred and undesirable purebred rams were castrated and disposed of as market lambs.

Table 21 summarizes the data collected on the resulting lamb crops from pure breeding and cross breeding.

The results obtained show little difference in the lamb crops of the two types of breeding. The number of lambs born and weaned per ewe was almost the same in both cases. At birth the crossbred lambs had the edge on the purebred ones as to weight; the same holds true at weaning age.

Other Stations are carrying cross breeding work with sheep (first cross). The resulting ewe lamb crop is sent to the Central Experimental Farm, Ottawa, for trial in producing second-cross market lambs.

Indications are that the second-cross lambs are early maturing and furnish a very desirable carcass.

Dissemination of Breeding Stock

During the last decade, a total of 57 rams and 23 ewes were sold for breeding purposes to farmers and breeders of the district.

SWINE

The swine herd consisted of Yorkshires. From 1936 to 1946 inclusive, an average of 11 sows and 2 boars were kept yearly. For the same period, 1,700 pigs were born at the Station.

Two herds are being maintained. Since the outbreak of World War II, the main breeding herd was used for the multiplication of breeding pigs and the testing of sows in the Advanced Registry. With the second herd, prepotency and inbreeding projects are being conducted.

Fecundity and Nursing Capacity

Records on the number of pigs born and weaned in each litter as well as the weight at weaning time were kept each year.

Table 22 gives the summary of the records on farrowing and weaning.

TABLE 22.—RECORDS ON FARROWING AND WEANING, 1936-1946 INCLUSIVE

Year	No. of litters	Average No. born per litter	Average No. weaned per litter (6 weeks)	Average weight at weaning per pig (6 weeks)	No. weaned per litter (8 weeks)	Average weight at weaning per pig (8 weeks)
				lb.		lb.
1936	7	14·0	9·6	22·8	.....	.....
1937	6	12·2	9·5	27·2	.....	.....
1938	10	10·7	8·8	27·3	.....	.....
1939	17	11·1	8·2	34·3	.....	.....
1940	14	8·8	7·3	29·0	.....	.....
1941	7	10·7	8·0	32·7	.....	.....
1942	14	11·0	9·1	24·4	.....	.....
1943	19	11·3	8·3	26·7	.....	.....
1944	19	9·9	.....	.....	7·5	34·0
1945	11	9·5	.....	.....	7·0	36·5
1946	14	10·1	.....	.....	5·6	37·9

For the eleven years, an average of 10·6 pigs were born per litter. From 1936 to 1943, when the pigs were weaned at six weeks, an average of 11·0 pigs per litter were born and 8·5 weaned weighing 28·3 lb. each. During the last three years, weaning took place at eight weeks and the weight per pig was 35·9 lb.

Swine Prepotency and Inbreeding

The object of this experiment is to develop a source of supply of purebred boars of high prepotency for desirable commercial characteristics.

The procedure is to find strains of purebred hogs which are outstanding for the qualities desired and to test them to determine their prepotency. Boars judged to be prepotent are tested by mating them with six of their daughters issued of sows well qualified in Advanced Registry from mating with these boars. The progeny of such matings are inbred as a means of fixing their characteristics. Multiplication and eventual distribution are the next steps.

As the work was started only in the fall of 1944 and as several generations of pigs will have to be tested, the results of the first two years are not given in this report.

Advanced Registry for Purebred Swine

The Advanced Registry for purebred swine is a method by which the breeding ability of sows and boars is tested. From 1936 to 1946, the Experimental Station sent to the test feeding station pigs from twenty sows.

To qualify, a sow is scored on three factors and must obtain the minimum scores on each of them as stated below:

(a) Production—40. A sow must have at least eight pigs (five points per pig) at the time of inspection among which the breeder chooses four to undergo the test.

(b) Maturity index—100. Based on the rate of gain of the pigs.

(c) Carcass test—75. Scored on the quality and the cutting value of the carcasses of the four pigs.

Table 23 shows the records of the sows entered under the Advanced Registry policy and that have qualified.

TABLE 23.—RECORDS OF SOWS THAT QUALIFIED FOR ADVANCED REGISTRY, 1936-1946 INCLUSIVE

Year	Name of Sow	Registration No.	Adv. Registry No.	Minimum score required for		
				Production (40)	Maturity index (100)	Carcass (75)
1936	Lx. Alexandra O. 107	170269	772	45	113	78
1939	Ste. Anne Blanche 7R	189018	1321	40	124	75
1939	Ste. Anne Blanche 28R	189020	1344	50	124	75
1939	Ste. Anne Blanche 6R	189017	1477	40	117	78
1939	Lx. Blanche 41S	198651	1504	40	107	81
1940	Lx. Maple Leaf 56S	198652	1582	40	127	81
1940	Lx. Maple Leaf 57S	198653	1590	50	110	84
1943	Lx. Maple Leaf 46V	233374	2475	40	108	91
1943	Lx. Maple Leaf 44V	233373	2480	45	100	88
1943	Lx. Blanche 29V	233370	2516	65	106	79
1944	Lx. Blanche 23V	233369	2716	55	105	78
1944	Lx. Blanche 118W	256139	2772	40	112	76
1944	Lx. Blanche 125W	256141	2861	55	103	82
1944	Lx. Maple Leaf 42X	264890	2864	40	101	82
1945	Lx. Blanche 101X	276178	2956	40	110	76
1946	Lx. Blanche 102X	276179	3207	40	116	75
1946	Lx. Maple Leaf 157Y	286719	3194	50	109	80

Of the 20 sows of which pigs were tested, 17 qualified for Advanced Registry. The three sows that failed to qualify went down on the carcass test only.

Pigs from 12 sows for which figures are available consumed an average of 484·5 lb. of feed per 100 lb. of gain in carcass weight and an average of 376·6 lb. of feed per 100 lb. of gain in live weight.

Dissemination of Breeding Stock

From 1936 to 1946 inclusive, 217 boars and 281 sows were sold to farmers and breeders of the district for breeding purposes. A large number of outside sows were bred by the boars kept at the Station.

HORSES

(J. A. Ste. Marie)

From the inception of the Experimental Station in 1914 to 1939, work horses only of the Clydesdale breed were kept at this Station plus a Clydesdale stallion for service in the district.

In 1939, a change of policy was made by transferring from the Farnham Experimental Station the Belgian stallion Rubix –5328– to Lennoxville. He was a son of Belle Phœnix –11290– and Rubis –8004–, both first prize individuals at the Chicago Show. The same year two Belgian mares were imported from Belgium as a start for a breeding stud. In 1940, six yearlings and two young fillies were added to the initial group.

In 1941, the stallion Rubix –5328– who had left many good colts at the Station and in the district was succeeded by Kenfleur's Robert Farceur –8477– a son of Jay Farceur –8479– and Vannie –14004– by Bœr d'Boy –13884–. This stallion was very popular in the district and left a number of very good colts.

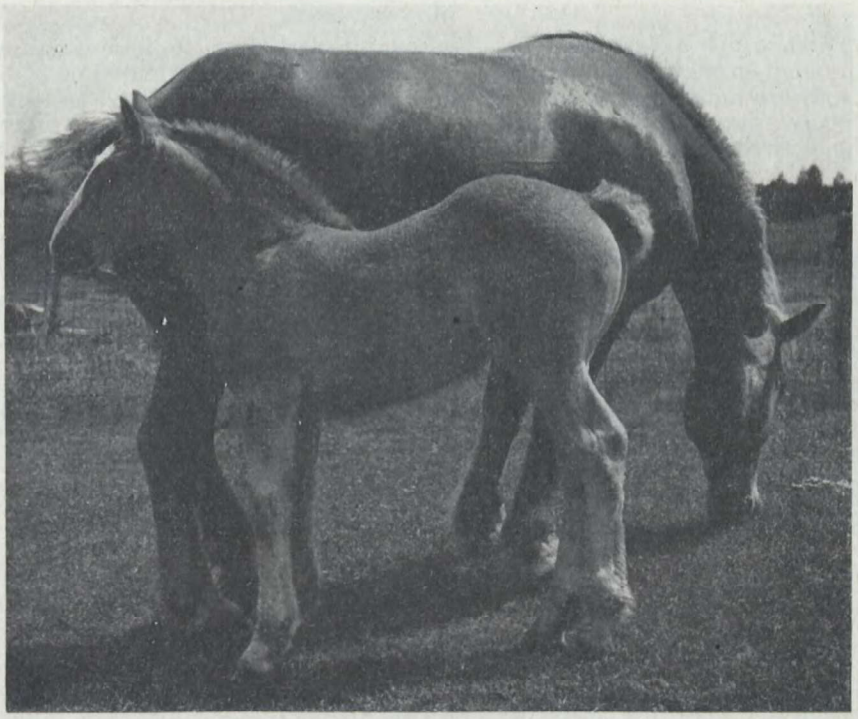


Fig. 7.—Belgian mare "Violette des Pins 6861" and her foal on pasture at the Dominion Experimental Station, Lennoxville, Que.

In 1944, in order to compare the Station horses with those of the district, eleven animals were exhibited at the Sherbrooke Fair. These animals captured all the first prizes in the classes in which they were shown with fairly strong competition.

In 1945, Kenfleur's Robert Farceur –8477– after a period of four years of service was replaced by another stallion of quality namely Mabelene Mordant –8980– a son of the famous imported Belgian stallion Mordant de la Vallée –6884– and from a grand old dam Silver Queen –4542–. This stallion, like his predecessors, graded "A" right at the start and is still heading the stud.

From 1940 to 1946 inclusive, a total of 35 colts were born of which 30 were raised. In 1946, the stud numbered nine purebred mares, 17 female colts and one stallion.

From 1943 to 1946, two stallions and twelve females of various ages were sold for breeding. A total of 306 outside mares were bred by the stallions of this Station from 1939 to 1946 inclusive.

POULTRY HUSBANDRY

(L. A. Gnaedinger)

The flock consists of Barred Plymouth Rocks, the variety most popular in the district served by this Station. During the period of 1936-1946, the average number of females wintered was 317, in the ratio of 227 pullets and 90 breeding hens.

A number of projects are maintained on various phases of poultry husbandry, such as the determination of cost, comparison and testing of methods and practices, and pedigree breeding.

General Management

The aim of the breeding work has been, in particular, to obtain increased egg production and hatchability, and improvement in vigour and type of bird All birds are individually pedigreed and all females are trap-nested as long as retained. Progeny testing permits the selection of those families that are superior in the desired qualities. At the same time, rigid culling is practised on the individual birds selected for reproduction.

Hatching

During the eleven years, the average date the first eggs were set was February 24, and the average date of last hatch was May 15.

The hatching results for the eleven years on eggs set for Station flock replacement are given in Table 24.

TABLE 24.—HATCHING RESULTS, 1936-1946 INCLUSIVE

Year	Number eggs set	Number fertile	Per cent fertile	Number of chicks hatched	Per cent of fertile eggs hatched	Per cent of total eggs hatched
1936	1,867	1,196	64	953	80	51
1937	1,267	1,096	86	848	77	67
1938	1,146	1,014	88	827	82	72
1939	1,439	894	62	684	77	48
1940	1,678	1,112	66	799	72	48
1941	1,219	981	80	742	76	61
1942	1,242	1,106	89	964	87	78
1943	1,364	1,169	86	844	72	62
1944	1,919	1,633	85	1,222	75	64
1945	1,527	1,312	86	1,028	78	67
1946	2,099	1,690	81	1,248	74	59
Total	16,767	13,203	78·7	10,159	76·9	60·6
Average	1,524	1,200	78·7	924	76·9	60·6

The quality of the chicks hatched was good. From all of those hatched for the Station flock during the eleven years, namely 10,159 chicks, the total mortality up to the age of three weeks was 2·9 per cent, 299 chicks, of which the half, 147, were in a single year.

Eggs were incubated each year from both hens and pullets. All chicks for the Station flock were hatched from yearling or older hens. All the chicks hatched from pullets were for disposal.

The results for the eleven years are given in Table 25.

TABLE 25.—HATCHING RESULTS FROM HENS AND PULLETS, 1936–1946 INCLUSIVE

Dams	Total eggs set	Total fertile	Per cent fertile	Total chicks	Per cent of fertile eggs hatched	Per cent of total eggs hatched
Hens	16,767	13,203	78·7	10,159	76·9	60·59
Pullets	38,983	31,421	80·6	23,637	75·2	60·63

Generally speaking, fertility of eggs was better from the pullets. In most cases, however, the hens showed the higher percentage hatch of fertile eggs. As a net result, there was practically no difference between the two, on the basis of hatchability of total eggs set.

Fig. 8.—Rearing Plymouth Barred Rock pullets on range at the Dominion Experimental Station, Lennoxville, Que.

Rearing

Fuel Costs.—The successive hatches were started under a modern oil-burning brooder for the first ten days to two weeks and then transferred to coal brooders. The cost of fuel for the brooding period ranged usually between six and eight cents per chick, varying mainly with time of year and size of brood.

Feed Costs.—The amount of feed required, per bird, from hatching time to the age of six months, varied between 27 and 30 pounds. This was in the approximate proportions of 5 pounds of starting mash, 8 pounds of growing mash and 15 pounds of grain. The cost of this feed per bird ranged between 51·6 cents and 64·9 cents, the principal cause of variation being the year-by-year fluctuations in prices of feeds.

Mortality.—With the exception of two years with losses considerably above the average, the death rate in the growing flock was held down fairly well. For the whole eleven years, the average mortality from hatching time to the age of six months was 8·4 per cent, as indicated in Table 26.

TABLE 26.—MORTALITY FROM DATE HATCHED TO SIX MONTHS OF AGE 1936–1946 INCLUSIVE

Year	Number Birds started	Number Birds lost	% Mortality
1936	953	71	7·4
1937	848	60	7·1
1938	827	59	7·1
1939	684	50	7·3
1940	799	42	5·3
1941	742	42	5·7
1942	964	47	8·0
1943	844	86	10·2
1944	1,222	197	16·2
1945	1,028	66	6·4
1946	1,248	107	8·6
Total	10,159	857	8·4

The above figures include losses from all causes including culling, predators and, in 1942, 29 chickens drowned in flood.

Laying Flock Mortality

During the eleven years, the average number of pullets under progeny test for high egg production was 201. The average annual mortality amongst these was 23 birds or 11·6 per cent. During the course of the years, with the exception of two where mortality took an upward surge, a fairly steady and gratifying decrease was obtained, from 18.2 per cent for the first two years of the group, down to 6·0 per cent for the last two. Details for the respective years are given in the combined Table 27.

Egg Production

Some gain was made in the egg production obtained per bird. Lowering of the mortality was accompanied by a roughly proportional increase in the average egg production obtained from the total of birds housed. On the basis of the average production of those birds only which survived the full laying year, some gain was attained as indicated in Table 27.

Egg Size

As may be noted also in Table 27, the average egg weight has shown a very constant rise, finally reaching in the last two years the average of 62·1 grams, which is near the maximum desirable.

TABLE 27.—MORTALITY, EGG PRODUCTION AND EGG SIZE, 1936-1946 INCLUSIVE

Year	Number of pullets started	Number died	Per cent died	Average egg production		Average egg weight in gm.
				Of total started	Of survivors	
1935-36	245	43	17·6	161	180	57·3
1936-37	255	48	18·8	175	199	57·4
1937-38	234	36	15·4	180	196	58·9
1938-39	219	19	8·7	179	186	58·3
1939-40	217	21	9·7	189	197	59·1
1940-41	125	10	8·0	198	208	57·6
1941-42	148	7	4·7	210	216	59·6
*1942-43	119	23	19·3	187	195	61·0
1943-44	200	23	11·5	182	187	61·5
1944-45	192	12	6·3	218	226	62·1
1945-46	256	15	5·9	205	211	62·1
Average	201	23	11·6	188	200	59·5

(*)—Omitted from the figures for the year 1942-43 are 109 birds that were drowned by flood on June 16, 1943.

Fast Feathering

In view of the economic disadvantage, especially from the market poultry standpoint, of the slow-feathering characteristic normal to Barred Plymouth Rocks, it was decided to convert the Station flock from slow-feathering to the genetically fast-feathering type as soon as practicable. With this object, two cockerels were obtained from the Central Experimental Farm which, while themselves slow-feathering, carried in their genetic make-up the factor for fast-feathering. In 1946, chicks were hatched from matings of these cockerels with the slow-feathering Station hens.

The results from the two sires are given in Table 28.

TABLE 28.—BREEDING FOR FAST-FEATHERING, 1946

Sire	Number of chicks hatched	Males		Females	
		Fast	Slow	Fast	Slow
E.49296	104	0	52	23	29
AC.182	102	0	56	26	20
Total	206	0	108	49	49

Regarding the feathering rate of these offspring, the results were as anticipated, all males being slow-feathering and roughly half of the females being fast-feathering.

Dissemination of Stock

A number of day-old chicks were sold each year in small lots at nominal prices to farmers in the area served by the Station. Each fall, in addition to surplus pullets, a number of breeding cockerels were sold, mainly R.O.P. Approved.

The quantity of both chicks and cockerels sold previous to 1938 was rather negligible. However, during the period 1938-1946, an average of 2,590 chicks and 90 R.O.P. cockerels were disposed of annually.

PASTURE INVESTIGATIONS

(W. S. Richardson)

Pasture, the crop, which in Eastern Canada, occupies more land than any other single crop and almost as much land as all other crops combined, in general, receives the least attention, It is the crop which forms the backbone of the livestock industry and yet it is usually treated as though it were unimportant. In the last decade, considerable experimental work has been carried on in an effort to find answers to some of the problems in the improvement and maintenance of pastures. At this Station, these experiments are conducted co-operatively by the Animal Husbandry, Field Husbandry and Forage Plants divisions. They consist of tests with fertilization and liming, management, types of pasture and seed mixtures. The results of trials with seed mixtures will be found in the Forage Plants section of this report under "Hay-Pasture Mixtures".

The improvement of permanent pastures by the use of chemical fertilizers is not only possible but profitable provided there is a reasonably good sward to start with. Experiments conducted at this Station for nine years on pastures for both beef and dairy cattle demonstrate this fact.

In these experiments, cattle were weighed three days in succession when placed on the pastures and the weights averaged. They were also weighed every twenty-eight days during the season and at the time they were removed.

Herbage yields were obtained from yard-square, cage-protected areas. These cages were clipped four times during the season. They were moved to a new location after each cutting in order to get a representative yield from the whole area.

Fertilizers for Beef Cattle Pasture

An experiment with fertilizers was carried on three fields of 2·5 acres each. The treatments were:

(1) Check.
(2) Minerals: 480 pounds superphosphate and 100 pounds muriate of potash every three years.
(3) Complete: 100 pounds sulphate of ammonia annually, 480 pounds superphosphate and 100 pounds muriate of potash every three years.

The fertilizers were applied in the spring. Shorthorn steers and heifers were used to graze these fields. Enough animals were kept on each field to graze it properly. Animals were removed or added according to the growth of grass. Actual grass yields were obtained from cage-protected areas. Table 29 shows the average results for nine years.

TABLE 29.—FERTILIZERS FOR BEEF CATTLE PASTURE—AVERAGE RESULTS PER ACRE FOR NINE YEARS, 1938-1946

Item	Check	Minerals	Complete
Green weight of herbage.....lb.	17,478	25,839	23,085
Dry weight of herbage.....lb.	4,028	5,451	4,959
Cost of fertilizer.....$	.....	2·68	4·86
Carrying capacity.....an. units*	0·45	0·76	0·75
Gain of beef.....lb.	168·9	292·4	259·0
Return value over cost of fertilizer.....$	15·68	25·14	18·76

(*) One animal unit—1,000 lb. cow giving 25 lb. of 4% milk daily.

The figures in Table 29 are strongly in favour of mineral fertilizers for pasture. Not only do they show the highest yield of herbage and gain of beef per acre but also the greatest return over the cost of fertilizers. The value of beef used in these calculations was the prevailing price for this class of livestock each year at Montreal, less freight to market.

Each year, analyses of the composition of the sward were taken in July in order to find the effect of the fertilizers on the different species of plants. Table 30 gives a résumé of the botanical analyses for an average of eight years.

TABLE 30.—FERTILIZERS FOR BEEF CATTLE PASTURE—BOTANICAL ANALYSES, EIGHT-YEAR AVERAGE, 1939–1946

Ground coverage	Check	Minerals	Complete
	%	%	%
Timothy	7·8	7·1	6·0
Kentucky blue grass	11·8	27·4	24·8
Red top	17·2	13·5	18·6
Brown top	6·8	1·2	5·4
Other useful grasses*	0·3	0·7	0·5
Total useful grasses	43·9	49·9	55·3
Wild white clover	20·8	29·4	5·7
Weeds	17·7	10·5	9·3
Bare ground and moss	17·6	10·2	9·7

(*) Other useful grasses: annual blue grass, orchard grass and red fescue.

Table 30 brings out the responses of the different plants to fertilizers and the general improvement of the sward. Kentucky blue grass and wild white clover show marked increases largely by filling up the bare ground and crowding out the weeds. The other grasses do not show an increase in percentage of the sward. The complete fertilizer has increased the grasses by 5·4 per cent over the minerals. Conversely, the minerals have increased the white clover by 3·7 per cent over the complete fertilizer.

Fertilizers for Dairy Cattle Pasture

An experiment designed to test the value of fertilizers for the improvement of permanent pasture for dairy cattle was laid out on four fields of four acres each. Milk produced by the cows on each pasture was recorded. Yields of herbage were obtained from yard-square, cage-protected areas. The fertilizer treatments were:

(1) Check.

(2) Complete: 100 pounds sulphate of ammonia annually, 480 pounds superphosphate and 100 pounds muriate of potash every three years.

(3) Minerals: 480 pounds superphosphate and 100 pounds muriate of potash every three years.

(4) Minerals plus lime: 480 pounds superphosphate, 100 pounds muriate of potash and 1 ton ground limestone every three years.

Table 31 summarizes the results of this experiment for an average of eight years.

TABLE 31.—FERTILIZERS FOR DAIRY CATTLE PASTURE—AVERAGE RESULTS PER ACRE FOR EIGHT YEARS, 1939–1946

Item	Check	Complete	Minerals	Minerals plus lime
Green weight of herbage.....lb.	21,479	28,104	26,901	26,150
Dry weight of herbage.....lb.	4,808	5,973	5,712	5,696
Cost of fertilizer.....$	.....	4.86	2.68	3.56
Carrying capacity.....an. units *	0·84	1·04	1·05	0·99
Milk produced, 4% fat corrected.....lb.	3,947·5	4,933·2	5,198·6	4,938·6
Value of milk over cost of fertilizer.....$	77.91	95.46	103.95	96.10

(*) One animal unit—1,000 lb. cow giving 25 lb. 4% milk daily.

The cost of fertilizers as shown in Table 31 was the market price for each year. The value of milk was the price paid each year for whole milk at the condensery. It will be noted that the carrying capacity of these pastures is high, even the check carrying 0·84 animal units. Nevertheless, fertilizers have given a substantial increase in herbage and milk. It was also profitable as shown by the value of the milk produced after paying for the fertilizer.

Each year, as with the pasture for beef cattle, a survey of the sod was made to determine the effect of the fertilizers on the various species of plants comprising the sward. Table 32 gives the average percentage of the important species.

TABLE 32.—FERTILIZERS FOR DAIRY CATTLE PASTURE—BOTANICAL ANALYSES, NINE-YEAR AVERAGE, 1938–1946

Ground Coverage	Check	Complete	Minerals	Minerals plus lime
	%	%	%	%
Timothy	5·6	5·7	5·5	4·6
Kentucky blue grass	14·7	23·2	19·4	22·9
Red top	20·5	19·0	15·4	13·1
Brown top	8·0	9·2	9·8	5·9
Other useful grasses*	0·8	0·5	5·0	7·5
Total useful grasses	49·6	57·6	55·1	54·0
Wild white clover	20·5	22·5	24·9	24·6
Weeds	14·2	9·4	11·0	10·9
Bare ground and moss	15·7	10·5	9·0	10·5

(*) Other useful grasses: red fescue, meadow fescue, orchard grass and annual blue grass.

Kentucky blue grass and wild white clover again made their gain when fertilized by filling in the bare ground and crowding out the weeds. There was slightly less wild white clover on the complete fertilized pasture.

Fertilizer Formulae for Pasture

In order to test the value of the three main fertilizing elements and lime as well as their rate and frequency of application for the improvement of permanent pasture, an experiment was laid out in strips 8 feet wide and approximately 100 feet long across two fields. There were 21 treatments and the check. These treatments were randomized in duplicate. Both fields were grazed and yields obtained from yard-square, cage-protected areas on each plot.

In order to bring out the points more clearly and to make interpretation easier, the results will be given in series. Table 33 shows the treatments dealing with the main fertilizing elements. In it, will be found the yield per acre for

both green and dry weights, together with the cost of fertilizer per acre and the cost of the fertilizer for each ton of increased yield of dry matter. All treatments were applied every three years.

TABLE 33.—EFFECT OF NITROGEN, PHOSPHORUS AND POTASH ON THE YIELD OF HERBAGE PER ACRE, NINE-YEAR AVERAGE, 1938-1946

Treatment	Green weight	Dry weight	Cost of fertilizer per acre	Cost per ton increased dry weight
	lb.	lb.	$ cts.	$ cts.
Check	15,466	3,559		
600 lb. 4-0-0	16,223	3,805	0 84	6 01
" 0-12-6	22,097	4,816	2 01	3 20
" 0-16-6	22,962	4,966	2 45	3 48
" 2-12-6	21,770	4,701	2 42	4 24
" 4-12-6	23,147	5,154	2 84	3 56
" 8-12-6	26,666	5,821	3 67	3 24
" 0-12-0	22,477	5,061	1 41	1 88
" 0-16-0	23,009	5,027	1 87	2 55
" 4-0-6	16,987	3,848	1 44	9 97
" 4-6-6	20,479	4,545	2 14	4 34
" 0-0-6	18,182	4,004	0 60	2 70
" 4-12-0	22,900	5,332	2 23	2 52
" 4-12-12	22,462	4,560	3 44	6 87
Nitrogen plots	21,282	4,777	2 24	
No nitrogen plots	19,556	4,360	1 01	
Phosphorus plots	22,439	4,986	2 13	
No phosphorus plots	16,715	3,804	0 72	
Potash plots	20,973	4,558	2 13	
No potash plots	20,963	4,557	1 27	

In Table 33, it can be seen that nitrogen and phosphorus generally gave an increase but potassium reduced the yield slightly in every case except that it was better than the check. The highest yield was produced with 600 pounds of 8-12-6 fertilizer.

When all plots which are directly comparable are considered, it is found on the average that nitrogen has increased the yield by 417 pounds, phosphorus 1,182 pounds and potash by only 1 pound of dry matter. The cheapest fertilizer is not always the most economical as can be seen by comparing the cost per acre and the cost per ton of increase.

To study the effect of these fertilizing elements on the composition of the sward, botanical analyses were made each year. Table 34 summarizes this effect on the ground coverage for nine years.

TABLE 34.—EFFECT OF NITROGEN, PHOSPHORUS AND POTASH ON THE BOTANICAL ANALYSES, NINE-YEAR AVERAGE, 1938-1946

Treatment	Useful grasses	Wild white clover	Weeds	Bare ground and moss
	%	%	%	%
Nitrogen plots	61·1	20·6	9·8	8·5
No nitrogen plots	55·5	21·5	11·6	11·4
Phosphorus plots	59·6	23·2	9·1	8·1
No phosphorus plots	56·7	18·1	12·9	12·3
Potash plots	57·8	23·2	9·9	9·1
No potash plots	59·3	19·6	11·0	10·1

The useful grasses include mainly: timothy, Kentucky blue grass, red top and brown top. Traces of annual blue grass, red fescue, meadow fescue and Canada blue grass were also found.

Table 34 points out that the greatest change in composition was made by phosphorus, which increased both the useful grasses and white clover. The nitrogen increased the grasses by 5·6 per cent but decreased the clover by less than one per cent. The potash on the other hand decreased the grasses by 1·5 per cent but increased the clover by 3·6 per cent.

Rate of Application of a Complete Fertilizer

In the experiment, the standard rate of application was 600 pounds per acre. To test if this application was too much, only 450 pounds of a 4-12-6 fertilizer were applied on a set of plots. The results are summarized in Table 35.

TABLE 35.—EFFECT OF RATE OF APPLICATION OF A COMPLETE FERTILIZER ON THE YIELD OF HERBAGE PER ACRE, NINE-YEAR AVERAGE, 1938-1946

Rate	Green weight	Dry weight	Cost of fertilizer per acre	Cost per ton increased dry weight
	lb.	lb.	$ cts.	$ cts.
600 lb.	23,147	5,154	2 84	3 56
450 lb.	20,586	4,601	2 13	4 09

Six hundred pounds of a complete fertilizer gave a higher yield than 450 pounds of the same fertilizer and although the cost per acre was naturally higher, the cost per ton of increased yield was 53 cents less than with the smaller application.

The average botanical analyses for nine years are shown in Table 36.

TABLE 36.—EFFECT OF RATE OF APPLICATION OF A COMPLETE FERTILIZER ON THE BOTANICAL ANALYSES—NINE-YEAR AVERAGE, 1938-1946

Rate	Useful grasses	Wild white clover	Weeds	Bare ground and moss
	%	%	%	%
600 lb.	60·1	22·9	9·6	7·4
450 lb.	57·9	21·4	10·1	10·6

The extra fertilizer increased both the useful grasses and the wild white clover to the detriment of weeds, bare ground and moss.

Frequency of Application of a Complete Fertilizer

Is it better to apply a small quantity of a complete fertilizer every year or three times as much once every three years? Plots fertilized with 200 lb. of a 4-12-6 fertilizer annually were compared with plots receiving 600 lb. of the same fertilizer every three years. The results are shown in Table 37.

TABLE 37.—EFFECT OF FREQUENCY OF APPLICATION OF A COMPLETE FERTILIZER ON THE YIELD OF HERBAGE PER ACRE, NINE-YEAR AVERAGE, 1938–1946

Frequency of application	Green Weight	Dry Weight
	lb.	lb.
200 lb. annually	21,471	4,697
600 lb. every three years	23,147	5,154

The annual application produced 457 pounds less dry matter per year than the triennial application. The amount of labour saved by the three-year application is also an important factor to consider as it requires practically the same amount of time and work to apply 200 pounds as it does for 600 pounds.

The different effects of these frequencies of application on the ground cover are brought out in Table 38.

TABLE 38.—EFFECT OF FREQUENCY OF APPLICATION OF A COMPLETE FERTILIZER ON THE BOTANICAL ANALYSES, NINE-YEAR AVERAGE, 1938–1946

Frequency of application	Useful grasses	Wild white clover	Weeds	Bare ground and moss
	%	%	%	%
200 lb. annually	53·5	26·0	10·9	9·6
600 lb. every 3 years	60·1	22·9	9·6	7·4

The plots receiving the heavy application every three years produced a higher percentage of grasses but less clover and weeds and had less bare ground and moss. As white clover has a shallow root system, an annual application seems to benefit this legume more than a heavy periodical application.

Frequency and Rate of Application of Nitrogen

While the figures in Tables 37 and 38 prove that a heavy application of a complete fertilizer, once in three years, is better than one third the amount every year, the question still arises as to whether an annual application of nitrogen in addition to the mineral elements every three years would be an improvement over a complete fertilizer every three years? The results of this test are summarized in Table 39.

TABLE 39.—EFFECT OF FREQUENCY AND RATE OF APPLICATION OF NITROGEN ON THE YIELD OF HERBAGE PER ACRE, NINE-YEAR AVERAGE, 1938–1946

Treatment	Green weight	Dry weight	Cost of fertilizer per acre	Cost per ton increased dry weight
	lb.	lb.	$	$
Nitrogen every 3 years	23,147	5,154	2 84	3 56
Nitrogen annually	23,323	5,206	4 61	5 60

From the figures in Table 39, it can be seen that the extra nitrogen gave only a very slight increase but raised the cost per acre and per ton of increase substantially.

The effect of this extra nitrogen on the composition of the sward is shown in Table 40.

TABLE 40.—EFFECT OF FREQUENCY AND RATE OF APPLICATION OF NITROGEN ON THE BOTANICAL ANALYSES, NINE-YEAR AVERAGE, 1938-1946

Treatment	Useful grasses	Wild white clover	Weeds	Bare ground and moss
	%	%	%	%
Nitrogen every three years	60·1	22·9	9·6	7·4
Nitrogen annually	64·3	21·7	7·7	6·3

The extra nitrogen, Table 40, increased the percentage of useful grasses and reduced the clover, weeds, bare ground and moss.

Lime

In trying ground limestone, this amendment was applied alone and with fertilizers. Treatments were made every three years. Table 41 gives the results and costs for nine years.

TABLE 41.—EFFECT OF LIME ON THE YIELD OF HERBAGE PER ACRE, NINE-YEAR AVERAGE, 1938-1946

Treatment	Green weight	Dry weight	Cost of fertilizer plus lime per acre	Cost per ton increased dry weight
	lb.	lb.	$ cts.	$ cts.
Check	15,466	3,559	.....	.....
1 ton lime	18,323	4,258	0 88	2 52
2 tons lime	18,594	4,279	1 76	4 89
600 lb. 0-12-0	22,477	5,061	1 41	1 88
1 ton lime plus 600 lb. 0-12-0	21,072	4,767	2 29	3 79
600 lb. 0-12-6	22,097	4,816	2 01	3 20
1 ton lime plus 600 lb. 0-12-6	22,999	5,161	2 89	3 61
600 lb. 4-12-6	23,147	5,154	2 84	3 56
1 ton lime plus 600 lb. 4-12-6	23,205	5,102	3 72	4 82
Lime plots	20,839	4,713	2 31	.....
No lime plots	20,797	4,648	1 57	.....

One ton of ground limestone per acre gave a substantial increase over the check, of 699 pounds of dry matter but when combined with fertilizers the lime produced no results as the average yields were practically the same. Two tons of ground limestone gave only a slight increase over one ton.

It is interesting to note the effect of lime on the ground cover. Table 42 shows the average percentage for nine years of useful grasses, wild white clover, weeds, bare ground and moss.

TABLE 42.—EFFECT OF LIME ON THE BOTANICAL ANALYSES, NINE-YEAR AVERAGE, 1938–1946

Treatment	Useful grasses	Wild white clover	Weeds	Bare ground and moss
	%	%	%	%
Check	53·0	15·5	15·5	16·0
1 ton lime	66·3	13·6	9·2	10·9
2 tons lime	63·9	16·3	9·1	10·7
600 lb. 0-12-0	60·8	22·4	9·3	7·5
1 ton lime plus 600 lb. 0-12-0	60·0	21·5	9·2	9·3
600 lb. 0-12-6	54·2	26·5	9·0	10·3
1 ton lime plus 600 lb. 0-12-6	61·5	22·6	8·1	7·8
600 lb. 4-12-6	60·1	22·9	9·6	7·4
1 ton lime plus 600 lb. 4-12-6	59·2	22·8	8·8	9·2
Lime plots	62·2	19·3	8·9	9·6
No lime plots	57·0	21·8	10·9	10·3

Lime increased the percentage of useful grasses and reduced the wild white clover, weeds, bare ground and moss.

Rotated vs. Continuous Grazing

In 1930, ten acres of rough pasture land was broken and seeded to a mixture of:

Timothy	4 pounds
Red clover	2 "
Alsike	2 "
White clover	2 "
Kentucky blue grass	2 "
Red top	2 "
Orchard grass	2 "

Oats at the rate of 2½ bushels per acre was used as a nurse crop. The area was divided into four fields of 2·5 acres each. The whole area was treated alike in every respect except the system of grazing. One field was grazed continuously, while on the other three, the cattle were rotated. They were moved from field to field at weekly intervals so that each field had two weeks rest between grazing periods. During the first round in the spring, the grazing periods were cut to four days so that the last field would not be too far advanced before the cattle were turned in. The number of cattle on these pastures were kept at parity; that is, for every head on the continuous pasture, three were kept on the rotated fields. The cattle were weighed three days in succession every three weeks and the weights averaged. Herbage yields were obtained from yard-square, cage-protected areas. Table 43 shows the average herbage yields, carrying capacity and gain of meat per acre for seven years.

TABLE 43.—CONTINUOUS vs. ROTATED PASTURE, SEVEN-YEAR AVERAGE, 1932–1938

System of Grazing	Yield per acre		Carrying capacity	Gain per acre
	Green weight	Dry weight		
	lb.	lb.	an. units	lb.
Continuous	13,457	3,278	0·59	181
Rotated	12,867	3,219	0·55	164

As can be seen from the figures in Table 43, there was little to choose between the two systems of grazing, but the continuous grazing had a slight advantage. The cost of the extra fence and the difficulty in many cases of supplying water to a number of separate fields is also against the rotational system.

Permanent Pasture vs. Pasture in a Crop Rotation

In order to compare the value of a fertilized permanent pasture with pasture in a short crop rotation, an experiment was set up on five fields of 2·5 acres each. The first field was a permanent pasture fertilized every three years with 100 pounds sulphate of ammonia, 480 pounds superphosphate and 100 pounds muriate of potash. The other four fields were used as pasture in a crop rotation as follows: first year, oats seeded down; second year, clover; third and fourth years, pasture. In the spring, the cattle were turned into the first, third and fourth year fields. In early June, the first year field was ploughed and worked. It was seeded with oats at the rate of 2½ bushels per acre and a hay mixture composed of 8 lb. of red clover, 2 lb. of alsike and 10 lb. of timothy about June 15. A crop of clover was removed from the second year field in June for either silage or hay. When the oats were from six to ten inches high, the cattle were allowed to pasture on them and on the aftermath of the clover field as well as the other two fields. The first year field was fertilized with 100 pounds sulphate of ammonia, 480 pounds superphosphate and 100 pounds muriate of potash. The third and fourth year fields received an application of 100 pounds sulphate of ammonia in the spring.

Grazing beef cattle and cages were used to measure the results obtained with these two types of pasture. This experiment was carried on for nine years and the average results are summarized in Table 44.

TABLE 44.—PERMANENT PASTURE vs. PASTURE IN A CROP ROTATION, NINE-YEAR AVERAGE. 1938-1946

Type of pasture	Yield per acre		Carrying capacity	Gain per acre	Cost of treatment	Return value over cost
	Green weight	Dry weight				
	lb.	lb.	an. units	lb.	$ cts.	$ cts.
Permanent pasture	23,027	4,813	0·75	259·0	4 82	18 76
Pasture in Crop Rotation	21,557	4,747	0·53	187·1	6 44	12 02

The figures in Table 44 would leave the impression that everything is in favour of the permanent pasture. This is not entirely true as pasture in a crop rotation has a great advantage in being able to carry the same number of cattle all season, while with the permanent pasture there is a flush of grass in June and falling off later in the year.

The cost of treatment includes, besides the fertilizer, the labour of ploughing, the seed and fencing. For this district, permanent pasture supplemented by the aftermath of the meadows will provide better and cheaper feed than pasture in a crop rotation.

It is interesting to see the progression of plants on a pasture. To show this, the botanical analvses are given in Table 45 for an average of three years.

TABLE 45.—PERMANENT PASTURE vs. PASTURE IN A CROP ROTATION, BOTANICAL ANALYSES, THREE-YEAR AVERAGE, 1944-1946

Ground coverage	Permanent pasture	Pasture in a crop rotation		
		Second year	Third year	Fourth year
	%	%	%	%
Timothy	4·5	25·9	36·1	28·8
Kentucky blue grass	26·2	1·0	4·6	4·0
Red top	24·2	3·7	8·6	11·5
Brown top	4·5	.....	2·1	1·5
Wild white clover	23·8	10·8	19·9	28·8
Red and alsike clovers	.....	17·6	2·3	1·0
Total useful plants	83·2	59·0	73·6	75·6
Total weeds	8·0	11·0	9·8	9·6
Moss	4·0	0·7	0·1	1·6
Bare ground	4·8	29·3	16·5	13·2

As can be seen from Table 45, the year after seeding in the rotation pasture' the plants are spaced widely as there is 29·3 per cent bare ground, which by the fourth year, has been reduced to 13·2 per cent by volunteer species which come in and fill up the spaces. The seeding mixture as noted before contained only timothy, red clover and alsike.

If the botanical analyses were taken in June before the hay was cut, the amount of red clover and alsike would be higher in the second year. Botanical analyses were made towards the end of July after this area had been heavily grazed. Thus, in the second year, the red clover and alsike form 17·6 per cent of the ground coverage but disappear rapidly as by the third year there is only 2·3 per cent and 1·0 per cent in the fourth. Kentucky blue grass, red top and wild white clover replace them and fill up considerable of the bare ground, so that there is a steady increase in useful plants. This natural progression of plants continues until the botanical analyses are like that shown for permanent pasture.

FIELD HUSBANDRY

(W. S. Richardson)

Field husbandry is concerned with the soil and the production of crops. Experimental work deals with the testing of cultural methods such as preparation of land, time and depth of ploughing, etc. Crop rotations, fertilization and soil amendments as well as weed control are studied. Pastures are an important part of the work and the results are shown in the previous section of this report. Records of meteorological data are kept.

Tillage Methods

The method of preparing soil for a crop may have a considerable bearing on the size of crop produced, the amount of power required and the weed population.

With the introduction of shallow tillage machines such as the one-way disk as substitute for the mould board plough, the question of depth of ploughing or of depth of preparation of the soil for crops becomes important. The deeper the ploughing, the greater the draught and the more power required.

An experiment to compare the virtues of deep and shallow ploughing was conducted for fourteen years on a soil classified as Sherbrooke sand. A four-year rotation of corn, oats, clover and timothy was used. Two depths of ploughing were practised: 4-inch and 7-inch. The land was spring ploughed for corn and fall ploughed for oats.

The average yields for fourteen years of all the crops in the rotation are shown in Table 46.

TABLE 46.—DEPTH OF PLOUGHING, 1923-1936 INCLUSIVE

Crop	4-inch ploughing	7-inch ploughing
Corn	14·21 tons	13·10 tons
Oats	47·6 bushels	46·3 bushels
Clover	2·22 tons	2·11 tons
Timothy	1·90 tons	1·91 tons

There was very little difference in yields and it would seem that on a light soil and for crops such as corn and oats that deep ploughing is not necessary and only adds to the expense.

When to plough is also a problem and one that has considerable bearing on the crops that follow and on the weed population. Couch grass is a troublesome weed which may be controlled by after-harvest cultivation. After-harvest cultivation consists of ploughing the land shortly after the hay is harvested. This is followed at about ten-day intervals by the disk harrow until the sod is broken and then the spring-toothed or stiff-toothed cultivator until growth ceases in the fall.

Two experiments dealing with methods of soil preparation bring out some of the effects of after-harvest cultivation. Both experiments were conducted on soil classified as Sherbrooke sand.

The first, which was in operation for eighteen years, dealt with the preparation of sod land for oats. A five-year rotation of oats, corn, oats, clover and timothy was used. The fertilization was the same for all rotations and all plots were treated alike except for the preparation of the timothy sod for the succeeding oat crop. The five different treatments on these plots were:

(1) Spring plough.
(2) Fall plough.
(3) Plough in July; after-harvest cultivate for the balance of the season and rib up in late fall.
(4) Plough in July; after-harvest cultivate for the balance of the season and leave flat in fall.
(5) Plough in July; after-harvest cultivate for the balance of the season and replough in late October.

The average yields for eighteen years of all the crops in the rotation are given in Table 47.

TABLE 47.—PREPARATION OF SOD LAND FOR GRAIN, 1924-1941 INCLUSIVE

Treatment	Av. yield per acre				
	Oats	Corn	Oats	Clover	Timothy
	bu.	tons	bu.	tons	tons
Spring plough	30·6	12·10	40·3	1·45	2·11
Fall plough	32·4	12·12	38·8	1·47	2·05
Plough July, top-work, rib in fall	39·7	10·62	34·7	1·32	1·85
Plough July, top-work, do not rib	40·1	10·20	33·9	1·31	1·84
Plough July, top-work, replough October	39·5	10·58	34·3	1·50	2·07

The second experiment dealt with the preparation of sod land for corn and was in operation for seventeen years.

The rotation used was corn, oats, clover and timothy. Fertilization and all work done on each rotation were exactly the same except for the preparation of the timothy sod for the succeeding corn crop. The treatments were:

(1) Manure in winter and spring plough.
(2) Manure in fall and fall plough.
(3) Plough in August, top-work, manure in winter and spring plough.
(4) Plough in August, top-work, manure in winter and disk in spring.

The average yields for seventeen years of all the crops in the rotation are summarized in Table 48.

TABLE 48.—PREPARATION OF SOD LAND FOR CORN, 1925-1941 INCLUSIVE

Treatment	Av. yield per acre			
	Corn	Oats	Clover	Timothy
	tons	bu.	tons	tons
Spring plough	13·26	44·4	2·18	2·14
Fall plough	13·75	43·8	2·25	2·13
After-harvest cultivate, replough in spring	11·34	46·5	2·26	2·04
After-harvest cultivate, disk in spring	11·15	40·3	1·91	1·87

After-harvest cultivation in both experiments practically eliminated couch grass and most of the weeds. Grain yields, as shown in Table 47, were substantially increased but corn yields, as shown in Table 48, were reduced by over two tons per acre following after-harvest cultivation. Also, if the figures in Table 47 regarding the yields of crops other than the first-year oats are examined, the picture in favour of after-harvest cultivation is not quite so clear. Although all corn plots were treated alike, those following the higher yields of oats produced a lower tonnage of corn. The same applies to the oat crop following the corn. It would appear that after-harvest cultivation should be used to eradicate couch grass and other weeds but its use at other times is of doubtful value.

On this light type of soil there is very little difference between spring or fall ploughing. Also ribbing or ploughing for the second time in the fall has not given any benefit. However, experience has shown that on the heavier types of soil the frost action on fall ploughed land or land that is ribbed makes it much easier to prepare for a seed-bed than land that is spring ploughed or left flat following after-harvest cultivation.

Soil Fertility Work

The fertility of the soil is an important factor in the success of farming. How to maintain or increase that fertility is a problem requiring much care and attention. In order to find out what fertilizers to use, when and how to apply them, experiments have been conducted at this Station for a number of years. These experiments will be discussed in the following pages.

Fertilizer Formulae for Grain and Hay on Sandy Soil

An experiment was conducted on soil classified by the soil surveyors as Sherbrooke sand to test the value of the three main fertilizing elements. A four-year rotation of oats and three years hay was used and the fertilizer treatments were:

(1) Check—no fertilizer.
(2) 75 pounds nitrate of soda, 160 pounds superphosphate.
(3) 75 pounds nitrate of soda, 160 pounds superphosphate and 50 pounds muriate of potash.
(4) 150 pounds nitrate of soda, 320 pounds superphosphate.
(5) 150 pounds nitrate of soda, 320 pounds superphosphate and 100 pounds muriate of potash.
(6) 100 pounds muriate of potash.

The nitrate of soda was applied every year and the minerals every second year to the oats and first-year timothy.

The average yields for eleven years of all the crops in the rotation are shown in Table 49.

TABLE 49.—FERTILIZER FORMULAE FOR GRAIN AND HAY ON SANDY SOIL, 1931-1941 INCLUSIVE

Treatment	Av. yield per acre			
	Oats	Clover	Timothy	Timothy
	bu.	tons	tons	tons
Check—no fertilizer	16·4	0·31	0·50	0·52
75 lb. nitrate of soda, 160 lb. superphosphate	29·0	0·53	0·77	0·64
75 lb. nitrate of soda, 160 lb. superphosphate, 50 lb. muriate of potash	32·2	0·87	1·35	1·02
150 lb. nitrate of soda, 320 lb. superphosphate	32·8	0·76	0·95	0·83
150 lb. nitrate of soda, 320 lb. superphosphate, 100 lb. muriate of potash	47·5	1·49	2·16	1·57
100 lb. muriate of potash	28·1	0·57	0·91	0·77

Results shown in Table 49 indicate that all fertilizers increased the yield but that on this light sandy soil, potash was the element which was in shortest supply. The addition of 100 pounds of muriate of potash to 150 pounds of nitrate of soda and 320 pounds of superphosphate nearly doubled the yield. Potash not only increased the yield but also improved the quality of the crops. Without potash the oat straw broke down and was almost impossible to harvest and the hay crop contained very little clover and many weeds.

Fertilizer Formulae for Grain and Hay on Silt Loam Soil

In 1942, an experiment was started to test the value of the three main fertilizing elements and manure on a Coaticook silt loam soil. A four-year rotation of oats, barley, clover and timothy was used. Sixty per cent of the fertilizers and manure were applied for the barley crop and forty per cent as a top-dressing for the timothy. One ton of ground limestone was applied to all oat plots except one receiving borax which will be noted later. As the experiment is rather involved, it will be broken down into sections for comparison.

Table 50 shows the average yields for four years of each crop in the rotation when fertilized with the different elements singly and in combinations.

TABLE 50.—FERTILIZER FORMULAE FOR GRAIN AND HAY ON SILT LOAM SOIL, 1943–1946 INCLUSIVE

Treatment	Av. yield per acre			
	Oats	Barley	Clover	Timothy
	bu.	bu.	tons	tons
Check—no fertilizer	44·1	17·5	1·83	1·50
100 lb. sulphate of ammonia	43·5	16·3	1·93	1·75
600 lb. superphosphate	50·7	27·5	2·36	1·85
100 lb. muriate of potash	46·9	21·7	2·09	1·83
100 lb. sulphate of ammonia, 600 lb. superphosphate	45·0	25·9	2·55	1·94
100 lb. sulphate of ammonia, 100 lb. muriate of potash	43·5	25·0	2·32	2·03
600 lb. superphosphate, 100 lb. muriate of potash	48·3	36·6	2·69	2·10
100 lb. sulphate of ammonia, 600 lb. superphosphate, 100 lb. muriate of potash	49·7	36·0	2·65	2·11
Nitrogen plots	45·4	25·8	2·36	1·96
No nitrogen plots	47·5	25·8	2·24	1·82
Phosphorus plots	48·4	31·5	2·56	2·00
No phosphorus plots	44·5	20·1	2·04	1·78
Potash plots	47·1	29·8	2·44	2·02
No potash plots	45·8	21·8	2·17	1·76

From Table 50, it can be seen that phosphorus and potash both increased the yields. Nitrogen decreased the yield of oats, had no effect on barley and gave a slight increase with hay. From the results to date, it would appear that the mineral elements, phosphorus and potash, will give as good results as a complete fertilizer and, of course, will cost less.

Rates of Applying a Complete Fertilizer for Grain and Hay on Silt Loam Soil

A complete fertilizer, 2-12-6, was applied at three rates on a four-year rotation of oats, barley, clover and timothy. Sixty per cent was drilled in with the barley and forty per cent used as a top-dressing on the timothy. The average results for four years are shown in Table 51.

TABLE 51.—RATE OF APPLYING A COMPLETE FERTILIZER FOR GRAIN AND HAY ON SILT LOAM SOIL, 1943–1946 INCLUSIVE

Rate	Av. yield per acre			
	Oats	Barley	Clover	Timothy
	bu.	bu.	tons	tons
500 pounds 2-12-6	50·0	29·5	2·46	1·97
1000 pounds 2-12-6	49·7	36·0	2·65	2·11
1500 pounds 2-12-6	50·4	34·0	2·59	2·22

There is practically no difference in the yield of oats between rates but the other crops, especially barley, have responded to the higher rates. From these figures for four years it would appear that 1,500 pounds is not better than 1,000 pounds.

Manure, Fertilizer and Combinations for Grain and Hay on Silt Loam Soil

In order to compare the value of manure, fertilizer and a combination of the two on a silt loam soil, plots were laid out with the following treatments:

(1) 1000 pounds 2-12-6.
(2) 16 tons manure.
(3) 8 tons manure.
(4) 8 tons manure plus 500 pounds 2-12-6.
(5) 8 tons manure plus 500 pounds superphosphate.

The rotation used was oats, barley, clover and timothy. Sixty per cent of the manure and fertilizer was applied for the barley and forty per cent used as a top-dressing for the timothy. The average yields for four years are shown in Table 52.

TABLE 52.—MANURE, FERTILIZER AND COMBINATIONS FOR GRAIN AND HAY ON SILT LOAM SOIL, 1943–1946 INCLUSIVE

Treatment	Av. yield per acre			
	Oats	Barley	Clover	Timothy
	bu.	bu.	tons	tons
1000 pounds 2-12-6	49·7	36·0	2·65	2·11
16 tons manure	49·5	26·7	2·59	2·00
8 tons manure	46·4	25·7	2·47	1·92
8 tons manure plus 500 pounds 2-12-6	48·7	32·9	2·64	2·10
8 tons manure plus 500 pounds superphosphate	49·9	28·9	2·78	1·98

These treatments, with the exception of 8 tons of manure alone, have produced close to the same yield of oats. Eight tons of manure is not enough for four years and the difference in yield may become more pronounced in succeeding years. The barley is the crop most affected by the differences in fertilization. This crop has received the most benefit from commercial fertilizer and it will be interesting to observe if this benefit carried on over a long period.

Drilled vs. Broadcast Fertilizer for Grain and Hay on Silt Loam Soil

Drilling in the fertilizer with the barley was compared with broadcasting the same fertilizer before seeding. Table 53 shows the difference in yields between the two methods.

TABLE 53.—DRILLED vs. BROADCAST FERTILIZER FOR GRAIN AND HAY ON SILT LOAM SOIL, 1943-1946 INCLUSIVE

Method	Av. yield per acre			
	Oats	Barley	Clover	Timothy
	bu.	bu.	tons	tons
Drilled	49·7	36·0	2·65	2·11
Broadcast	48·3	28·3	2·71	2·17

The barley yield was 7·7 bushels higher where the fertilizer was drilled in with the seed than where it was broadcast. There was very little difference with the other crops.

Boron for Grain and Hay on Silt Loam Soil

It is a well known fact that many soils are deficient in boron. This shows up noticeably in the turnip crop where it causes the disease called brown-heart. It has also been established that an application of borax on an alkaline soil does not have the desired results as the calcium renders the borax unavailable to plants. To test the value of borax for grain and hay, plots were laid down with twenty pounds of borax added to the complete fertilizer on both limed and unlimed soil. The lime was applied before seeding oats. Sixty per cent of the fertilizer and all of the borax were drilled in with the barley seed. Forty per cent of the fertilizer was top-dressed on the timothy. Table 54 gives the average yields for four years.

TABLE 54.—BORON FOR GRAIN AND HAY ON SILT LOAM SOIL, 1943-1946 INCLUSIVE

Treatment	Average yield per acre			
	Oats	Barley	Clover	Timothy
	bu.	bu.	tons	tons
1000 lb. 2-12-6 plus 1 ton lime	49·7	36·0	2·65	2·11
1000 lb. 2-12-6 plus 1 ton lime plus 20 lb. borax	49·1	30·8	2·51	2·24
1000 lb. 2-12-6 plus 20 lb. borax	45·8	27·3	2·60	2·12

So far the borax has not shown to advantage as the barley yield is lower. The lack of lime has further reduced the yield.

Manure, Fertilizer and Combinations for Potatoes on Sandy Soil

The production of potatoes has increased markedly in the last ten years in the Eastern Townships due mainly to growers who specialize or make potatoes their main crop. The growing of potatoes, except for the small plot for home use, tends to become a specialist's job, because of the amount of machinery and equipment necessary to look after the crop properly and economically. Most of the specialized potato farms are located on the sandy soils of the district. On such soils, the use of the right fertilizers is essential to high yields and economical production. An experiment to test the value of various amounts of fertilizer and manure was conducted at this Station for sixteen years. A four-year rotation of potatoes, oats, clover and timothy was used with all the manure and fertilizer being broadcast for the potatoes. The treatments were as follows:

(1) Check—no manure, no fertilizer.
(2) 450 pounds of fertilizer.
(3) 900 pounds of fertilizer.
(4) 1,800 pounds of fertilizer.
(5) 16 tons manure.
(6) 10 tons of manure plus 450 pounds of fertilizer.

In addition to the above treatments, for six years, two more sets of plots were added which received 2,700 pounds and 3,600 pounds of fertilizer respectively. The fertilizer was made up at the rate of:

100 pounds of nitrate of soda.
240 pounds of superphosphate.
50 pounds of muriate of potash.

The average yields per acre for sixteen years are summarized in Table 55.

TABLE 55.—MANURE, FERTILIZER AND COMBINATIONS FOR POTATOES ON SANDY SOIL, 1923-1938 INCLUSIVE

Treatment	Average yield per acre in bushels
Check	63·8
450 pounds fertilizer	113·6
900 pounds fertilizer	162·9
1800 pounds fertilizer	210·1
16 tons manure	207·4
10 tons manure plus 450 pounds fertilizer	208·7

Table 55 shows the check producing a very poor yield. Increased amounts of fertilizer produced increased yields. On the plots which were in operation for sixteen years, there was very little difference between 1,800 pounds of fertilizer, 16 tons of manure or 10 tons of manure plus 450 pounds of fertilizer.

After the above mentioned experiment had been in operation for ten years, two heavy fertilizer treatments were added which show some contrasts. The average yields per acre for the last six years are given in Table 56.

TABLE 56.—MANURE, FERTILIZER AND COMBINATIONS FOR POTATOES ON SANDY SOIL, 1933-1938 INCLUSIVE

Treatment	Average yield per acre in bushels
Check	36·1
450 pounds fertilizer	93·0
900 pounds fertilizer	152·9
1800 pounds fertilizer	206·6
2700 pounds fertilizer	251·3
3600 pounds fertilizer	257·3
16 tons manure	230·2
10 tons manure plus 450 lb. fertilizer	221·0

It will be noted from Table 56 that the 2,700 pounds of fertilizer gave a substantial increase over 1,800 pounds, and at that while 3,600 pounds produced a small increase over 2,700 pounds, it was not enough to pay for the extra fertilizer.

A very important factor in any soil, and one that is often lacking in the sandy soils on which potatoes are grown, is humus or organic matter. This can be supplied by manure or by ploughing under a green crop such as clover. The need for humus is shown by comparing the yields in Tables 55 and 56. The average yields for the last six years were less than the sixteen-year average for all plots, except those receiving manure. On these plots, there was an increase of 12·3 bushels to 22·8 bushels.

VALUE OF POTASH FOR POTATOES ON SANDY SOIL

To make the best use of fertilizers, the proper formula for the soil is necessary. The sandy soils generally are deficient in potash. This is clearly demonstrated in another experiment conducted at this Station. Not only is the need for potash shown but also the fact that too much is not profitable.

The plots each received 10 tons of manure. This was supplemented with 450 pounds of commercial fertilizer made up in three different formulæ as follows: 3-10-5, 3-10-10 and 3-10-20.

The average yields of marketable potatoes per acre for three years are summarized in Table 57.

TABLE 57.—VALUE OF POTASH FOR POTATOES ON SANDY SOIL, 1936-1938 INCLUSIVE

Treatment	Average yield per acre in bushels
10 tons manure plus 450 lb 3-10-5	221·5
10 tons manure plus 450 lb. 3-10-10	242·0
10 tons manure plus 450 lb. 3-10-20	238·0

From the figures in Table 57, it can be seen that the fertilizer containing 10 per cent potash gave the highest yield per acre. When the percentage of potash in the fertilizer was increased to 20 per cent, a reduction in yields was noted.

From all these experiments on the fertilization of potatoes on sandy soil, it can be stated that:

(1) High fertility for potatoes is profitable.
(2) The correct formula is important.
(3) Organic matter or humus is essential to successful production.

VALUE OF LIME ON SANDY SOIL

Soil surveys in seven counties of the Eastern Townships have shown that much of the agricultural land is deficient in calcium or, as it is commonly expressed, it is acid or sour. Calcium has two functions in the soil. A certain amount is taken up by the plant and is used in its growth but the chief function is to sweeten the soil by neutralizing acidity. Calcium may be supplied to the soil by an application of ground limestone.

The value of ground limestone on acid soil has been clearly demonstrated by the results of an experiment conducted at this Station for 18 years, on a soil classified as Sherbrooke sand. A four-year rotation of corn, oats, clover and timothy was used. On one set of plots two tons of ground limestone per acre were applied every four years before the oat crop. The other set received no limestone.

The average yields per acre for eighteen years are presented in Table 58.

TABLE 58.—VALUE OF LIME ON SANDY SOIL, 1924-1941 INCLUSIVE

Crop	Average yield per acre	
	Limed	Unlimed
Corn	14·27 tons	11·26 tons
Oats	48·4 bushels	38·1 bushels
Clover	1·81 tons	1·04 tons
Timothy	1·85 tons	0·98 tons

As can be seen from Table 58, the increase in yield of any one crop would more than pay for the ground limestone, and the increase on the other three crops was profit. Besides this increase in yield, the quality of the crops, especially the hay, was very much improved by the ground limestone.

Farmers who contemplate applying ground limestone are advised to have their soil tested for lime requirements by their local agronome or nearest Experimental Farm. As there is a Government freight assistance policy, it is also advisable to purchase ground limestone through the local agronome.

CEREALS

(Paul Gervais)

Experimental work with cereals has increased considerably during the last decade. Investigations carried on included not only the testing of varieties of various cereal crops but also breeding work, production of Foundation Stock, Elite and Registered seed, and disease studies. All the experiments with cereals were carried on Coaticook silty loam.

The main practical feature of the work rested upon the introduction, multiplication and distribution of new and superior varieties to farmers of this community. Also a better knowledge has been gained of their adaptability and value under the Eastern Townships soil and climatic conditions.

As dairy industry and beef production are two main features of the farm enterprise, large amounts of feed grain are bought yearly. The growing of better varieties of grain—and perhaps on a larger scale—would release part of the farm revenue spent in the purchasing of feed. Increased grain production resulted on the farms where this practice was followed.

The value of good varieties cannot be too strongly emphasized. They are a real asset to farmers in the improvement of their grain production.

Oats

Hundreds of varieties and strains of oats were tried during the last decade but only those which proved to be superior and of which seed is available on the market will be discussed.

Table 59 gives the performance of four old varieties in comparison with a newer variety: Vanguard.

TABLE 59.—OATS, 1939-1942 INCLUSIVE

Variety	Days to mature	Straw		Average yield per acre	Weight per bushel	Weight per 1,000 kernels
		Length	Strength			
		in.	0-10 pts.	bu.	lb.	gm.
Vanguard	88·3	39·8	7·7	94·7	37·0	34·8
Legacy	89·9	42·9	7·5	87·3	36·0	32·3
Banner	92·5	45·5	6·5	85·1	36·5	33·5
Alaska	83·7	41·2	6·9	77·5	39·5	35·7
Cartier	83·6	41·1	8·5	75·6	41·7	35·8

Vanguard is a mid-early variety maturing from four to five days earlier than Banner; it possesses a straw of fair length and good strength, and carries resistance to stem rust. Both the yield and the quality of the grain are superior to those of Banner. Vanguard oats introduced in the Eastern Townships of

Quebec in 1939 by this Station is widely adapted and is now the chief sort grown. It is believed that at least 75 per cent of the area devoted to oats is sown with Vanguard. It has displaced Banner and Legacy, the two main varieties grown previously.

Alaska and Cartier are early varieties producing grain of high quality with a good weight per bushel, but yield much less than Vanguard. Alaska is weaker in the straw than Cartier.

Legacy matures at about the same time as Vanguard, possesses a longer straw and yields less. The quality of its grain about equals that of Vanguard.

Victory was also tested for a few years. It resembles the Banner variety in most respects and ranks about the same.

With the exception of Vanguard, none of these varieties carries resistance to stem rust.

New varieties are being developed from year to year and become available commercially after thorough testing. Therefore, old varieties are deleted from the tests and new ones are tried. Table 60 shows the results obtained over a five-year period with five leading varieties.

TABLE 60.—OATS, 1942-1946 INCLUSIVE

Variety	Days to mature	Straw		Average yield per acre	Weight per bushel	Weight per 1,000 kernels
		Length	Strength			
		in.	0–10 pts.	bu.	lb.	gm.
Roxton	99·6	48·1	8·0	91·7	38·2	38·9
Ajax	89·2	41·5	8·7	86·4	37·2	33·0
Vanguard	92·5	39·3	9·2	85·8	36·2	35·2
Beaver	92·1	41·8	9·4	84·8	36·6	37·0
Mabel	86·7	42·6	7·5	80·3	36·4	36·9

Roxton is a late-maturing variety and the highest yielder of the group. It possesses a long straw of good strength. The grain is plump and of excellent quality. Where a late variety is desired Roxton should prove very satisfactory.

Beaver is mid-early, it matures at the same time as Vanguard, possesses about the same characteristics but carries a longer straw and its grain is slightly larger.

Mabel is an early variety with a straw of good length and fair strengths. It is a good yielder. The grain is light buff in colour and of very good quality.

Ajax matures a few days later than Mabel. It is a high yielding variety with good length and strength of straw. The grain is rather small and contains a fairly high percentage of hull.

Roxton, Ajax, Vanguard and Beaver carry considerable resistance to stem rust; Mabel, Beaver and Roxton show moderate resistance to leaf rust.

The testing of oat varieties is also conducted at outside points. As climatic conditions and soil types vary tremendously, it is felt that the testing of varieties of cereals at a number of places is of great importance to farmers in appraising the value of the varieties for their own conditions.

Fig. 9.—Testing varieties of oats at the Dominion Experimental Station, Lennoxville, Que.

In co-operation with the Division of Illustration Stations, outside tests were started in 1938. These tests were located at the following places: Compton (Compton Co.,) 1938 to 1943, South-Roxton (Shefford Co.,) 1938 and 1939, Plessisville (Arthabaska Co.,) 1938, Farnham (Mississiquoi Co.,) 1938 and 1939, Wotton (Wolfe Co.,) 1939 to 1946, Laurierville (Megantic Co.,) 1939 to 1945, St. Evariste (Frontenac Co.,) 1940 to 1945, Ste. Edwidge (Compton Co.,) 1940 to 1945, St. Flavien (Lotbiniere Co.,) 1945 and 1946, Pintendre (Levis Co.,) 1946, East Broughton (Beauce Co.,) 1946, Frampton and St. Prosper (Dorchester Co.,) 1946.

A good many varieties were tried at these different places, but only a few were retained. As a number of varieties were discarded after a few years testing and as some tests were moved to other farms after a certain length of time, long-time averages are hard to establish. However, average yields are given for some stations in Table 61.

TABLE 61.—OATS. AVERAGE YIELDS PER ACRE AT OUTSIDE POINTS

Variety	St. Evariste		Ste. Edwidge		Laurierville		Wotton		Compton
	3 yr.	6 yr.	3 yr.	6 yr.	3 yr.	5 yr.	4 yr.	7 yr.	4 yr.
	bu.	bu.	bu.	bu.	bu.	bu.	bu.	bu.	bu.
Roxton	90·8	94·8	84·5	93·0	88·9	82·5	72·2	80·8	84·5
Ajax	89·5	96·5	80·0	90·1	94·2	90·8	82·1	88·8	84·0
Vanguard	85·5	91·1	72·3	82·7	80·3	79·0	68·0	77·5	83·9
Beaver	86·0	.....	72·2	.....	86·9	.....	74·1	.....	.....
Mabel	93·7	92·2	69·5	76·4	92·2	86·3	74·4	80·1	76·0
Banner	89·8	90·6	65·1	75·5	75·4	71·8	55·6	64·5	81·9

As mentioned previously, Vanguard is the chief variety grown and has done well at most places where tried. It is a popular oat. Beaver, Ajax and Roxton have also impressed the farmers and in some sections they may eventually replace Vanguard.

Barley

Barley is second to oats in importance as a cereal crop. Although barley is a more exacting crop than oats, good yields are obtained when proper treatments are applied and good cultural practices followed. Its feeding value makes it a very valuable production on the farm.

A great many varieties were involved in the program conducted on barley testing and improvement. Reports on the investigations carried on deal only with the varieties which are or were of outstanding promise and those which are commonly grown as shown in Table 62.

TABLE 62.--BARLEY, 1936-1939 INCLUSIVE

Variety	Days to mature	Straw		Av. yield per acre	Weight per bushel	Weight per 1000 kernels
		Length	Strength			
		in.	0-10 pts.	bu.	lb.	gm.
Byng	91·3	32·7	4·8	58·1	48·4	37·5
Peatland	92·5	38·0	9·7	57·2	50·4	32·3
Pontiac	89·1	38·0	7·7	56·8	49·0	37·1
O.A.C. 21	89·4	37·3	6·1	56·0	49·3	36·8
Velvet	89·7	37·6	6·9	53·9	48·7	35·1
Plush	93·2	34·1	5·6	52·5	49·0	39·5
Newal	90·8	35·9	5·9	50·5	47·9	38·1
Nobarb	91·7	35·7	4·7	49·8	49·9	38·1
Charlottetown 80	91·5	35·6	6·2	45·2	50·7	38·0
Olli	84·2	29·8	6·1	44·1	47·3	33·7
Hannchen	90·6	31·4	1·1	41·5	49·7	34·7

Byng is a smooth-awned, six-rowed barley, matures 2-3 days later than O.A.C. 21, gives high yield but carries a rather weak straw. The crop is apt to lodge on fertile soils and where moisture is plentiful.

Peatland is a six-rowed variety with strong straw and rough awns. It takes about three days more to mature than does O.A.C. 21, produces high yield, is well adapted and is resistant to stem rust.

Pontiac is rough-awned and six-rowed with about the same maturity as O.A.C. 21. It is a high yielder.

O.A.C. 21 is the standard variety for malting. It is a six-rowed and rough-awned variety, matures early and is well adapted to a wide range of conditions.

Velvet is a smooth-awned, six-rowed variety, which behaves similarly to O.A.C. 21.

Plush is six-rowed and smooth-awned. It is the latest variety of the group with fair yield.

Newal and Nobarb are two six-rowed and smooth-awned varieties which behave very similarly. They are fair yielders. Nobarb has the weaker straw of the two.

Olli is six-rowed and rough-awned. It is a very early maturing, short-strawed variety which produces rather low yields.

Charlottetown 80 and Hannchen are two two-rowed, rough-awned varieties and mid-early. Hannchen is shorter in the straw than Charlottetown 80 and its straw is quite weak. Charlottetown 80 is a better yielder than Hannchen, but neither of them produces as much as the six-rowed recommended varieties.

Byng, Pontiac, O.A.C. 21, and Velvet are the recommended varieties and have done well in the past. Peatland will definitely have a place in the district when seed of this variety is made available in appreciable amounts. At present Peatland is being multiplied at this Station for distribution to farmers.

Montcalm—a newer introduction—is also recommended and its performance is given in Table 63.

TABLE 63.—BARLEY, 1941-1946 INCLUSIVE

Variety	Days to mature	Straw		Av. yield per acre	Weight per bushel	Weight per 1000 kernels
		Length	Strength			
		in.	0-10 pts.	bu.	lb.	gm.
Byng	89·5	30·5	7·9	55·7	50·5	41·9
Montcalm	92·1	34·3	8·3	52·5	50·2	38·6
O.A.C. 21	86·9	35·0	8·7	49·0	49·7	38·2
Velvet	89·7	34·7	9·3	48·9	49·2	36·9

Montcalm is a six-rowed and smooth-awned variety. It matures a few days later than Byng, yields well and is suitable for malting.

The testing of barley varieties was also carried on at one outside point, at the Illustration Station, Wotton (Wolfe Co.,). Results are given in Table 64 for four of the leading varieties grown during the last five years.

TABLE 64.—BARLEY, 1942-1946 INCLUSIVE

Variety	Days to mature	Straw		Av. yield per acre	Weight per bushel	Weight per 1000 kernels
		Length	Strength			
		in.	0-10 pts.	bu.	lb.	gm.
Byng	85·5	32·4	8·5	54·2	48·8	39·1
Montcalm	87·3	35·2	9·5	52·3	48·8	38·3
O.A.C. 21	80·5	35·1	9·5	49·4	49·0	37·3
Velvet	86·1	34·8	9·7	46·6	49·8	36·7

The results obtained at the outside point substantiate those of the Experimental Station. At both places, the varieties yielded in the same order: Byng is first, Montcalm second, O.A.C. 21 third and Velvet occupies the fourth place.

Mixed Grains

Mixed grains are commonly grown in this part of the country. Oats and barley are used for that purpose. It is a common belief on the part of many that mixed oats and barley yield better than either oats or barley grown singly. Table 65 dealing with an experiment conducted during a three-year period with oats and barley shows interesting facts.

TABLE 65.—MIXED GRAINS, 1942-1944 INCLUSIVE

Mixture	Rate of seeding per acre	% of each crop in grain harvested	Days to mature	Weight per bushel	Av. yield per acre	Digestible nutrients per acre
	lb.			lb.	lb.	lb.
Vanguard	100	100	87·4	36·3	2,907	1,969
Vanguard	25	18·7	85·6	45·7	2,569	1,985
Peatland	75	81·3	85·1			
Vanguard	50	36·3	85·7	43·7	2,638	1,963
Peatland	50	63·7	84·9			
Vanguard	75	62·9	86·6	40·3	2.887	2,075
Peatland	25	37·1	86·2			
Peatland	100	100	84·9	50·0	2,504	1,992
Mabel	100	100	81·4	36·7	2,556	1,815
Mabel	25	27·8	82·2	44·7	2,483	1,911
O.A.C. 21	75	72·2	82·2			
Mabel	50	46·3	81·2	42·0	2,350	1,774
O.A.C. 21	50	53·7	81·7			
Mabel	75	71·5	80·9	39·0	2,447	1,794
O.A.C. 21	25	28·5	81·3			
O.A.C. 21	100	100	81·8	48·7	2,417	1,908
Average of Vanguard and Peatland grown singly					2,705·5	1,980·5
Average of the three Vanguard and Peatland mixtures					2,698·0	2,007·7
Average of Mabel and O.A.C. 21 grown singly					2,486·5	1,861·5
Average of the three Mabel and O.A.C. 21 mixtures					2,426·7	1,826·3

In making up grain mixtures, attention must be given to the question of varieties. Unless varieties mature at about the same time, undue loss of yield will likely occur through shattering or head breaking. The mixtures used at this Station, Vanguard oats with Peatland barley, and Mabel oats with O.A.C. 21 barley, are good combinations in this regard.

Peatland and Vanguard, two varieties resistant to stem rust, are well adapted and have outyielded O.A.C. 21 and Mabel. The former two varieties are mid-early while the latter ones are early.

Irrespective of the varieties used and regardless of the proportions of oats and barley in the seeding mixtures, none of the mixtures yielded as much as the oats grown alone while all mixtures but one produced more than the barley grown alone although in most cases, the differences were small. The average yield of grain of all mixtures is slightly below that of oats and barley grown singly.

As to the amount of digestible nutrients produced per acre, mixtures do not differ appreciably from oats or barley grown singly. Oats and barley grown singly average 1,921 pounds of digestible nutrients while mixtures including these two crops gave 1,914 pounds.

It must be mentioned that mixed grains registered heavier weight per bushel than oats alone and the higher the proportion of barley in the harvested grain, the heavier is the weight per bushel. Barley has less hull than oats and the fact that barley, in the harvested crop, has gained on the oats adds to the feeding value of the mixtures.

As oats and barley are not in the same proportions in the harvested crop as in the seeding mixtures, new mixtures should be made every year or either oats or barley should be added to make up the mixtures in their proper proportions.

WHEAT

In the Eastern Townships, wheat assumes very little importance. The area devoted to this crop is quite limited, and wherever grown, it is used for feed. As a rule, under field conditions, the yields are low, and some years, disappointing. A number of named varieties and hybrids were tried during the last decade, but most of them were discarded after a few years testing owing to various defects. The report presented in Table 66 deals with named varieties.

TABLE 66.—WHEAT, 1938-1941 INCLUSIVE

Variety	Days to mature	Straw		Av. yield per acre	Weight per bushel	Weight per 1000 kernels
		Length	Strength			
		in.	0-10 pts.	bu.	lb.	gm.
Coronation	97·2	35·5	9·6	24·9	60·5	31·3
Regent 975·1	94·6	35·4	9·9	24·9	60·6	34·1
Huron Ott. 3	95·9	39·3	8·4	23·5	58·5	29·3
Garnet Ott. 52	88·7	33·9	8·5	20·8	59·5	24·4

Coronation is a late-maturing variety resistant to both leaf rust and stem rust and yields fairly well. It is a bearded variety.

Regent 975·1 matures earlier than Coronation by a few days and yields about the same. It is a beardless variety resistant to both rusts.

Huron Ott. 3 is a late-maturing variety, carries a long straw, shows susceptibility to both leaf rust and stem rust, and yields about equal to Coronation and Regent. It is a strongly bearded variety.

Garnet Ott. 52 matures early and shows high susceptibility to both rusts. It does not yield as much as do the above mentioned varieties. Garnet has bald heads.

From 1942 on, Coronation and Regent 975·1 respectively were replaced by Coronation II and Regent 975·11. Table 67 summarizes the results obtained with these two varieties tested along with Huron for a five-year period.

TABLE 67.—WHEAT, 1942-1946 INCLUSIVE

Variety	Days to mature	Straw		Average yield per acre	Weight per bushel	Weight per 1,000 kernels
		Length	Strength			
		in.	0–10 pts.	bu.	lb.	gm.
Huron Ott. 3	102·2	39·6	9·6	26·9	61·0	36·1
Coronation II	101·7	36·1	9·6	25·1	61·6	33·4
Regent 975·11	97·6	34·2	10·0	22·8	61·6	33·9

Coronation II resembles Coronation in every respect but is more easily threshed. Regent 975·11 is a selection of the original Regent and behaves similarly.

Fall Rye

Fall rye is a three-purpose crop. It is grown for grain, for early spring or late autumn pasture and as a cover crop. It is a highly productive cereal. Where the land is well drained, the winter survival is quite good as the varieties used are sufficiently hardy for the conditions prevailing in the district. Table 68 gives the results obtained when Fall rye is grown for grain.

TABLE 68.—FALL RYE, 1936-1939 INCLUSIVE

Variety	Straw		Average yield per acre	Weight per bushel	Weight per 1,000 kernels
	Length	Strength			
	in.	0-10 pts.	bu.	lb.	gm.
Crown	58·6	8·7	64·0	57·5	29·3
Imperial	61·3	8·9	56·7	58·1	30·1
Star	58·9	8·5	54·7	56·4	28·6
Cornell 45	60·1	8·5	52·1	55·4	27·3
Rosen	59·1	8·7	50·5	55·9	30·0
Cornell 76	60·2	8·8	49·8	55·7	29·1
Dakold	60·3	8·3	48·1	57·1	21·9

All these varieties mature at about the same time, possess a long straw of good strength. The crop is, as a rule, ready to be harvested towards the end of July. In most years, this cereal is early enough to escape bad rust infection.

During the more recent years, new varieties were developed and included in the tests. The results obtained with the six leading varieties are summarized in Table 69.

TABLE 69.—FALL RYE, 1941-1943 INCLUSIVE

Variety	Straw		Average yield per acre	Weight per bushel	Weight per 1,000 kernels
	Length	Strength			
	in.	0-10 pts.	bu.	lb.	gm.
Prussian	57·7	4·5	58·8	57·3	25·0
Horton	62·7	5·2	58·3	58·7	23·9
Imperial	60·4	4·2	58·3	58·0	25·2
White Russian	59·7	4·3	53·5	57·3	22·7
Crown	57·8	4·4	52·1	58·0	24·8
Rosen	59·8	4·5	48·2	57·0	26·4

Prussian, Horton and Imperial are high grain yielders. Horton is widely recommended as a general purpose variety. It is a tall-growing variety which tillers freely and starts growth early in the spring. Imperial is a slightly shorter variety, is well adapted and makes luxuriant growth in the spring. Crown yields well, while Rosen and Dakold are not so productive as the other varieties mentioned above.

Field Peas

Field peas are produced largely for soup purposes but they are also a valuable feed for livestock as a protein supplement. As a rule, peas are a sure crop to grow. The yields are quite satisfactory but it is sometimes hard to harvest good cooking peas.

Three well known varieties, Arthur, Chancellor and Early Blue were tested along with a number of hybrids. These hybrids have done well but need further testing. The results obtained with the named varieties are presented in Table 70.

TABLE 70.—FIELD PEAS, 1936-1941 INCLUSIVE

Variety	Days to mature	Average yield per acre	Weight per bushel	Weight per 1,000 seeds
		bu.	lb.	gm.
Early Blue	91·3	47·5	63·8	182·2
Arthur	99·6	41·3	63·7	222·3
Chancellor	98·3	40·8	63·4	122·2

Early Blue is a high yielder and fairly early. The seed is blue, wrinkled and varies from small to medium in size.

Arthur and Chancellor yield very well. Both are yellow peas and mid-early but Chancellor is a day or two earlier than Arthur. Chancellor is a small pea while Arthur is medium in size. Both are commonly used and are quite satisfactory for table use. During the last eleven years, Arthur gave 41·8 bushels to the acre and Chancellor 39.0 bushels. Seed of these two varieties is available commercially.

Field Beans

Work with field beans is confined to variety testing. The growing of early varieties is desirable in many places so as to escape early autumn frosts. Although field beans are not an important crop commercially, they have, however, a place in the domestic life as they make a delicious dish. Results with field beans, as indicated in Table 71, show that satisfactory yields are obtained.

TABLE 71.—FIELD BEANS, 1936-1944 INCLUSIVE

Variety	1936-1940 inclusive				1941-1944 inclusive (*)			
	Days to mature	Average yield per acre	Weight per bushel	Weight per 1,000 seeds	Days to mature	Average yield per acre	Weight per bushel	Weight per 1,000 seeds
		bu.	lb.	gm.		bu.	lb.	gm.
Navy	108·2	29·2	63·8	291·6	115·2	28·0	63·2	352·7
Genesee	113·9	33·5	65·3	237·8	111·7	30·4	64·5	243·3
Burbank	108·1	27·0	65·8	236·2	.....	.....	.....	.....
Corvette	.....	.....	.....	.....	105·1	33·7	64·5	288·0
Michelite	.....	.....	.....	.....	108·2	33·3	65·7	210·4

(*) 1942—Crops destroyed by flood.

Seed of any of these varieties are suitable for table use. They are all white in colour but vary as to size. Michelite has small seed. Navy and Corvette are large-seeded while Genesee and Burbank are medium in size.

Corvette is the earliest variety of the group and yields well. Michelite is a few days later and yields about the same. These two new varieties are replacing the older sorts. Navy and Genesee are rather late and produce good yields. Burbank yields slightly less.

Breeding Work

Breeding work is carried on with oats, barley and peas with a view to developing superior varieties well adapted to the Eastern Townships soil and climatic conditions, as well as carrying disease resistance.

With oats, the following hybrid material is involved:

Vanguard × Roxton
Roxton × Ajax
R.L. 1276 × Roxton

A number of promising lines have already been selected for increase and further tests.

The program on barley improvement includes the following strains:

Byng × Peatland
Prospect × Peatland
Len. 16 × Peatland
Velvet × Chevron
O.A.C. 21 × Velvet

A large number of selections were made and several of them are likely to produce very interesting material of both rough- and smooth-awned types.

The work with peas shows good promise. The six strains which were retained and are under test come from the following parentages:

Early Blue × Arthur
Chancellor × Early Blue

A few of these strains seem to be widely adapted and are high yielders.

Rust Studies

Varieties of oats, barley and wheat are grown in a rust nursery in order to study the races which are prevalent as well as the degree of infection of their host. This work is being done in co-operation with the Dominion Laboratory of Plant Pathology at Winnipeg, Man.

The intensity of the rust attack varies from year to year and in some years, rusts take a heavy toll on the cereal crops. New races have appeared recently to which some of the varieties called rust-resistant are susceptible. These new races have to be considered now when breeding and selecting for rust resistance.

Foundation Stock

This work was initiated in 1945. It involves two varieties of barley, Peatland and Len. 16. Peatland is of particular interest as a feed barley in

the Eastern Townships and Foundation stock of this variety is being produced. The Len. 16, a smooth-awned hybrid, developed at this Station, is showing good promise and Foundation stock is also being produced.

Elite Stock and Registered Seed

Elite stock, the basis of Registered seed, is produced with a view to maintaining high standard seed of one variety of oats, Vanguard, which is extensively grown in the district served by this Station. Vanguard Elite seed production was started in 1940, and from 1940 to 1946 inclusive, 549 bushels of seed were produced and used either for maintaining Elite stock or for producing Registered seed.

The production of Registered seed of Vanguard is another important feature of the Cereal Division activities. From 1940 to 1946 inclusive, 6,402 bushels of registered seed were produced and the bulk of it was released to farmers of this community.

Fig. 10.—Field of Registered Vanguard Oats grown at the Dominion Experimental Station, Lennoxville, Que.

FLAX

(Paul Gervais)

Flax is an annual plant grown either for fibre or seed. Fibre flax has become an important crop in a fairly large section of this district as a consequence of World War II. Experiments, therefore, were conducted to study the performance of the crop under the existing conditions and also to determine the best varieties to grow.

Flax for Fibre

A crop adaption project was carried on from 1941 to 1946 with one variety, i.e. Liral Dominion. Results are given in Table 72.

TABLE 72.—FIBRE FLAX, 1941-1946 INCLUSIVE

Year	Height	Retted straw	Line fibre	Tow	Seed
	in.	lb.	lb.	lb.	bu.
1941	36·3	3,866·7	493·3	213·3	3·00
1942	40·0	3,253·3	381·7	421·6	6·29
1943	35·7	3,307·0	368·3	216·7	4·55
1944	37·3	2,746·7	335·0	150·0	2·59
1945	36·7	3,520·0	160·0	413·3	3·72
1946	28·7	3,573·3	366·7	178·3	14·81
Average	35·8	3,377·8	350·8	265·5	5·83

The climatic conditions prevailing in this district are favourable to the culture of flax. Moisture, as a rule, is plentiful. The growing season is fairly warm and comparatively long. The results obtained show that flax can be grown successfully. The yield of line fibre produced per acre is quite satisfactory and the amount of seed harvested is also interesting.

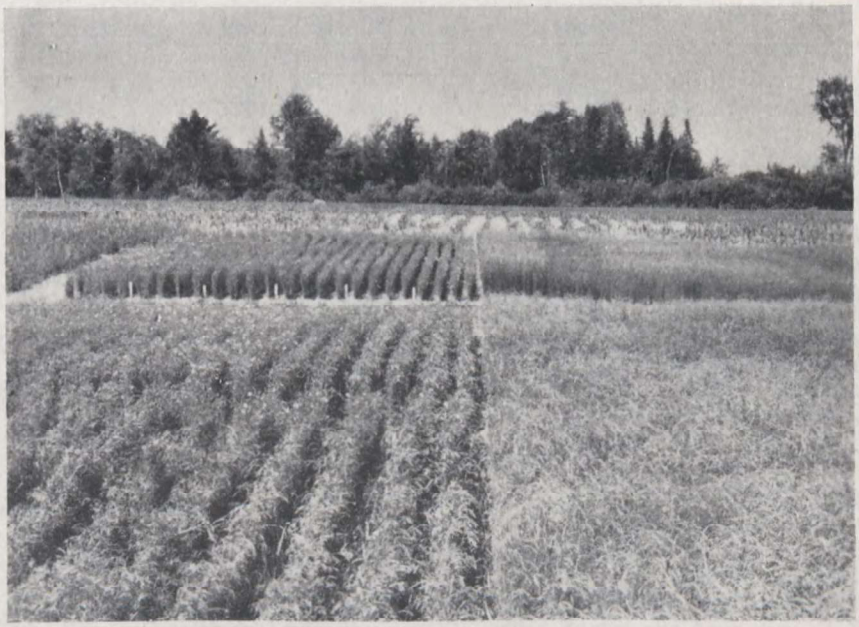


Fig. 11.—View of flax variety test plots at the Dominion Experimental Station, Lennoxville, Que. Left, varieties for seed; right, varieties for fibre.

Variety tests were also started in 1945. Of the six varieties tried, results are given in Table 73 on three leading varieties grown commercially.

TABLE 73.—FIBRE FLAX, 1945 AND 1946

Variety	Height	% Fibre green	Average yield per acre	
			Fibre	Seed
	in.		lb.	bu.
Stormont Cirrus	31·3	21·7	807·3	7·7
Liral Prince	28·3	22·0	672·3	7·9
Liral Dominion	30·3	19·3	612·8	11·5

Stormont Cirrus is a tall variety with a stiff straw. It gives a very good yield of fibre and a fair yield of seed. Liral Prince is slightly shorter than Cirrus and carries a straw of very good strength. It produces satisfactory yields of both fibre and seed. Liral Dominion has a long and strong straw. The fibre is of good quality. It is a high yielder of seed.

Flax for Seed

During the last four years, variety tests were conducted with flaxseed. Of the varieties and hybrids tried, Bison, Royal and Redwing give satisfactory results as shown in Table 74.

TABLE 74.—FLAXSEED, 1943–1946 INCLUSIVE

Variety	Days to mature	Straw		Average yield per acre	Weight per bushel	Weight per 1,000 kernels
		Length	Strength			
		in.	0–10 pts	bu.	lb.	gm.
Royal	104·3	24·4	10	16·5	56·0	5·7
Bison	106·2	23·7	10	15·7	56·0	6·5
Redwing	96·5	21·5	10	14·9	57·0	4·9

Royal is a medium to late maturing variety. It carries a good straw of fair length. It is a good producer which shows fairly high resistance to rust and wilt. Bison matures at about the same time as Royal. The straw is medium in height and of good strength. It is a good yielding variety highly resistant to wilt but susceptible to rust. Both Royal and Bison are large-seeded varieties. Redwing is much earlier and slightly shorter in the straw than either Royal or Bison. It also carries a straw of good strength. It is a small-seeded variety fairly resistant to both rust and wilt.

FORAGE PLANTS

(Paul Gervais)

Investigations carried on with forage plants included annual, biennial and perennial crops such as roots, corn, soybeans, sunflowers, annual hays, and hay and pasture plants.

Variety tests of these crops were conducted with a view to studying the performance and the adaptability of the individual varieties as well as their response under the soil and climatic conditions of the Eastern Townships.

Much attention has also been paid to herbage plants used for either hay or pasture production, as they provide an abundance of nutritious feed and make an excellent use of the land.

All the experiments on forage plants were conducted on Coaticook silty loam.

Field Roots

Swedes and mangels are crops of limited importance in the Eastern Townships of Quebec. Although not grown extensively, they are well liked by cattlemen for feeding purposes. In some sections, swedes are grown for table use. As a rule, swedes yield better than mangels.

Swedes

In the standard tests, registrable varieties of the globe-type were tried. Of the varieties tested for yield and suitability, results are presented in Table 75.

TABLE 75.—SWEDES, 1937-1946 INCLUSIVE

Variety	Av. yield per acre			
	1937–1942 inclusive (*)		1937–1946 inclusive (*)	
	Green matter	Dry matter	Green matter	Dry matter
	tons	tons	tons	tons
Wilhelmsburger	27·09	2·43	23·30	2·16
Ditmars Bronze Top	26·50	2·32	23·55	2·13
Acadia	24·88	2·29	21·95	2·10
Bangholm Herning	23·41	2·23	.....	.....
Hall's Westbury	24·12	2·21	.....	.....
Laurentian	23·04	1·86	19·77	1·68

*No yield available for 1939.

Wilhelmsburger is a globe-type swede with green skin colour. It is a high yielder possessing resistance to club-root.

Ditmars is a flat-globe to globe-type with green to bronze skin colour. It is a high yielder possessing very good quality for table use.

Acadia, a globe-type with purple skin colour, is a good swede and yields well.

Laurentian is a globe to slightly longer than globe-type with clear purple skin colour. It is a smooth swede of excellent quality for table use. It is a slightly lower yielder than the other varieties.

Bangholm Herning and Hall's Westbury are globe-types with purple tops. They are good yielders.

Mangels

Varieties of both intermediate and half-long types were tried. They are easy to harvest, produce good yields, keep well and are fairly uniform. The six varieties listed in Table 76 have given a good account of themselves.

TABLE 76.—MANGELS, 1937-1946 INCLUSIVE

Variety	Av. yield per acre			
	1937–1942 inclusive (*)		1940–1946 inclusive (*)	
	Green matter	Dry matter	Green matter	Dry matter
	tons	tons	tons	tons
Tip Top	15·76	1·78	11·74	1·62
White Intermediate	16·16	1·66	.....	.....
Giant White Sugar	16·80	1·55	13·94	1·49
Yellow Intermediate	18·09	1·54	.....	.....
Prince	21·01	1·37	17·03	1·34
Frontenac	.....	.....	13·90	1·53

* No yield for 1939.

Tip Top is a short intermediate root of orange-yellow colour. This variety ranks high in dry matter but is rather low in green matter.

Prince is a half-long, white mangel producing a high yield of green matter but is low in dry matter.

Frontenac and Yellow Intermediate are both of the intermediate type and orange-yellow in colour. They produce good yields of both green and dry matter.

Giant White Sugar is half-long and white. It is a good yielder.

White Intermediate, as its name implies, is a white and intermediate root giving good yields.

Corn for Ensilage

Corn is the chief crop grown for ensilage, but during recent years, grass silage has made progress. On a number of farms, corn occupies a place in the rotation being grown for both ensilage and green fodder production. The dent and flint varieties are grown fairly successfully.

Varieties of both dent and flint types with a wide range of maturity were tried. The tests included open-pollinated varieties, varietal hybrids and double-cross hybrids. Results obtained with corn from 1937 to 1940 are summarized in Table 77.

TABLE 77.—CORN FOR ENSILAGE, 1937-1940 INCLUSIVE

Variety	Height	Av. yield per acre	
		Green matter	Dry matter
	in.	tons	tons
Wisconsin 7	92·3	16·12	2·25
Algonquin	87·5	14·41	2·13
Longfellow	82·3	15·18	2·04
Ontario Golden Glow	89·3	13·05	2·03
Canada Golden Glow	92·1	14·12	2·00
Compton's Early	81·7	12·62	1·77
Northwestern Dent	76·9	10·91	1·70

During the last decade or so, the breeding of hybrids has made very good progress. Quite a number of them are now available to farmers. Although the corn hybrids are rather new, they are gaining in popularity and are being grown more and more extensively. In Table 78, the hybrids are compared with the open-pollinated varieties.

TABLE 78.—CORN FOR ENSILAGE, 1942-1945 INCLUSIVE

Variety	Height	Av. yield per acre	
		Green matter	Dry matter
	in.	tons	tons
Canada 606	100·9	14·88	2·75
*Wisconsin 7	104·3	15·25	2·74
Algonquin	93·7	14·14	2·69
*Longfellow	99·8	15·15	2·68
*Early Golden Glow	96·3	13·47	2·57
Canada 255	82·5	10·41	2·56
Canada 355	88·7	12·01	2·52
Canada 460	89·3	12·03	2·47
Canada 240	81·0	9·79	2·44
Canada 531	96·1	12·72	2·41
Canada 279	81·0	9·17	2·01

* Open-pollinated.

The open-pollinated varieties (see also Table 77) include Wisconsin 7, Longfellow, Compton's Early, Northwestern Dent and the Golden Glows. Algonquin is a varietal hybrid while all the Canada numbers are double-cross hybrids. All the sorts listed are dent corn with the exception of Longfellow, Compton's Early and Algonquin which are of the flint type. The flints tend to tiller more freely than the dents. The hybrids are stronger in the stalk than the open-pollinated varieties and are likely to suffer less from breaking resulting from lodging corn and borer attack.

The highest yields of both green and dry matter are obtained from the large, medium to late maturing varieties or hybrids although they do not always reach the desired stage of maturity at harvest time. Mid-season sorts are generally preferred—although slightly lower yielders—so as to escape early autumn frosts.

All the open-pollinated varieties mentioned are medium to late in maturity, Wisconsin 7 being the latest of the group. Algonquin is a mid-season hybrid. Hybrids designated "Canada" show a wide range of maturity; the smaller the number, the earlier is the hybrid, i.e. Canada 240 is early while Canada 606 is medium to late in maturity.

Soybeans for Hay

The soybean is an annual crop tested for the production of dry hay and green fodder. Five varieties were grown for that purpose. Table 79 shows the results obtained.

TABLE 79.—SOYBEANS FOR HAY, 1936-1942 INCLUSIVE

Variety	Height	Av. yield per acre		
		Green matter	Dry matter	Hay 15% moisture
	in.	tons	tons	tons
Mandarin	30·3	14·21	3·27	3·84
O.A.C. 211	32·2	15·27	3·21	3·77
Manchu	36·3	14·69	2·84	3·34
Wisconsin Black	27·5	11·90	2·75	3·24
Kabott	26·2	11·30	2·68	3·17

Soybean hay is about equal in quality to alfalfa. It has a high content of digestible protein. Difficulties are often experienced in the curing of soybeans for hay unless ideal weather conditions prevail for some time after cutting date.

Other experiments conducted at this Station have shown that soybeans produce less forage than do oats, O.P.V. (oats, peas and vetch), Japanese and Empire millets. These annual crops are preferred to soybeans in this regard, oats alone being the most extensively used.

Wherever soybeans are grown, Mandarin and O.A.C. 211 are likely to give the best results. They are medium to late-maturing varieties possessing a straw of good height. O.A.C. 211 is a few days later than Mandarin. Manchu yields slightly less, is taller and later than Mandarin and O.A.C. 211. Wisconsin Black and Kabott are shorter and much earlier varieties than those mentioned above.

Soybeans for Seed

Soybean seed has a great value for both commercial and feed purposes. It is high in protein and in oil. As a protein concentrate, soybean seed is useful to balance the ration.

Of the varieties and hybrids tried, results are given in Table 80 for those available commercially.

TABLE 80.—SOYBEANS FOR SEED, 1936-1944 INCLUSIVE

Variety	1939-1944 inclusive			1936-1942 inclusive		
	Days to mature	Height at maturity	Av. yield per acre	Days to mature	Height at maturity	Av. yield per acre
		in.	bu.		in.	bu.
Mandarin	132·8	27·9	27·0	135·3	25·2	23·4
Kabott	121·8	24·5	25·9	123·4	22·7	23·4
Pagoda	114·5	22·6	22·7	.....	.....	.....
Manitoba Brown	110·8	16·5	21·7	114·6	16·0	20·9
Wisconsin Black	.....	.....	.....	124·0	23·6	23·2

Mandarin is tall and late-maturing. In some years, this variety does not reach full maturity. Where the growing season is long enough to allow the seed to mature, Mandarin could be used. It is a good yielder and a yellow-seeded variety. Kabott is approximately twelve days earlier and slightly shorter than Mandarin. It is also a good yielder and a yellow-seeded variety. Pagoda is early and yields fairly well. It carries yellow seed. Manitoba Brown is an early maturing and short variety producing fair yields. It is a brown-seeded variety. Wisconsin Black matures at about the same time as Kabott. It is a medium to tall black-seeded variety with good yield.

The area devoted to soybeans grown for seed is almost nil in this district. Wherever grown, Mandarin, Kabott or Pagoda are the varieties used. In general, this crop does not produce sufficient returns to meet the cost of labour and seed.

Millet for Grain

Millet is a valuable emergency or supplementary crop for grain. The feeding value of the grain is almost equal to that of barley and the yields are quite comparable. Millet, because it is a warm weather plant, can be sown later than the commonly-grown cereals and yet produce good yields of grain. Three varieties of millet are compared in Table 81.

TABLE 81.—MILLET FOR GRAIN, 1942-1946 INCLUSIVE

Variety	Days to mature	Height	Av. yield per acre
		in.	bu.
Siberian	92·6	36·9	58·5
Empire	105·6	48·2	57·1
Crown	82·4	37·5	18·8

Siberian is a mid-season variety of fair height and with a high yield. This variety is quite suitable for grain production. Empire is a late variety requiring a long season to mature. In some years, it does not reach full maturity. It is a high yielder. Crown is early, medium in height and a much lower yielder than the other two. Crown has a tendency to shatter when ripe.

Sunflower for Seed

During the war years, sunflower was grown as a possible source of oil. A variety test was conducted with a view to securing information on the effect of environment on the oil content of sunflower, seed yield and relative maturity. Four varieties were used, namely Mennonite, Sunrise, Hungarian White and Mammoth Russian.

Hungarian White and Mammoth Russian are tall varieties and definitely too late to reach maturity in this district. They are better adapted to ensilage production.

Mennonite and Sunrise are both seed-type varieties. They reach a height of 3 to 4 feet. Mennonite takes around 100 days to mature while Sunrise is about 12 days later. The decorticated seeds contain about 50 per cent oil. As a two-year average, Mennonite produced 59·8 bushels of seed and Sunrise 44·5 bushels per acre.

Annual Crops for Hay

A variety of crops are often used for the purpose of providing green fodder or dry hay. Where needed, these crops can also be used for ensilage. Most frequently, oats are seeded singly but are sometimes mixed with peas and vetch. Millet and sudan grass are warm-weather crops and can be seeded late. Millet has a wider adaptation than sudan grass. The results obtained with various crops are set forth in Table 82.

TABLE 82.—ANNUAL CROPS FOR HAY, 1942-1946 INCLUSIVE

Crop	Height	Average yield per acre		
		Green matter	Dry matter	Hay 15% moisture
	in.	tons	tons	tons
Japanese Millet	46·5	20·43	4·51	5·31
Empire Millet	45·1	15·14	4·06	4·78
Oats	42·7	12·94	3·31	3·90
O.P.V.	42·8	13·96	3·21	3·77
Soybeans	32·1	12·85	2·81	3·31
Siberian Millet	34·7	10·63	2·76	3·25
Sudan grass	67·6	10·56	2·67	3·13

Japanese millet is a coarse-stemmed type producing very high yields. The hay is usually of poorer quality than that of other varieties of millet. It is a late variety. Empire is somewhat earlier than Japanese, yields well and produces feed of good quality. Oats and O.P.V. yield about the same and make high quality feed. O.P.V. is more expensive than oats alone owing to cost of seed. Siberian millet is a mid-season variety inferior to both Japanese and Empire in yield and is much shorter. It is better adapted to grain production. Sudan grass is not a steady yielder in this district; in some years, its production is rather low. Soybeans give high quality protein hay but the hay is hard to cure. As a rule, the production of soybeans is below that of oats which is most commonly grown for that purpose and the cost of seed is much higher.

Timothy

Timothy is the most important and the most commonly seeded forage grass. It is grown mostly for hay and is also an important component of all pasture mixtures. Of the varieties tested, Boon, Milton, Medon and Drummond are the ones which have shown the best promise. Yields of these varieties are given in Table 83.

TABLE 83.—TIMOTHY, 1943-1946 INCLUSIVE

Variety	Average yield per acre	
	Dry Matter	Hay 15% Moisture
	tons	tons
Milton	3·22	3·79
Medon	2·98	3·51
Boon	2·91	3·42
Drummond	2·77	3·25

All these varieties are good yielders and fairly leafy. Milton, Medon and Boon are of the same maturity while Drummond is about ten days later. Medon and Boon yield about the same while Milton is slightly more productive. Drummond does not produce quite as much as the others but as it is a late variety, it may permit a later cutting of the forage without losing too much of its feeding value.

Red Clover

Red clover has a wide adaptation and is extensively grown for hay in combination with timothy and other legumes. It is also a very valuable legume for pasture purpose and is included in most recommended pasture mixtures. In some sections of this district, red clover seed production is an important cash crop.

Two types of red clover were tried, early or double-cut varieties and late or single-cut varieties. The results are shown in Table 84.

TABLE 84.—AVERAGE YIELDS OF FIVE RED CLOVER VARIETIES

Variety	Yield per acre			
	1941 & 1943 2-Year Average		1941, 1943, 1944 & 1945 4-Year Average	
	Dry matter	Hay 15% moisture	Dry matter	Hay 15% moisture
	tons	tons	tons	tons
Dollard	3·30	3·88	3·37	3·96
Ottawa	2·98	3·50	2·84	3·34
Altaswede	2·37	2·79	2·66	3·14
Ontario Mammoth	2·46	2·90	.....	.....
Manhardy	1·65	1·95	.....	.....

Dollard and Ottawa are double-cut clovers. They are early, very good yielders, winter hardy and disease resistant. Dollard and Ottawa are the recommended varieties.

Altaswede, Ontario Mammoth and Manhardy are single-cut varieties. They are late and generally more winter hardy than the double-cut clovers. Manhardy does not yield as much as Altaswede and Ontario Mammoth.

Double-cut clovers are more productive than single-cut clovers in this district.

Alfalfa

Alfalfa is a valuable perennial legume. Being more exacting in its requirements than red clover, it thrives best on deep, drained and fertile soils. For best results, soil acidity must be corrected.

The yields of the four varieties tested are presented in Table 85.

TABLE 85.—AVERAGE YIELDS OF FOUR ALFALFA VARIETIES

Variety	Yield per acre			
	1937, 1941, 1943 and 1944 4-Year Average		1937, 1938 and 1941 to 1945, incl. 7-Year Average	
	Dry matter	Hay 15% moisture	Dry matter	Hay 15% moisture
	tons	tons	tons	tons
Grimm	3·19	3·75	3·14	3·70
Ontario Variegated	3·12	3·67	3·16	3·71
Cossack	3·06	3·60	2·93	3·45
Ladak	2·89	3·40	.....	.....

Grimm and Ontario Variegated are the two varieties recommended. They yield well, produce a good aftermath and are winter hardy. Cossack behaves similarly to Grimm and Ontario Variegated. Ladak is not so productive as the others are and recovers slowly after cutting.

Alfalfa is a very useful component of all hay mixtures. When grown on favourable locations alfalfa increases both the yield and the quality of the hay.

Investigations on Hay and Pasture Mixtures

The conditions prevailing in this community lend themselves to a good grassland program. More and more attention is being devoted to biennial and perennial legumes and grasses sown alone and in mixtures for hay and pasture. As a rule, moisture is abundant and well distributed over the growing season and as the topography of the land is more or less rolling, grasses and legumes make an excellent use of the land, help in preventing erosion and give good returns.

Hay Mixtures

Timothy, red clover, alsike clover and alfalfa are the four main plants grown for hay. The first three are the most commonly used and the most widely adapted. Wherever the conditions are suitable for alfalfa, the addition of a few pounds of this legume to the mixture is advisable as shown in Table 86.

TABLE 86.—HAY MIXTURES, 1943-1945 INCLUSIVE

Mixture No.	Composition of mixtures and rates of seeding per acre	Average yield per acre		
		Dry matter	Hay 15% moisture	Protein
		tons	tons	lb.
1	Timothy 10, red clover 8, alsike 2	3·08	3·63	653
2	Timothy 8, red clover 6, alsike 2, alfalfa 4	3·34	3·93	729
3	Timothy 8, red clover 6, alsike 2	3·35	3·94	721
4	Timothy 8, red clover 3, alsike 5	3·31	3·89	656
5	Timothy 8, red clover 3, alsike 1, alfalfa 4	3·97	4·67	977
6	Timothy 6, red clover 4, alsike 2, alfalfa 4	3·79	4·45	933
7	Timothy 10, alfalfa 8	3·82	4·51	925
8	Brome 16, alfalfa 8	3·99	4·70	1036
9	Timothy 10, Ladino 2	3·34	3·93	810
10	Timothy 12	2·34	2·75	358
11	Brome 20	1·86	2·19	340
12	Alfalfa 12	3·31	3·89	1066

Mixtures including alfalfa gave the highest yields of hay and of protein. Pure stands of alfalfa yielded quite satisfactorily and produced the most protein per acre in this test; however, the growing of pure alfalfa, as a rule, is not too successful and it is preferable to raise alfalfa in mixtures. The mixtures, timothy-alfalfa and brome-alfalfa, are good combinations wherever alfalfa is adapted and produce hay of good quality. Both timothy and brome, when grown alone, failed to bring satisfactory returns. It is apparent that these two grasses must be grown in mixture with legumes.

One of the interesting features of this test is the production obtained with mixtures Nos. 2, 5, and 6 which all contain timothy, red clover, alsike and alfalfa. The rates of seeding for timothy and alfalfa are constant in the three mixtures while the rates of red and alsike clovers vary. Mixture No. 5 which contains the least clover recorded the highest yield while mixture No. 2 which is heavy with clovers has given the lowest production of the three. This shows that the increase in the rates of seeding of red and alsike clovers brought a decrease in the yield of hay. As 3 pounds of red clover and 1 pound of alsike appeared to be sufficient, considerable economy in the use of seed could be realized. A similar trend is exhibited by the yields of mixtures No. 1 and No. 3. Mixture No. 3 seeded at the rate of 16 pounds outyielded mixture No. 1 sown at the rate of 20 pounds.

The mixture timothy-Ladino has given a good account of itself. Ladino is a new crop which has shown good promise and its possibilities are now being explored for hay production.

Hay-pasture Mixtures

On a number of farms, forage crop mixtures are sown with a view to taking one year of hay followed by pasture for two or three years. In 1943, an experiment including six mixtures for both hay and pasture production was started. A crop of oats was harvested in 1943 and a crop of hay was taken in 1944. In 1945 and in 1946, the plots were cut at intervals during the growing season to simulate grazing. The results are given in Table 87.

TABLE 87.—HAY-PASTURE MIXTURES, 1944-1946 INCLUSIVE

Mixture No.	Composition of mixtures and rates of seeding per acre	Av. yield per acre			
		Hay in 1944		Pasture in 1945 and in 1946	
		Dry matter	Protein	Dry matter	Protein
		tons	lb.	lb.	lb.
1	Timothy 8, red clover 6, alsike 2, alfalfa 4	3·67	921	4,151	484
2	Timothy 8, red clover 4, alsike 2, Kentucky blue grass 2	3·37	836	3,976	460
3	Timothy 8, red clover 4, alsike 2, red top 2	3·39	905	3,640	450
4	Timothy 8, Kentucky blue grass 5, wild white clover 2	3·02	611	3,913	449
5	Timothy 8, Kentucky blue grass 5, Ladino 2	3·38	967	4,372	478
6	Timothy 8, Kentucky blue grass 3, red top 2, wild white clover 1	3·04	555	3,860	430

Mixture No. 1 which is a straight hay mixture has given the highest yield when the crop was cut for hay and is the second highest in the production of pasture herbage. Mixture No. 5 which contains Ladino ranked first for the production of pasture herbage and produced also very good yields of hay. Mixtures Nos. 4 to 6 which are essentially pasture mixtures are not so satisfactory as the others when one year of hay is taken before the field is devoted to pasture.

It is seldom necessary to include in the dual-purpose mixtures bottom species, such as Kentucky blue grass, red top, wild white clover, etc., as they volunteer readily in this district. Under good grazing conditions, these species appear soon in the sward in appreciable amount. It must also be considered that a dense crop of hay may crowd them out. Where these pasture sorts do not volunteer, their inclusion in the seeding mixture may be justified.

PASTURE MIXTURES

In the Eastern Townships, the area devoted to pasture is immense. Botanical surveys have shown that the flora of a number of pastures is not always of a desirable composition. Poor swards and impoverished soils are mainly responsible for the relatively low production of these pastures. The rejuvenation of old and poor pastures is generally done by the breaking of the land, proper fertilization and reseeding.

Eight pasture mixtures were tried in an experiment conducted from 1943 to 1946 inclusive. The results are summarized in Table 88.

TABLE 88.—PASTURE MIXTURES, 1943-1946 INCLUSIVE

Mixture No.	Composition of mixtures and rates of seeding per acre	Av. yield per acre	
		Dry matter	Protein
		lb.	lb.
1	Timothy 8, red clover 6, alsike 2	3,231	522
2	Timothy 8, red clover 6, alsike 2, alfalfa 4	3,503	540
3	Timothy 8, red clover 4, alsike 2, Kentucky blue brass 2	3,588	515
4	Timothy 8, red clover 4, alsike 2, red top 2	3,687	526
5	Timothy 8, Kentucky blue grass 5, wild white clover 2	3,538	503
6	Timothy 8, Kentucky blue grass 5, ladino 2	3,615	653
7	Timothy 8, Kentucky blue grass 3, red top 2, wild white clover 1	3,218	482
8	Timothy 6, red clover 3, alsike 2, Kentucky blue grass 2, red top 2, creeping red fescue 2, wild white clover 1	3,137	485

It is a common and proved practice in this district to include in the pasture mixtures short-lived but productive legumes such as red and alsike clovers which provide abundant forage in the first years. Timothy is also a valuable grass. These three tall growing plants are the basic species used in the reseeding of old and rough pastures on soils which are not too well drained or are acid. On cultivated land or on soils well drained, neutral or only slightly acid, the addition of alfalfa may be justified.

As mentioned previously, it is rarely necessary to sow bottom species such as Kentucky blue grass, red top, wild white clover, etc., as they volunteer readily in this district. Where they do not grow naturally or when a rapid establishment of a good dense sward is desired, seeding of these species is advised.

Observation and botanical surveys have shown that the species seeded will gradually disappear and will be replaced after a few years by vigorous longer-lived grasses and legumes best adapted to grazing. Pasture mixtures, therefore, may be simple, less expensive as to cost of seed and yet provide an abundant supply of feed. Mixture No. 8 of this experiment which contained a fairly larger number of grasses and legumes has given the least production of all the mixtures tested.

Ladino—a perennial and giant white clover—has given very satisfactory results so far. It is apparent from results of other experiments that it would be preferable not to grow aggressive grasses such as bent grass, Kentucky blue grass, etc., in association with this clover as they tend to smother it out. A mixture including 8 pounds of timothy and 2 pounds of Ladino appears to be a very good combination. Ladino provides an abundance of highly nutritious feed.

Results obtained to date would indicate that Ladino is well adapted to conditions in the area served by the Station. It requires, for the best growth, an ample supply of moisture and good fertile soil. It is as tolerant to acidity as alsike and appeared to be as hardy as red clover As a pasture plant, Ladino is quite promising but close grazing should be avoided.

Fig. 12.—Ladino-timothy pasture at the Dominion Experimental Station, Lennoxville, Que.

ILLUSTRATION STATIONS—CENTRAL QUEBEC

(Omer Allard)

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. The work conducted on Illustration Stations has been consistently broadened in scope and has progressed from the original purposes of disseminating experimental data by field and cultural demonstrations, to include crop testing and experiments of a fact-finding nature.

On Illustration Stations, the production of adapted varieties of cereals and forage crops is promoted in order that these farms may serve as a source of pure seed for farmers. Special attention is given to livestock policies which are designed to encourage the development of improved herds of cattle and swine, and flocks of sheep and poultry from which neighbouring farmers may procure breeding stock. 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 Lennoxville supervisory district, comprising sixteen counties, is bounded on the north by the St. Lawrence River and on the south by the United States border. On the west side, it extends to Yamaska, St. Hyacinthe and Rouville counties, and on the east to Montmagny.

In 1946, the complete list of Illustration Stations for the district was as follows:—

County	*Station*	*Operator*
Beauce	East Broughton	E. Doyon
Bellechasse	Honfleur	A. Laliberté
Bellechasse	St. Nérée	L. Asselin
Compton	La Patrie	L. Langlois
Dorchester	Frampton	L. Couture
Dorchester	St. Prosper	E. Larochelle
Frontenac	St. Evariste	C. Veilleux
Levis	Pintendre	A. Couture
Lotbiniere	St. Flavien	A. Laroche
Megantic	Lauriervilie	A. Vachon
Wolfe	Wotton	N. Corbeil

Description of Stations

East Broughton.—The station is located in the west part of Beauce county, in East-Broughton village. The total area of the farm is 130 acres of which 53·8 acres are under cultivation and submitted to a four-year rotation including 2 acres in hoed crops, 20 acres in cereals, and 31·8 acres in hay. The soil type is sandy loam.

The projects under way at the station are: cereal variety tests, fertilizer trials on rotational crops, pasture improvement by means of fertilization and renovation with special emphasis on the adaptability of Ladino clover.

Frampton.—Located in the center of the village of Frampton, the station comprises 132 acres of which 33 acres are under a four-year rotation. The soil

of the farm is a silt loam and very difficult to drain. The land under cultivation in 1946 was divided as follows: hoed crops, 1·1 acres; cereals, 8 acres; and hay, 23·9 acres.

The projects under way at the station are: pasture renovation, fertilizer trials for rotational crops and cereal variety tests.

Honfleur.—The station is located four miles from Honfleur village on range II. The total area of the farm is 144 acres. A five-year rotation system is in operation on 84·2 acres including the following crops: hoed crops, 3 acres; cereals, 25·2 acres; clover hay, 26 acres; and mixed hay, 30 acres. The soil is a clay loam. For the past eight years, a great deal of drainage was done on this farm. The two main projects under way at the station deal with fertilization of pasture and the use of fertilizers on rotational crops.

La Patrie.—This a relatively new station located two and a half miles from the village of La Patrie, half a mile from the highway La Patrie-Scotstown. The total area of the farm is 350 acres of which 68.7 acres are under cultivation. The natural pasture and wood-lot comprise 268 acres. Two four-year rotations were established on this Station. In 1946, 1·8 acres were devoted to hoed crops; 14·45 acres to cereals; and 52·45 acres to hay. The soil is a sandy loam.

The main projects under way at the station are: old pasture improvement by fertilization and renovation, cereal variety tests, fertilizer trials for rotational crops.

Laurierville.—The station is located in the north part of Megantic county, half a mile from the village of Laurierville. The farm is organized for general mixed farming with specialization in potato growing. The soil is sandy and the total area of the farm is 93 acres, of which 77 acres are worked under two rotations; a four-year rotation for potatoes and a five-year rotation for mixed farming. The area devoted to each crop is: hoed crops, 11·5 acres; cereals, 16 acres; hay, 39 acres and pasture in the rotation 10.5 acres.

The projects under way are: cereal variety tests, pasture improvement, and fertilizer trials on rotational crops.

Pintendre.—The station is located in the village of Pintendre, six miles from Levis city. The soil is a clay loam which lacks in uniformity and is difficult to drain. An area of 74·5 acres out of one hundred acres is devoted to the following crops worked under a four-year rotation: hoed crops, 1 acre; cereals, 22·25 acres, and hay, 51.25 acres. The main projects carried on at the station are: plant food deficiency studies, pasture improvement, fertilizer trials on rotational crops and pasture improvement by fertilization and reseeding with Ladino clover.

St. Evariste.—The station is located half a mile from the village of St. Evariste in the northern part of Frontenac county. The soil is a sandy loam and requires considerable drainage. The total area of the farm is 137 acres of which 61·4 are under cultivation and worked under a five-year rotation including 4·4 acres in hoed crops, 15 acres in cereals and 42 acres in hay. The principal projects carried on at this station are relative to the improvement of pasture, the use of chemical fertilizers as a supplement to farm manure and variety test of cereals.

St. Flavien.—The station is located one mile from the village of St. Flavien, and two miles from Laurier Station. It is a long, narrow and level farm of 125 acres, of which 15 acres are in pasture and 56.6 acres worked under a four-year rotation. The soil is sandy, grey in colour and very wet. The crop area comprises 35·6 acres in hay, 18 acres in cereals, and 3 acres in hoed crops. The principal projects under way are: cereal variety tests, pasture improvement through fertilization and renovation, and fertilizer trails on rotational crops.

St. Nérée.—The station is located five miles from the village of St. Nérée, in the 8th range of the parish. The area of the farm is 301 acres, of which only 37 acres are under cultivation. The soil is a sandy loam which is highly productive

but the land is very stony. There is a five-year rotation on this farm with the following crops grown: hoed crops, 1·25 acres; cereals, 11·4 acres and hay, 24·35 acres. The wood-lot provides an important part of the farm revenue. The principal projects under way deal with studies on plant food deficiency and fertilizer trials on rotational crops.

St. Prosper.—The station is located one mile from the village of St. Prosper. The highway divides the farm into two sections, each section having a four-year rotation. The total area of the farm is 112 acres of which 54·5 acres are under cultivation including 1 acre in hoed crops, 14 acres in cereals and 39·5 acres in hay. During the last ten years, all the land between the buildings and the wood-lot has been drained. On this section, half of the area is muck soil and the balance clay loam. In front of the buildings, on the other side of the road, the soil is heavy but easy to cultivate. The principal projects carried on are: plant food deficiency studies, pasture improvement, cereal variety tests and chemical fertilizer as a supplement to farm manure.

Wotton.—The station of 100 acres is located two and a half miles from the village of Wotton on the road to Asbestos and along side the road going to St. Adrien. The soil is a sandy loam, which has required considerable drainage. During the past eight years, a good part of it was drained which resulted in considerable improvement on the crop yields. The farm may be divided into three sections: maple bush, 16·5 acres; pasture and yard, 26·5 acres; crop land 57 acres, of which 2·5 acres are in hoed crops, 19 acres in grain and 35·5 acres in hay. The principal projects under way are plant food deficiency studies, pasture improvement, cereal variety tests (oats and barley) and chemical fertilizer as a supplement to farm manure.

Crop Rotations and Field Plans

Each Illustration Station, as soon as established, is surveyed in order to know the exact area of each field and the possibility of their future utilization.

A cropping system is established on each farm taking into consideration the following factors: the agricultural situation in the district, the marketing possibilities, and the wishes and the aptitudes of the owner.

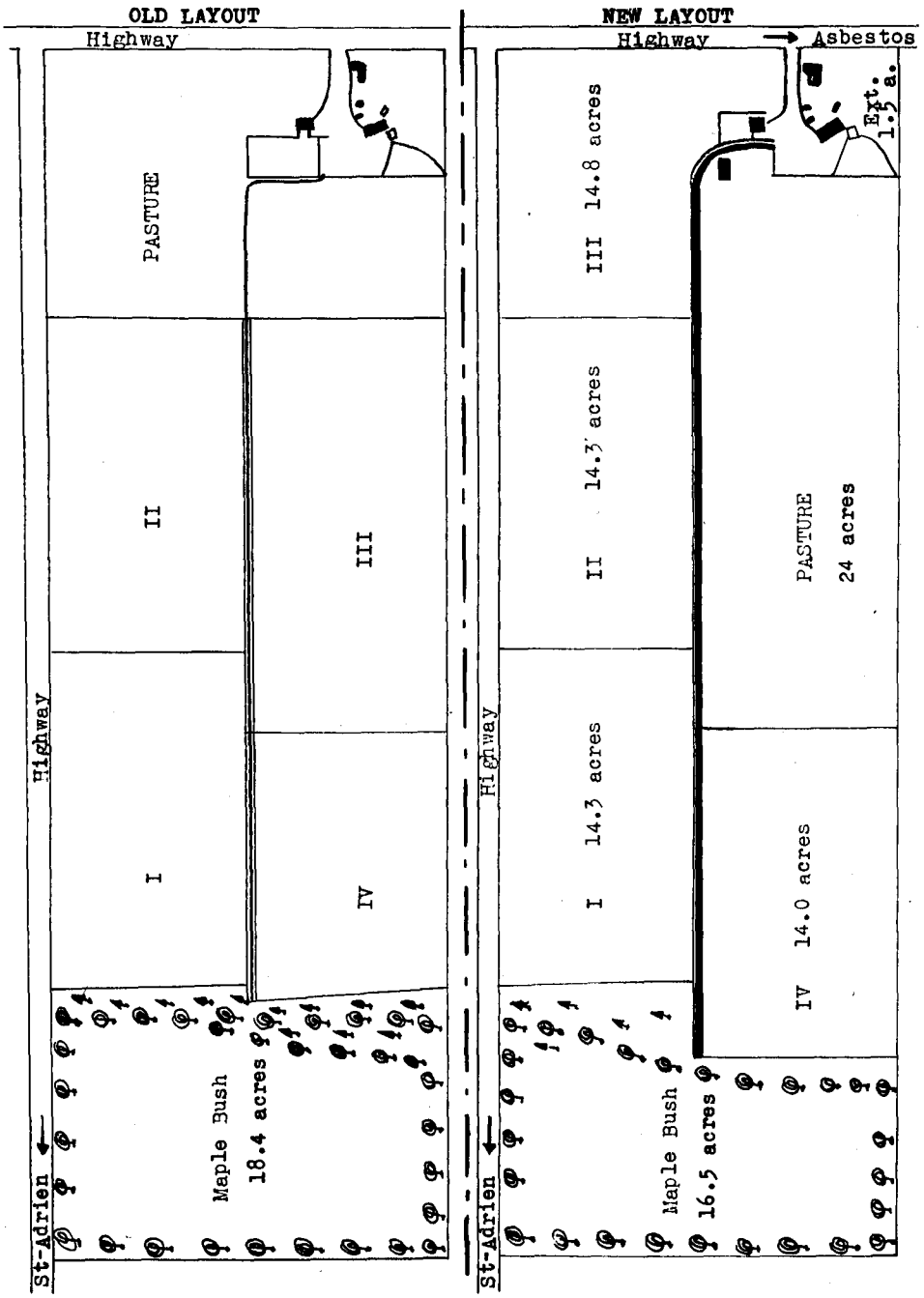
At East Broughton, Frampton, Pintendre, St. Flavien and Wotton, the cropping system established is a four-year rotation. At Honfleur, St. Evariste, and St. Neree a five-year rotation system was found more profitable.

On some stations as at Laurierville, St. Prosper, and La Patrie, two different rotational systems have been established. In the case of Laurierville, the occurrence of a light sandy soil required a special system of a four-year rotation for potato growing, and a five-year rotation for ordinary farming.

At St. Prosper on one part of the farm, the soil is a clay loam and on the other part, it is a muck soil resulting in the establishment of two four-year rotations.

At La Patrie, there is a possibility that this farm might be divided later on, so two rotational systems were established.

As an example of a four-year rotation, the farm plan of the station at Wotton, Wolfe Co., is given in Plan I showing the farm before and after establishment of the Illustration Station. As can be seen, the farm was already divided into five fields, one of which was being used as permanent pasture. After establishing the new rotation system part of the pasture was transferred, as shown in the layout because, in the case of the field near the road, the rock comes very close to the surface of the soil with the result that, in mid-summer particularly during drought periods, the production of herbage was very low. Moreover, in its new location, the pasture communicates directly with each field in the rotation which is a great advantage in the fall, when the aftermath has to be pastured. This new layout also eliminates the necessity of having a lane.



Farm plan of the Illustration Station at Wotton, Wolfe Co., showing the old and new layout of a 4-year rotation.

The total area of the farm comprises 100 acres of which 57 acres are under cultivation. The area of each field varies from 14 to 14·8 acres. The first year of the rotation includes usually 1 acre of potatoes, 1 acre of turnips, ½ acre of corn, and 2 acres of O.P.V. The remaining 10 acres are seeded to oats at the rate of 2½ bushels per acre, of which 7 acres are seeded down with a hay mixture.

The second field has 7 acres in clover hay and about 7 acres in mixed grain seeded down. Usually the hay mixture includes 8 pounds of timothy, 4 pounds of red clover, 2 pounds of alsike clover and 3 pounds of alfalfa per acre.

The third and fourth fields are in hay. Each year the total crop can be summarized as shown in Table 89 for the year 1946.

TABLE 89.—CROPS, ACREAGE AND YIELDS OBTAINED ON THE ILLUSTRATION STATION AT WOTTON, QUE., IN 1946

Crop	Acreage	Total yield
Turnips	1·0 acre	23 tons
Potatoes	1·0 "	265 bushels
Corn	0·5 "	5 tons
O.P.V.	2·0 "	4 "
Grain	17·0 "	1,000 bushels
Clover hay	14·5 "	26 tons
Mixed hay	21·0 "	36 "
Total	57·0 acres	

Drainage

The drainage is a very important factor to be considered in farm management. At least 60 to 70 per cent of all the farms in the district lack drainage and this reduces crop yields considerably. In order to make the farmers more familiar with this kind of work, many demonstrations are given on each Illustration Station regarding farm drainage.

Drainage work is considered by the operators of Illustration Stations as being the most important thing to do when preparing a piece of land for seeding. In all cases, drainage is carried out by the use of tile drains or open ditches.

From 1939 to 1946, at Wotton, for example, the operator has installed over 3,000 feet of underground drainage and has dug over 20,000 feet of open ditches. At Honfleur, 1,000 feet of tile drainage were put in, about 15,000 feet of ordinary open ditches were dug, and two large ditches each 5 feet deep by 20 feet wide at the top, totalling 1,000 feet in length were made. Since 1938, a summary of the drainage work performed on the Illustration Stations indicates that 20,000 feet of tile drainage were put in, and 70,000 feet of open ditches dug.

Soil Fertility Studies

MANURE AND FERTILIZERS

The productive capacity of soil, its deficiency and its requirement were studied by means of experiments and fact-finding tests with manure, fertilizers, and lime.

On all stations, tests were conducted with different crops such as roots, cereals, hay and pasture.

In view of the fact that the soils vary tremendously as to type and generally show a lack of humus, and that all stations in the district are largely livestock farms, the supplementing of chemical fertilizers to farm manure for the production of crops is one of the most important projects studied. As indicated in Table 90, the best yields are obtained when the manure is applied at a reasonable rate, combined with chemical fertilizers. The manure and the fertilizers were applied the first year of the rotation.

TABLE 90.—MANURE, FERTILIZER AND COMBINATIONS FOR TURNIPS, CLOVER AND MIXED HAY ON ALL ILLUSTRATION STATIONS, 1941-1946 INCLUSIVE

Treatment	Av. yield per acre		
	Turnips	Clover hay	Mixed hay
	tons	tons	tons
20 tons manure	21·91	1·47	1·26
1,000 lb. 2-12-6	22·88	1·42	1·17
10 tons manure plus 500 lb. 2-12-6	23·71	1·65	1·34

As shown in Table 90, 10 tons of manure and 500 lb. of 2-12-6 fertilizer give as good or slightly better results for any one crop than the other treatments used. It also can be seen that 20 tons of manure are about the equivalent of 1,000 lb. 2-12-6.

Table 91 shows the results obtained with potatoes.

TABLE 91.—MANURE, FERTILIZER AND COMBINATIONS FOR POTATOES ON ALL ILLUSTRATION STATIONS, 1941-1946 INCLUSIVE

Treatment	Av. yield per acre
	bushels
20 tons manure	210·61
1,000 lb. 4-8-10	213·65
10 tons manure plus 500 lb. 4-8-10	233·95

The combination of manure and fertilizer gives the best results for potato production.

At the Illustration Station of St. Nérée, where a special test was carried on, it was found that the application of chemical fertilizers without manure give fair results for the first turn of the rotation but that the yields cannot be maintained if chemical fertilizers only are applied for the second turn of the rotation as shown in Table 92.

TABLE 92.—MANURE, FERTILIZER AND COMBINATIONS FOR TURNIPS AT ST. NEREE, 1941 AND 1945

Fertilizers applied in 1941 and 1945	Average yield per acre	
	First turn of rotation started in 1941	Second turn of rotation started in 1945
	tons	tons
Check—no manure, no fertilizer	1·86	0·29
Complete fertilizer: 250 lb. sulphate of ammonia, 500 lb. superphosphate, 100 lb. muriate of potash	13·47	10·60
10 tons manure	14·90	21·40
10 tons manure plus 480 lb. superphosphate	25·13	26·85
10 tons manure plus 400 lb. 2-12-6	18·58	21·10
10 tons manure plus 800 lb. 2-12-6	24·11	29·78

All the treatments have increased the yields of turnips considerably over those of the untreated plot for both years. Manure alone raised the yields appreciably over the complete fertilizer alone in the second turn of the rotation. The supplementing of manure with fertilizers gave very good yields in all cases and for both years although some differences were noted between the fertilizers used and their rates of application.

In order to study the plant food deficiency of the soils in this district a special test was carried on at five Illustration Stations namely: Wotton, St. Nérée, Pintendre, St. Prosper and St. Evariste. The results presented in Table 93 show that the soils are low in both organic matter and phosphorus and that applications of farm manure along with fertilizers high in phosphorus and containing some potash can be expected to give appreciable increases in yields.

TABLE 93.—MANURE, FERTILIZER AND COMBINATIONS FOR TURNIPS, CLOVER AND MIXED HAY ON FIVE ILLUSTRATION STATIONS, 1940-1946 INCLUSIVE, 7-YEAR AVERAGE

Crop	Sulphate of ammonia 250 lb.	Muriate of potash 100 lb.	Super-phosphate 500 lb.	Manure 10 tons	Manure 10 tons plus Super 480 lb.	Check
	tons	tons	tons	tons	tons	tons
Turnips	5·31	7·74	12·80	14·61	20·75	3·52
Clover hay	0·68	0·88	0·90	1·17	1·31	0·61
Mixed hay	0·85	1·24	1·12	1·22	1·33	0·92

LIME

A test was conducted to determine the effect of ground limestone on clover growth on light and acid soils at Laurierville, Ste. Edwidge and St. Evariste in 1941, at St. Nérée and St. Prosper in 1942, and at Wotton in 1943. The ground limestone was applied at the rate of three tons per acre as against a check plot which received no lime. Both plots received ten tons of manure per acre. The results obtained show that the application of lime increased the hay yield by 40·8 per cent for the six Stations. In the same test, a third plot received an application of ten tons of manure and 400 pounds of 2-12-6 per acre. Comparing this treatment with the check plot, it showed an increase in yield of only 18·3 per cent.

The same test was carried on at Pintendre, in 1944, where the soil is heavy and almost neutral. When compared with the check plot, the fertilizer increased the hay yield by 24·6 per cent while the lime reduced the yield by 7·97 per cent.

It would then appear that on light soils where the acidity is too high, soil acidity should be corrected first, if one wants full benefit from the fertilizer.

Pasture Investigations

In the central Quebec district, dairy herds are of prime importance, being the chief source of revenue on the farms. In fact, on the eleven Illustration Stations, this department produces 41 per cent of the total revenue of the farm. This means that pasture is one of the most important problems in the district, and that special attention must be given to the fertilization and management of pastures in order to improve both the quantity and the quality of the herbage.

Different methods are recommended to improve pasture but the principal ones used on Illustration Stations are fertilization and renovation by the way of reseeding.

PASTURE FERTILIZATION

On many farms, pasture does not produce herbage in abundance because the soil is poor and the plants do not find in it the food needed. An application of fertilizer will, in such a case, improve the situation.

On some other farms, the fertility may be low but the most important factor is the fact that the composition of the sward is mostly weeds or undesirable plants.

In such a case, the land has to be ploughed or harrowed and reseeded before obtaining results from fertilization.

Where experiments were carried on with fertilizers only, the following procedure was adapted: the fertilizers were applied as early as possible in the spring. On each plot, two cages were set on locations where the growth was most representative of the plot. The yields were taken from these cages which were cut three or four times during the summer. The herbage was weighed and individual records kept for each cage. After each cutting, the cages were moved to a new location.

In 1937, the first test was started on four Illustration Stations with an application of 300, 600, and 900 pounds of 0-16-6 chemical fertilizer per acre every three years. The average yields in tons of green weight per acre obtained at these stations for a period of three years were: 6·02, 7·35 and 9·88 for 300, 600, 900 lb. of a 0-16-6 fertilizer respectively, whereas the check plot yielded only 3·99 tons.

In 1944, another experiment was started and carried on at the following stations: East Broughton, Honfleur, St. Evariste, St. Prosper, Pintendre, and Wotton. The purpose of this experiment was to compare:

(1) Different fertilizer formulae.
(2) The quantity to be applied.
(3) The frequency of application.

Table 94 shows the effect of rates and frequency of application of different fertilizer formulae on the yield of green matter in tons per acre on six Illustration Stations, 1944-1946 inclusive.

From the results summarized in Table 94, it can be stated that:

(1) All treatments increased considerably the yield of herbage over that of the check.

(2) A heavy triennial application of fertilizer outyielded a light annual one.

(3) An annual application of nitrogen did not increase the yield.

(4) A heavy annual application of a complete fertilizer showed the highest increase in the production of herbage, but when considered from the standpoint of probable increase in animal production this heavy application has not proved economical or advisable.

Pasture Renovation

In addition to the foregoing experiments, some tests were laid down on all Illustration Stations in the district in order to find and indicate to the farmers the best methods of improving the old natural sward or to renew some parts of the permanent pasture.

In the Eastern Township and Beauce districts, a large area of pasture land has never been worked and is largely covered with moss and weeds. It was found that an application of chemical fertilizer on such pastures did not give good results, the same situation being observed on some of the long-term seeded pastures. In the latter case, after four or five years, the land is often invaded by moss and weeds, the quantity of herbage decreases year after year and an application of chemical fertilizer does not give full returns.

TABLE 94.—EFFECT OF RATES AND FREQUENCY OF APPLICATION OF DIFFERENT FORMULAE ON THE YIELD OF GREEN MATTER IN TONS PER ACRE ON SIX ILLUSTRATION STATIONS, 1944-1946 INCLUSIVE

Station	100 lb. sulphate of ammonia annually 857 lb. 0-14-7 every 3 years			857 lb. 0-14-7 every 3 years			600 lb. superphosphate every 3 years			100 lb. sulphate of ammonia annually 286 lb. 0-14-7 annually			100 lb. sulphate of ammonia annually 857 lb. 0-14-7 annually			Check		
	1944	1945	1946	1944	1945	1946	1944	1945	1946	1944	1945	1946	1944	1945	1946	1944	1945	1946
East Broughton	.....	.....	11·4	.....	.....	9·4	.....	.....	6·5	.....	.....	12·3	.....	.....	12·7	.....	.....	5·2
Honfleur	11·95	11·3	.....	11·7	13·6	.....	12·7	11·6	.....	10·4	8·2	.....	14·7	14·0	.....	4·5	7·7	.....
Pintendre	12·75	14·4	.....	10·2	15·6	.....	10·9	11·6	.....	10·0	15·2	.....	16·6	17·2	.....	7·0	10·3	.....
St. Evariste	18·96	11·6	6·7	19·0	12·3	7·9	16·3	9·2	9·6	16·1	11·6	7·0	20·3	15·5	11·0	8·9	5·8	4·8
St. Flavien	.....	6·8	10·8	.....	5·2	10·2	.....	4·3	7·1	.....	6·0	8·9	.....	7·6	10·1	.....	4·2	3·4
St. Prosper	15·15	11·2	5·1	16·5	12·7	5·9	10·4	10·4	6·3	10·3	12·3	6·5	14·1	17·2	10·2	7·4	5·6	3·2
Wotton	8·9	6·6	6·9	8·1	6·3	6·1	5·6	5·2	5·3	5·3	7·5	6·9	5·4	10·3	7·5	3·0	3·2	2·6
Yearly average	13·5	10·3	8·2	13·1	10·9	7·9	11·2	8·7	7·0	10·4	10·2	8·3	14·2	13·6	10·6	6·2	6·2	3·9
3-year average	10·66			10·63			8·97			9·63			12·80			5·43		

The methods used to renovate unproductive pastures are as follows:

(1) Where possible, an application of manure varying from 8 to 12 tons per acre is made in the fall, and the manure is incorporated with the soil by ploughing or harrowing.

(2) Where necessary, an application of 1 to 2 tons of lime is made either in the fall or in the spring of the following year.

(3) The land is harrowed, fertilized with an application of 600 lb. of a 2-12-6 fertilizer, and seeded down early in June with 3 bushels of oats, 8 lb. of timothy, 4 lb. of red clover, 1 lb. of Kentucky blue grass and 1 lb. of wild white clover per acre.

(4) The newly seeded field is not fenced but pastured as soon as the oats start to grow and continuously throughout the summer.

(5) In the fall (middle of September) where possible, another light coat of manure is applied in order to increase fertility and at the same time stop animal grazing.

The results obtained are very satisfactory and this practive is now followed by a good number of farmers in the district.

In 1939, a test was started on all Illustration Stations to compare the value of renovation vs. fertilization for the improvement of old pastures.

The herbage yield was recorded for three years from two stations only: St. Prosper and Wotton. The results are given in Table 95.

TABLE 95.—RENOVATION VS. FERTILIZATION FOR THE IMPROVEMENT OF OLD PASTURES, 1941-1943 INCLUSIVE, 3-YEAR AVERAGE

Station	Renovation				Fertilization			
	Plot manured and ploughed in the fall of 1939. Seeded in 1940				Plot fertilized in the fall of 1939			
	Yield per acre	Clover	Useful grass	Weeds	Yield per acre	Clover	Useful grass	Weeds
	tons	%	%	%	tons	%	%	%
St. Prosper	4·2	22·5	64·3	13·2	2·1	8·5	74·0	17·5
Wotton	8·0	25·0	62·0	13·0	7·9	14·0	61·5	23·5

In 1945, at East Broughton, and in 1946 at Frampton, La Patrie, and St. Flavien, a new test was initiated regarding the renovation of permanent pasture. The procedure followed was the same, except that the seed mixture was composed of 8 lb. of timothy and 2 lb. of Ladino clover per acre. No yields have been recorded yet, but the Ladino clover showed rapid and very thick growth during the summer and was still in very good condition in the fall.

Cereals

In order to introduce varieties of oats and barley, more productive and better adapted to the district than those already being grown by farmers, a number of rod-row tests were conducted on some Illustration Stations in co-operation with the Experimental Station at Lennoxville.

These tests were first started in 1939 at Laurierville and Wotton, while Ste. Edwidge and St. Evariste were added in 1940 and St. Flavien in 1945. In 1946, St. Edwidge, St. Evariste and Laurierville were replaced by St. Prosper, Frampton and Pintendre.

Oats

Of the varieties and hybrids of oats tried, results are given for the period under review, on four new varieties compared with Banner which was the main sort grown. For each station, the yields are reported in bushels per acre.

Laurierville (5-year average):

Ajax, 90·8; Mabel, 86·3; Roxton, 82·5; Vanguard, 79·0; Banner, 71·8.

Ste. Edwidge (6-year average):

Ajax, 90·1; Roxton, 93·0; Vanguard, 82·7; Mabel, 76·4; Banner, 75·5.

St. Evariste (6-year average):

Ajax, 96·5; Roxton, 94·8; Mabel, 92·2; Vanguard, 91·1; Banner, 90·6.

Wotton (7-year average):

Ajax, 88·8; Roxton, 80·8; Vanguard, 77·5; Mabel, 74·4; Banner, 64·5.

Barley

A barley rod-row test was carried on at Wotton. The average yield in bushels per acre for the last three years of the period under review are as follows: Byng, 51·5; Peatland, 50·3; Montcalm, 45·6; O.A.C. 21, 42·7 and Velvet, 40·6.

In 1945, the Peatland variety was tried on a field scale basis on six Illustration Stations namely East Broughton, St. Flavien, Pintendre, St. Prosper, St. Nérée and Wotton and the yields varied from 26 to 43 bushels per acre with an average of 33·7 bushels.

Fig. 13.—Field of Peatland Barley grown in 1946 at the Illustration Station, St. Flavien, Lotbiniere, Co.

DISTRIBUTION OF SEED GRAIN

From the results obtained and the performance of Peatland in the field, this variety was considered as one of the best to grow. This barley, therefore, was multiplied and in 1946, some 80 bushels were sold to the neighbouring farmers in order to replace the O.A.C. 21 variety already being grown throughout the district.

Each year, a certain quantity of seed grain of oats and barley is sold by the Illustration Stations throughout the district.

From 1938 to 1946, 4,344 bushels of seed grain were sold to 496 farmers.

Legumes

As indicated previously, the soil needs drainage and is acid, consequently it is difficult to grow alfalfa and is more difficult to maintain it more than a year or two. The only legumes that can be grown successfully for hay on most of the farms of the district are red and alsike clovers which means that the quantity of legume hay consumed by animals, particularly dairy cattle, is rather small and insufficient. Experiments have been conducted by the Experimental Station at Lennoxville and at the Illustration Stations in order to try other legumes which could replace alfalfa for hay production and be more persistent. A test was then started on the Lennoxville Experimental Station with Ladino clover and later on, in 1944, this clover was introduced on some Illustration Stations. The first crop grown at East Broughton in 1945 gave

Fig. 14.—Heavy crop of clover hay produced in 1941 at the Illustration Station, Laurierville, Megantic Co.

very good results; 2·3 tons of Ladino clover hay per acre. In 1946 (second-year hay) the hay still contained 45 per cent clover. At Frampton, the same year, the first-year hay contained 70 per cent Ladino clover and in 1946, 46 per cent clover was found in the second-year hay.

Farm Management and Business Study

Crop rotations, soil management, and the inclusion of subsidiary enterprises or sidelines have an important bearing on the financial effectiveness of the farm business. In 1937, preliminary studies were undertaken to determine the sources of revenue on the farms operating as Illustration Stations in the central Quebec district. The data collected have been used to determine the relative productivity of the various farming types in terms of money income. This project has been expanded further and since 1940 a complete farm business study covering annual operations of all stations in the district has been conducted. A weekly report of farm revenues and expenditures is supplied by each operator

and at the end of each year, an inventory record is undertaken listing kind, acreage, and production of crops grown; capital investment in land and buildings; livestock, machinery and equipment; feeds and supplies, accounts receivable, and liabilities such as balances owing on agreements of sale and mortgage indebtedness. Some of the more important phases of this study are outlined below.

LAND UTILIZATION

The summary for 1946 inventory records shows that on the eleven Illustration Stations, the land was utilized as follows: the total area of land owned by operators is 1,724 acres of which 786 acres (46 per cent) are in cropland, 293·2 acres (17 per cent) in natural pasture, 522·6 acres (30 per cent) constitute the wood-lot and the maple bush. The balance, 122·2 acres (7 per cent), is classified as waste, barn yard, garden, roads, etc.

The total land under a rotation system 647·2 acres, can be divided in three groups: grain, 183·80 acres; hay, 432·25 acres, and hoed crops, 31·15 acres. Particulars of land utilization are outlined in Table 96.

TABLE 96.—LAND UTILIZATION ON THE ILLUSTRATION STATIONS CENTRAL QUEBEC DISTRICT

Item	Total area	Average per farm	Per cent of area per farm
	acres	acres	
Total area	1,724·0	156·7	100
Natural pasture	293·2	26·6	17
Wood-lot and maple bush	522·6	47·5	30
Roads, farmstead and waste land	122·2	11·1	7
Cropland (including improved pasture)	786·0	71·45	46
Hoed crops	31·15	2·83	1·8
Grain	183·80	16·71	10·8
Hay	432·25	39·29	25·3
Improved pasture	138·80	12·62	8·1

It will be noted from the figures in Table 96 that these farms are mainly devoted to the growing of forage crops and of cereal grains to provide feed for livestock.

At St. Nérée and at Frampton, most of the grazing is provided by natural pasture while the stations at St. Prosper, Laurierville, Pintendre resort to improved pasture. On the other stations, both natural pasture and improved pasture are used.

Only one farm, Laurierville, is organized to produce a special crop, potatoes.

In all cases, the land-use plan is designed to attain maximum productivity on both tillable and untillable land.

FARM CAPITAL

In studying the figures appearing in Table 97, it can be seen that the percentage of capital invested in land and buildings varies from 50·70 to 73·52; in livestock from 14·82 to 27·99 and, in machinery and equipment from 10·12 to 28·77.

A gross revenue of $66·36 per acre of crop land can be considered fairly good if consideration is given to the fact that only 19·25 per cent of the total capital is invested in livestock.

TABLE 97.—PER CENT OF CAPITAL INVESTMENT AND GROSS REVENUE PER ACRE CROPLAND ON ILLUSTRATION STATIONS—CENTRAL QUEBEC

Station	Per cent of capital invested in			Investment per acre crop land	Gross receipts per acre crop land
	Land and buildings	Livestock	Machinery and equipment		
	%	%	%	$ cts.	$ cts.
East Broughton	55·37	15·86	28·77	192 33	59 35
Frampton	73·52	16·36	10·12	222 39	79 93
Honfleur	50·70	20·79	28·51	174 97	81 98
La Patrie	63·78	22·23	13·99	227 29	65 26
Pintendre	54·80	18·43	26·77	195 85	66 75
St. Evariste	58·86	14·82	26·32	172 29	50 03
St. Flavien	69·15	15·88	14·97	176 81	63 95
St. Nérée	69·88	19·58	10·54	226 64	86 00
St. Prosper	51·53	20·66	27·81	145 97	56 48
Wotton	60·07	27·99	11·94	138 47	53 83
Average	60·77	19·25	19·98	183 22	66 36

SOURCES OF REVENUE

A summary of business operations showing the sources of revenue is drawn up as of December 31 each year. Average figures for the five-year period, 1942 to 1946, inclusive are summarized in the accompanying chart.

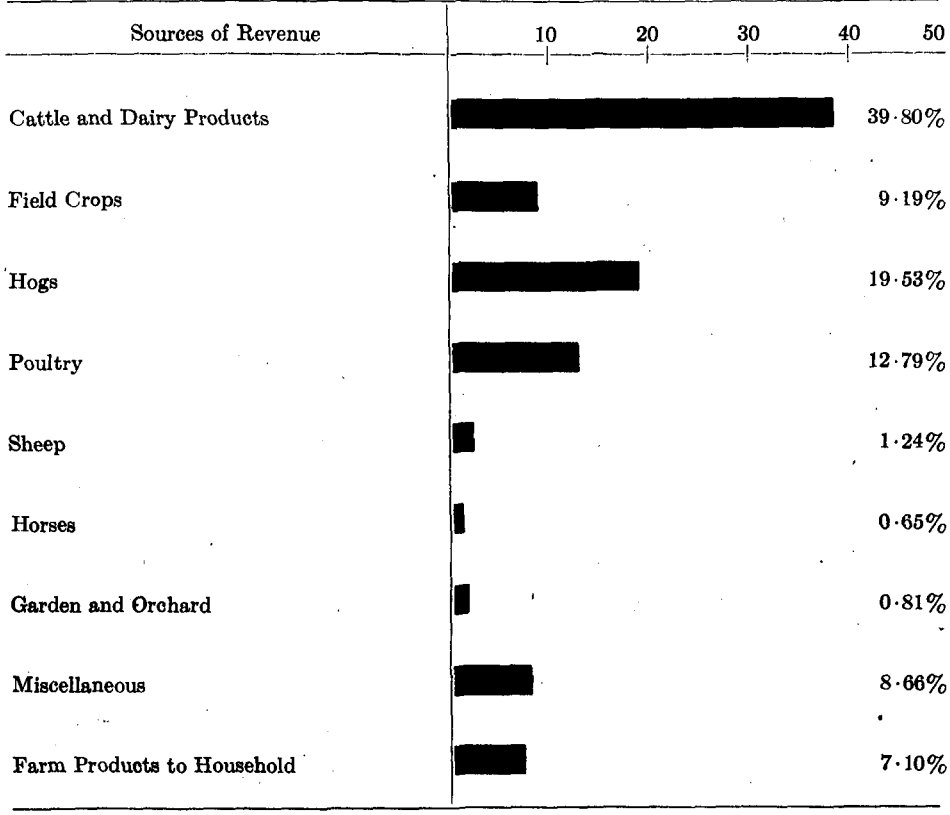


Chart showing sources of revenue on Illustration Stations, Central Quebec, 1942 to 1946 inclusive.

Sales of cattle and dairy products constitute the main source of revenue on all Illustration Stations of the district, contributing 39·8 per cent of total receipts; hogs and poultry 19·53 and 12·79 per cent respectively.

Each year, cattle, hogs, sheep, etc., are sold for breeding purposes to neighbouring farmers. From 1938 to 1946, 160 cockerels, 824 pullets, 4,336 dozen hatching eggs, 38 sheep, 290 hogs and 279 head of cattle were sold to farmers.

Field Days

Each year, meetings are organized on Illustration Stations for the farmers of the district. Field days are held to give the farmers the opportunity to discuss their own problems on drainage, fertilization, adaptation of different crops to their soil types, adaptability of certain new varieties of cereals, and to study the results obtained from the experiments underway at the Illustration Stations. These meetings also provide the opportunity for releasing general information on improved methods of cultivation, new varieties of grain, pasture improvement, farm organization and management, and on the experiments which are in progress.

From 1938 to 1946, a total of 10,580 farmers attended these meetings in the district.

Fig. 15.—Judging calf competition at the field day held at the Illustration Station Honfleur, Que., on August 23, 1946.

Miscellaneous

Garden

Special attention is given to gardening on all Illustration Stations. In fact, a great number of vegetable varieties are tested and the best ones recommended to farmers. Cotton-frame hot-beds introduced by the Illustration Stations to replace the ordinary glass-frame type have contributed a great deal in keeping the farmers keenly interested in gardening.

In the past, farmers using hot-beds were not very numerous but since the introduction of the cotton-frame type, over 60 per cent of the farmers in the vicinity of each Illustration Station are starting their own plants every year, with the result that the garden area has been enlarged and more vegetable species are grown for the benefit of the family.

HOMESTEAD

On all Illustration Stations, a lawn has been built and planted with shrubs, perennial and annual flowers. The house is painted, all farm buildings and fence posts are whitewashed every summer, giving a better appearance to the farm and drawing public attention to the Illustration Stations which serve as a model for neighbouring farmers to keep their farms more attractive.

Fig. 16.—Piggery built in 1941 at the Illustration Station, Wotton, Que.

Fig. 17.—View of Operator's residence and surroundings, Illustration Station at St. Evariste, Que., showing lawn, flower beds and general appearance of neatness.

At St. Evariste, for example, until 1939 there was no lawn or flowers and the weeds grew freely all around the house. During that year, however, some old trees were cut, the land was ploughed, levelled, fertilized and seeded to a lawn mixture.

In 1940, a cement border was made around the lawn, provision was made for the road entrance and a sidewalk was put in from the house to the road.

In 1941, two flower beds were made on the lawn, near the highway. A few perennial flowers were planted near the veranda. The house was painted and repaired. Result? This farm is now one of the most attractive in the district.

LIST OF ACTIVE PROJECTS

1936–1946 Inclusive

Animal Husbandry—

HORSES

A-881 Breeding Belgian Horses.

SHEEP

A-518 Breeding Oxford Down Sheep.
A-875 Cross breeding vs. Pure breeding of Sheep.
A-324 Co-operative Marketing of Wool.

SWINE

A-513 Breeding Yorkshire Swine.
A-679 Advanced Registry Policy for Purebred Swine.
A-858 Fecundity and Nursing Capacity in Swine.
A-919 Swine Prepotency and Inbreeding.
A-158 Cost of Feeding Brood Sows.
A-160 Cost of Raising Pigs to Time of Weaning.

CATTLE

A-503 Breeding Jersey Cattle.
A-520 Breeding Shorthorn Cattle.
A-860 Beef Cattle Production in Canada.
A-893 Rearing Dairy Calves.
A-58 Record of Performance.
A-360 Private Herd Records.
A-56 Cost of Milk Production.
A-59 Cost of Raising Dairy-Bred Calves from Birth to One Year.
A-457 Feed Cost of Maintaining Herd Bulls.
A-93 Control of Tuberculosis in Cattle.
A-660 Serum Test for Contagious Abortion.
A-832 Commercial Fertilizer Formulae for Pasture.
A-768 Rate of Applying Commercial Fertilizer for Pasture.
A-833 Permanent Pasture vs. Pasture in Crop Rotation.
A-773 Rotated vs. Continuous Grazing.

Poultry Husbandry—

P-55 Methods of Handling for Egg Production.
P-56 Pedigree Breeding for Egg Production.
P-114 Breeding for Egg Size.
P-111 Breeding for Fertility, Hatchability and Livability.
P-62 Costs of Egg Production.
P-22 Costs of Brooding.
P-31 Costs of Rearing.
P-3 Best Dates for Incubation.
P-157 Improving Quality of Poultry in District.

Field Husbandry—

F-305 Meteorological Records.
F-48 Preparation of Land for Grain.
F-49 Preparation of Land for Silage Crops.
F-52 Depth of Ploughing.
F-322 Crop Sequence Experiment.
F-315 Timothy Continuously vs. Timothy in Rotation.
F-85 The Use of Lime.
F-478 The Value of Various Types of Bedding Material in Manure.
F-368 Place in Rotation of Applying Manure and Commercial Fertilizer.
F-353 Manure and Commercial Fertilizer Combinations for Hay Crops.
F-358 Manure and Commercial Fertilizer Combinations for Potatoes.
F-411 Manure and Commercial Fertilizer Combinations for Barley.
F-412 Commercial Fertilizer Formulae for Hay.
F-468 Commercial Fertilizer Formulae for Barley.
F-366 Rate of Applying Manure for Silage Crops.
F-409 Rate of Applying Commercial Fertilizer for Hay.
F-369 Commercial Fertilizer Formulae for Pasture.
F-371 Rate of Applying Commercial Fertilizer for Pasture.
F-373 Rotated vs. Continuous Grazing.
F-400 Permanent Pasture vs. Pasture in a Crop Rotation.
F-339 Weed Eradication on Pasture.
F-477 Losses in Ensiling Various Crops.

Cereals—

CE-1 Spring Wheat—Test of Varieties and Strains.
CE-5 Oats—Test of Varieties and Strains.
CE-6 Barley—Test of Varieties and Strains.
CE-7 Field Peas—Test of Varieties and Strains.
CE-8 Field Beans—Test of Varieties and Strains.
CE-11 Fall Rye—Test of Varieties and Strains.
CE-29 Oats—Breeding and Selection.
CE-30 Barley—Breeding and Selection.
CE-31 Field Peas—Breeding and Selection.
CE-60 Barley and Oats—Mixed Grain.
CE-50 Production of Registered Seed.
CE-136 Production of Elite Stock Seed.

Flax—

E-3 Flax Variety Test.

Forage Plants—

Ag-1 Corn for Ensilage—Test of Varieties and Strains.
Ag-16 Field Roots—Swedes and Mangels—Test of Varieties and Strains.
Ag-76 Sunflowers—Test of Varieties and Strains.
Ag-126 Alfalfa—Test of Varieties and Strains.
Ag-146 Red Clover—Test of Varieties and Strains.
Ag-181 Soybeans for Forage and Grain.
Ag-201 Timothy—Test of Varieties and Strains.
Ag-251 Millets—Test of Varieties and Strains.
Ag-246 Annual Hays.
Ag-101 Seed Production—Grasses, Clovers, Corn, Soybeans, Field Roots and Miscellaneous Crops.
Ag-264 Biennial and Perennial Grasses and Legumes for Hay.
Ag-267 Biennial and Perennial Grasses and Legumes for Pasture.
Ag-255 Forage Crop Nursery.

Illustration Stations—

IS-El.42 Four-year Rotation: Hoed Crops, Cereals, Clover Hay, Mixed Hay.
IS-El.51 Five-year Rotation: Hoed Crops, Cereals, Clover Hay, Mixed Hay, Timothy Hay or Pasture.
IS-02.01 Plant Food Deficiency Study.
IS-02.03 Chemical Fertilizer as a Supplement to Farm Manure.
IS-02.04 Fertilizers, Study of Rates.
IS-02.14 Methods of Application of Farm Manure.
IS-02.08 The Effect of Ground Limestone on Farm Crops.
IS-06.05 Testing Cereal Varieties.
IS-06.04 Introducing Suitable Varieties of Cereals.
IS-08.01 Chemical Fertilizers for Pasture, Study of Rates.
IS-08.02 Chemical Fertilizers for Pasture, Study of Formulae.
IS-08.06 Pasture Seeding and Management Studies.
IS-13.01 Dairy Cattle Production.
IS-13.05 Sales of Livestock for Breeding Purposes.
IS-13.07 Swine Production.
IS-13.08 Sheep Production.
IS-14.01 Poultry Production.
IS-05.01 Study of Regional Climatic Conditions Related to Crop Production.
IS-05.02 Record of Regional Precipitation.
IS-09.06 Methods of Controlling Brown-Heart in Turnips.
IS-11.02 Stimulating Interest in the Development of the Farm Garden.
IS-11.17 Farm Home Beautification.
IS-17.03 Study of Farm Productivity and Progress.
IS-17.04 Study of Farm Business.
IS-19.01 Field Days.
IS-19.02 Publications and Presentation of Results.

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
KING'S PRINTER AND CONTROLLER OF STATIONERY
1950