DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

PROGRESS REPORT OF THE CHIEF SUPERVISOR

J. C. MOYNAN, B.S.A.

ON

THE ILLUSTRATION STATIONS

IN

PRINCE EDWARD ISLAND, NOVA SCOTIA,
NEW BRUNSWICK, QUEBEC AND ONTARIO.

For the Years 1931, 1932 and 1933

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PROGRESS REPORT ON ILLUSTRATION STATIONS

IN

Prince Edward Island, Nova Scotia, New Brunswick, Quebec, and Ontario

As outposts, the two hundred and seven Illustration Stations now in operation, link up the centrally located Experimental Farms with the farm problems of outlying districts. Thirteen of these stations are in operation in Prince Edward Island, twenty in Nova Scotia, nineteen in New Brunswick, fifty-two in Quebec, seventeen in Ontario, fifteen in Manitoba, thirty in Saskatchewan, twenty-two in Alberta and nineteen in British Columbia. These stations are located on privately owned farms and operated co-operatively with progressive farmers, having not only a personal, but a community interest in agricultural betterment. As fact-finding and community organizations, some ninety-eight projects of investigation and comparative demonstrations embrace the main divisional activity, centering around problems of practical crop and live stock production, soil fertility, cultural methods, testing of crops and varieties deemed most suitable for the districts, conservation and use of farmyard manure also chemical fertilizers, crop sequence, farm layout, farm management, cost of production and assembling of meteorological data. Farm gardens, flowers, and trial orchards are established and developed under supervision, and building and general home improvement undertaken.

SURVEY OF FARM BUSINESS AND MANAGEMENT

During the past three years a complete farm business and management survey has been carried out on each of the farms operating as an Illustration Station, in the eastern provinces and British Columbia. In this survey a complete record was obtained as to the area of land under cultivation, or as otherwise held including permanent pasture, bush or rough land. An inventory was taken of the capital invested in buildings, live stock, machinery and equipment. By keeping a simple system of farm accounts it was possible to obtain a statement of annual expenditures and receipts from each class of live stock kept, including cattle, sheep, hogs and poultry, as well as any cash crops grown. This information is being compiled and is proving of value in indicating undeveloped or unprofitable lines within each farm organization. In addition these data will form a basis for measuring the results of increased crop productivity, in terms of carrying power of animal units per farm, in its relationship to labour income.

THE FARM LAYOUT

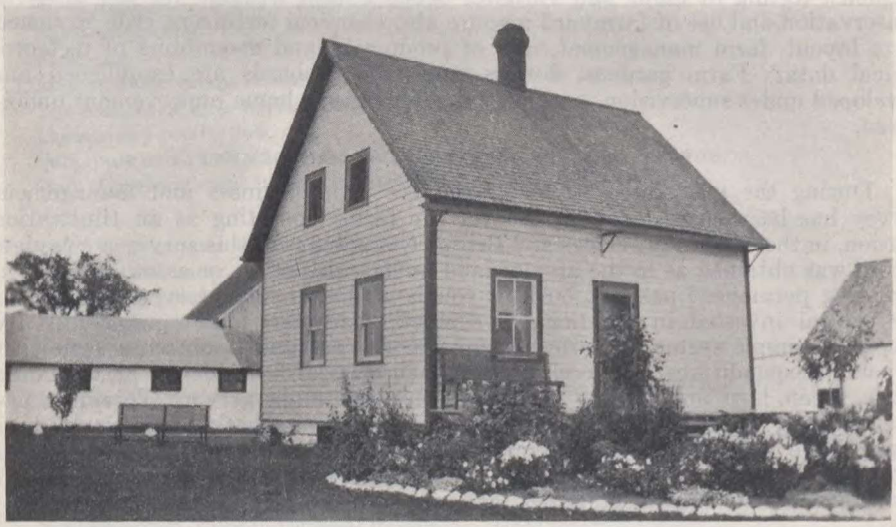
At each Illustration Station the objective is to duplicate on the main farm the rotation procedure conducted and as found most practical on the station. Some have fully completed this program, particularly the older established stations. Others are making substantial progress. This program has involved, in many cases, the re-alignment of fences to enlarge fields, the removal of accumulative debris, such as, stones, brush, fence bottoms, etc. This phase of the work has a strong appeal to the operators. Each operator has under development a program of roadside improvement. In many cases this has been an extremely heavy task. Each year a goodly quota of farm buildings are painted or whitewashed, adding greatly to their general appearance. Old buildings are being demolished, new barns and farm homes taking their place.

ILLUSTRATION STATIONS AS CENTRES FOR THE PRODUCTION OF PURE SEED

To determine, multiply and distribute seed with a view of establishing the most suitable crops and varieties on neighbouring farms is an active project and important service which the Illustration Stations are rendering in their respective

communities. During the past three years the operators in Nova Scotia and Alberta have led in the sale of wheat, oats and barley, those in Peace River district in the sale of alfalfa, those in Manitoba in the sale of sweet clover, while the operators in Western Quebec, Eastern Ontario and Prince Edward Island led in the sale of red clover and timothy seed. The Prince Edward Island, New Brunswick and British Columbia operators were the largest and most important growers of certified seed potatoes.

The purity and the general quality of the seed produced and sold will be reflected in the fact that Illustration Station operators obtained sixteen placings with their exhibits at the World's Grain Show, Regina, operators taking first placing in the early oat and sweet clover classes, with high placings in hard, red, wheat. During the past season the operators of stations throughout the different provinces sold to their neighbours 26,930 bushels of oats, 16,518 bushels of wheat, 3,336 bushels of barley, 194 bushels of peas, 10,988 bushels of seed potatoes, 7,882 pounds of timothy seed and 17,251 pounds of clover seed.



Improvement to home surroundings through the establishing of a perennial border on the Illustration Station at Verner, Ontario.

LIVE STOCK IMPROVEMENT AND SALE OF BREEDING STOCK

Live stock and dairy products supply the principal source of revenue on sixty-nine per cent of the farms operated as Illustration Stations. It is, therefore, of economical importance, particularly in periods of low prices, that the Illustration Station operators and adjoining farmers should test or cull their herds and poultry flocks, so as to retain only the most productive. Economical individual milk production is aimed at, rather than an increased total production. All operators have undertaken a program aiming to build up their herds and poultry flocks as centres from which neighbouring farmers might obtain purebred sires, breeding stock, poultry and hatching eggs. The sales of breeding stock last season comprised 69 bulls, 114 mature cows, 85 heifers, 316 hogs, 171 sheep, 662 cockerels, 438 pullets and 1,364 settings of hatching eggs.

IMPROVEMENT OF GARDENS AND FARM SURROUNDINGS

While Illustration Stations are primarily concerned with problems relating to crop and live stock production, the possibility of developing and maintaining attractive home-surroundings and adequate buildings is given due consideration in progress plans. On many stations windbreaks, hedges, shrubbery, lawns, perennial and annual flower borders are being steadily developed for the purpose of illustrating what varieties are best suited to a locality and how they can most effectively be planted. Trial orchards, including tree and small fruits, are set out on stations where climate and facilities are suitable.

Building plans for erecting of new barns, homes and outbuildings, are discussed with the operators as required. Other improvements, such as the laying of cement floors, putting in more and larger windows in farm buildings, installation of sheep dipping tanks and the painting or whitewashing of forty-two barns and homes in 1932 and seventy-five in 1933, on farms operated as Illustration Stations were effected during the year.

ILLUSTRATION STATION FIELD DAYS AND CO-OPERATIVE EFFORTS

A consistent effort has been made to increase the usefulness and the service which the Illustration Stations may render in the various farming communities served. In this connection, it is essential that crops grown, methods adopted and results of fact-finding projects, pertaining to local problems, be brought to the attention of the surrounding farmers. Field Days held on the stations and, where possible, organized in co-operation with the local Agricultural Society, Farmers' Institute or Agricultural Representative, is one means undertaken to meet the farmers to explain the work under way, as well as the results obtained. In 1932, one hundred and thirty-two and in 1933, one hundred and forty-two field days were held.

The attendance at Illustration Station field days in 1932 totalled 11,759, or an average of 89 per meeting, in 1933, there were 14,600 persons present, or an average attendance of 104 per meeting.

The supervisor has co-operated with Representatives of the Provincial Departments of Agriculture, in school fairs, short courses, judging at exhibitions, ploughing matches and in grasshopper control work.

REPORT OF THE ILLUSTRATION STATIONS FOR PRINCE EDWARD ISLAND

FOR THE YEARS 1931, 1932 AND 1933

R. C. Parent, M.S.A., Supervisor

In Prince Edward Island there are, at the present time, thirteen Illustration Stations. The rotation fields include 150 acres, and in 1933, 219 plots of varying size were employed outside the station fields for tests with commercial fertilizer.

As an organization for the study of local farm problems and as a means of bringing to the attention of farmers the results of experimental findings, the Illustration Station plan appears to be more effective each year. This is due in no small measure to the operators who own the stations and who are responsible for the actual carrying on of many of the demonstrations. Were it not for their approval of the illustrational idea, their careful and painstaking labour, their valuable suggestions regarding demonstrations and their interest in the improvement of the community, present accomplishments could not be realized.

The locations of the stations and names of the operators are as follows:—

Sylvain Peters	Palmer Road
Alfred Gorrill	Glenwood
Cephas Grigg	West Devon
Thomas Noonan	Richmond
William E. Johnstone	New London
John L. Clark	Rustico
Malcolm McKenzie	Rose Valley
Hector McKay	De Sable
Clifford McEwen	St. Peters
Nelson R. Stewart	Red Point
Fred. G. Macintyre	Montague
James E. Daly	Iona
Alexander Matheson	Wood Islands

In this report reference will be made, from time to time, to the work being conducted at these above named points. When this is done, it will refer to that being conducted co-operatively by the Division with the parties whose names are as given.

PRECIPITATION AND THE GROWTH OF CROPS

The 1933 season was satisfactory for the growth of all crops with the exception of corn and pasture. May was dry and favourable for seeding operations. In June, an average of 3·34 inches of rain fell and germination was rapid, but July and early August were extremely dry and pastures suffered seriously. Corn also suffered, but to a lesser extent. The weather during haymaking was the best for many years, and practically all hay in the province was saved in perfect condition. Heavy frost set in early in November, and many farmers experienced difficulty in getting their turnips harvested.

The following average seeding dates are almost identical with those of 1932: oats and wheat May 21, potatoes June 4, turnips June 7, and corn June 10. Haymaking was general July 18 and the harvesting of grain commenced August 22.

FIELD DAYS

An Illustration Station Field Day is the gathering of neighbours at their nearest station on an appointed day. From July 5 to August 21, thirteen such Field Days were held on the Prince Edward Island stations and for attendance and interest shown were an improvement over those of former years. In 1933, all Field Days were held in the afternoon, starting at 2 p.m. and ending about 5.30 p.m.

The following typical program gives an idea of the subjects dealt with:—

1. Introductory remarks.
2. Visit to station fields and the following discussed:—
   - (*a*) Rotation of crops.
   - (*b*) Saving timothy for seed.
   - (*c*) Early cutting of clover hay.
   - (*d*) Alfalfa production.
   - (*e*) Growing of potatoes, turnips, corn and mangels and value of commercial fertilizers and manure.
   - (*f*) Weed control.
3. Brown heart experiment on turnips.
4. Parade of live stock. Importance of testing and proper feeding outlined.
5. Experimental Farm Truck Exhibit shown and various panels discussed.
6. Short addresses by prominent farmers.

Spray mixing demonstrations were put on at Palmer Road, Glenwood and Richmond, also milk testing demonstrations at De Sable.

During the course of these Field Days, 1,000 copies of the following leaflets were distributed:—

1. Value of ground limestone in securing good stands of clover and alfalfa.
2. The farm garden and choice of varieties.
3. Feeding the layers.
4. Preparing for the marketing of poultry.

The attendance ranged from 50 to 300. The greatest number was present at New London, followed closely by Rustico and De Sable. In all 1,620 people were in attendance, or an average of 127.

The supervisor has, wherever possible, co-operated with the Provincial Department of Agriculture in School Fair, Exhibition and Short Course work. In 1933 he judged at six fairs and exhibitions and gave a series of eight lectures on "Soil and Farm Management" at the short course, Charlottetown.

THE FARM GARDENS AND VARIETIES GROWN

The stimulating of interest in the development of farm gardens is an active project of the division. A good garden adds greatly to the well being of the whole family by supplying a variety of vegetables for summer and winter use, that might not otherwise be provided, thus assisting the family budget. Several important considerations have been emphasized, as being essential if satisfaction is to be obtained, namely: soil rich in plant food and thoroughly cultivated; rows long enough to permit of horse cultivation; care in the selection of fresh seed of suitable varieties.

The following varieties were tested at each station and found well suited to soil and climatic conditions existing in the respective localities:—

Beans, Pencil Pod Black Wax
Beets, Morses Improved Detroit Dark Red
Carrot, Chantenay
Cabbage, Copenhagen Market
Cucumber, Davis Perfection
Corn, Golden Bantam
Lettuce, Grand Rapids
Onions, Extra Early Flat Red
Peas, Thomas Laxton, Stratagem
Parsnip, Hollow Crown
Pumpkin, Small Sugar
Radish, Scarlet Turnip White Tip
Squash, Green Hubbard
Tomato, Earliana

The development of a vegetable garden is an active and important project on all Illustration Stations.

SUPPLEMENTARY USE OF CHEMICAL FERTILIZER

In the province of Prince Edward Island, soil fertility is a major problem in the securing of profitable yields of all classes of farm crops. For this reason various methods of increasing fertility by the supplementary use of commercial fertilizer have been studied, since the stations were first organized in 1923. This report gives the results of eight active projects being carried on by the Division.

EFFECT OF NITROGENOUS FERTILIZERS ON MEADOWS

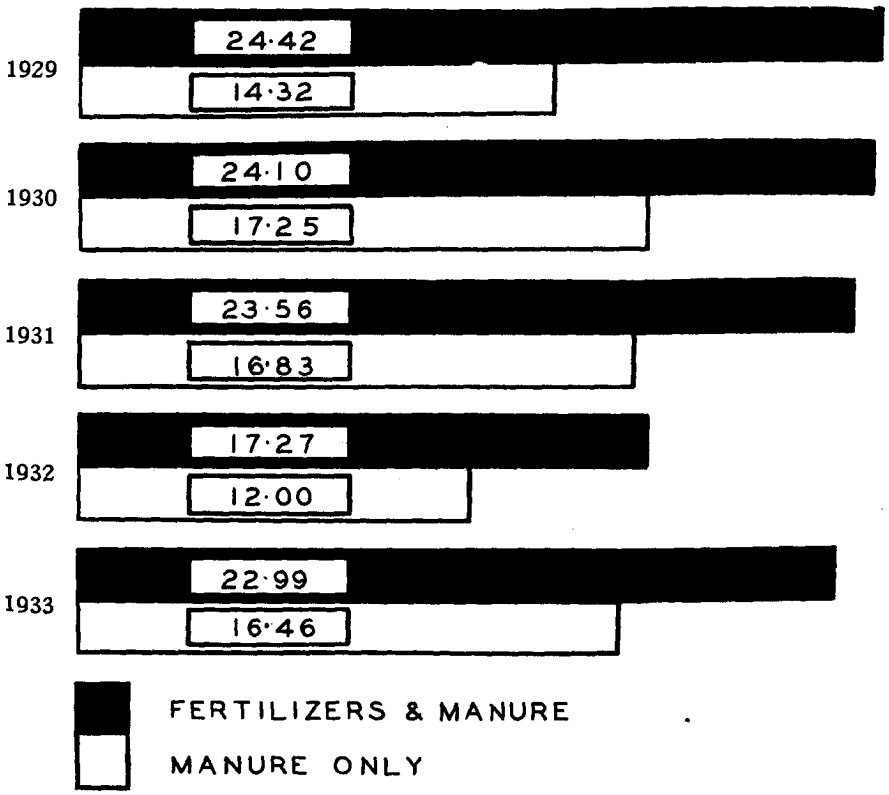
The practice of sowing 125 pounds of nitrate of soda or 125 pounds of nitro chalk, or 100 pounds of sulphate of ammonia on the timothy sod in early spring is one which has been followed on the Prince Edward Island Illustration Stations for the past eight years. In the 1930 report, a complete summary of

the effect of nitrate of soda was given. In 1931, 1932 and 1933, sulphate of ammonia, owing to its cheapness was used exclusively. In 1931 the average yield of timothy from twelve stations was 1·59 tons per acre, with 100 pounds of sulphate of ammonia, and 0·93 ton without ammonia. In 1932, 1·66 tons and 0·99 ton were obtained from the treated and untreated areas respectively, while in 1933, 2·07 and 1·38 tons per acre were harvested from the treated and untreated areas. Not only is a heavier and leafier growth obtained, but many weeds seem to be crowded out. The operators, who save their own timothy seed find that the fertilized area is much more profitable for this purpose, than the unfertilized area.

EFFECT OF COMMERCIAL FERTILIZER ON THE GROWTH OF SWEDE TURNIPS

For the production of a large crop of turnips at an economical cost a liberal dressing of commercial fertilizer seems advisable in many instances, this in addition to barnyard manure and the careful preparation of the seed bed and handling of the crop.

EFFECT OF COMMERCIAL FERTILIZERS ON THE YIELD OF TURNIPS
TONS PER ACRE



FERTILIZERS USED IN 1929-30-31
100 lbs. N. of soda
80 lbs. S. of ammonia
600 lbs. Superphosphate
80 lbs. M. of potash
1932 and 1933 25 per cent less

In 1933, 750 pounds of a 3-10-4 fertilizer mixture was responsible for increases ranging from 2·28 tons to 15·58 tons per acre with an average increase of 6·53 tons. At some localities, the effect of the fertilizer was very marked, while at others very small, for example, at Iona, Montague and Red Point, the increases in 1933 were 10·76, 15·38 and 11·11 tons per acre, respectively, while at De Sable, Palmer Road and St. Peters, the increases were only 2·38, 2·28 and 2·11 tons per acre respectively. At the last group of stations, the soil is much richer in organic matter than at the first group.

Below is given in diagram, the average yield secured with and without commercial fertilizers for the year 1929 to 1933 inclusive.

It will be noted that the average increases vary from 5·27 tons per acre in 1932 to 10·10 tons in 1929. These represent increases of 44 per cent in 1932 and 70 per cent in 1929.

The total value of the fertilizer, including hauling and sowing was $8.64 per acre in 1932 and $14.46 in 1929. Fifty-five per cent of these amounts, which more nearly approximates that used by the turnips would leave the cost at $4.75 and $7.95 for the years 1932 and 1929 respectively.

EFFECT OF COMMERCIAL FERTILIZER ON THE GROWTH OF FODDER CORN

Over a period of years it has been found that a medium dressing of commercial fertilizer in addition to barnyard manure has given a profitable increase in yield. For example, in 1932 seven hundred and fifty pounds of a 3-10-4 mixture costing less than $8 per acre was responsible for increases ranging from one to nine tons per acre, and an average increase of 4·73 tons on twelve stations.

In 1933 the increases ranged from 1·98 tons to 7·37 tons per acre, with an average of 3·83 tons. The yield with fertilizer was 13·59 tons and without 9·76 tons per acre.

EFFECT OF COMMERCIAL FERTILIZER ON THE GROWTH OF POTATOES

Demonstrations and experiments conducted on the Prince Edward Island Illustration Stations, over a number of years, have shown conclusively that commercial fertilizer can be used with profit, in the majority of cases, on the potato crop; but that the best results cannot be expected unless one also uses clean seed, thoroughly prepares the seed-bed and provides ample protection against insects and diseases.

Barnyard manure in medium amounts is used at all stations.

In addition to manure 800 pounds of a 4-8-8 mixture, composed of the following chemicals: 150 pounds sulphate of ammonia, 400 pounds superphosphate and 128 pounds muriate of potash per acre were used in 1933 at all stations, excepting Wood Islands, where 1,200 pounds of the mixture were applied.

In 1932 this amount of fertilizer was responsible for an average increased yield of 91 bushels of potatoes per acre. The 1933 results are given by stations in the table below:

EFFECT OF COMMERCIAL FERTILIZER ON THE GROWTH OF POTATOES, 1933

Station	Yields per acre						
	With fertilizer			Without fertilizer			Increase due to fertilizer
	Marketable	Small	Total	Marketable	Small	Total	Marketable
	bush.	bush.	bush.	bush.	bush.	bush.	bush.
De Sable	415·0	49·8	464·8	265·6	49·8	315·4	149·4
Glenwood	144·0	56·0	200·0	72·0	80·0	152·0	72·0
Iona	224·6	18·3	242·9	47·7	88·0	135·7	176·9
Montague	303·0	63·0	366·0	198·0	30·0	228·0	105·0
New London	128·0	40·0	168·0	104·0	64·0	168·0	24·0
Red Point	276·0	102·0	378·0	132·0	66·0	198·0	144·0
Rose Valley	249·0	15·0	264·0	180·0	24·0	204·0	69·0
Rustico	189·2	61·6	250·8	123·2	70·4	193·6	61·0
St. Peters	227·5	14·7	242·2	176·2	33·0	209·2	56·3
West Devon	113·7	47·7	161·4	55·0	22·0	77·0	58·7
Wood Islands	271·9	49·5	321·4	206·0	33·0	239·0	65·9
Totals	2,541·9	517·6	3,059·5	1,559·7	560·2	2,119·9	982·2
Averages	231·1	47·0	278·1	141·8	50·9	192·7	89·3

From the above table, it will be noted that the increased yield due to the fertilizer, varies greatly with the stations for example at Iona, the increased yield was 176 bushels per acre, at Red Point, 144 bushels, at Montague 105 bushels and at De Sable 149 bushels, while only small increases were secured at Glenwood (72·0 bushels), New London (24·0 bushels), and West Devon (58·7 bushels). These small increases at the latter group of stations is due partly to the choice of an early maturing variety and consequently low yields and partly to the fact that the soil does not ordinarily respond to treatment as much as at Iona or Montague.

EFFECT OF VARYING AMOUNTS OF POTASH ON THE POTATO CROP

For the production of a profitable crop of potatoes, a supply of available potash, as well as nitrogen and phosphoric acid, is absolutely necessary. Potash aids in the improvement of the general vigour of the crop and is necessary for the production of starches and sugars. This of course, in the potato is of prime importance.

During the years when the potato seed industry was rapidly advancing fertilizer was used in very large amounts in many instances. It was not uncommon for farmers to sow one ton or more per acre and in making home mixtures excessive amounts of one or more elements were often used.

To demonstrate the effect of potash on the potato crop, the following experiment was tried on five stations in 1928, 1929 and 1930. Fifteen hundred pounds of a fertilizer mixture in which the nitrogen and phosphoric acid were constant (300 pounds sulphate of ammonia and 750 pounds superphosphate) and in which the muriate of potash in the mixture varied from none to 400 pounds, were sown on five plots at each of the five stations. The results were as follows: 0 potash, 266·9 bushels; 100 pounds potash, 330·7 bushels; 200 pounds potash, 343·6 bushels; 300 pounds potash, 340·8 bushels, and 400 pounds potash, 341·3 bushels per acre. The complete results of this experiment are given in table and in diagram in the 1930 report.

A similar experiment to the above was tried in 1932 and 1933, at five stations, namely, Glenwood, Iona, Montague, Palmer Road and Red Point. In

this experiment the rate of application was 2,000 pounds per acre and the muriate of potash varied from none to 640 pounds. The sulphate of ammonia and superphosphate were constant, 380 pounds and 1,000 pounds respectively. The following average yields were obtained:—

0	pounds	potash	equivalent	to	2,000	pounds	4-8- 0	mixture	—189·7	bushels	per	acre
160	"	"	"	"	2,000	"	4-8- 4	"	—241·3	"	"	"
320	"	"	"	"	2,000	"	4-8- 8	"	—258·1	"	"	"
480	"	"	"	"	2,000	"	4-8-12	"	—263·3	"	"	"
640	"	"	"	"	2,000	"	4-8-16	"	—264·4	"	"	"

The results of this experiment agree very closely with those of the first experiment and indicate that the use of excessively high preparations of muriate of potash, in most cases, are uneconomical.

EFFECT OF VARYING AMOUNTS OF SUPERPHOSPHATE ON THE GROWTH OF POTATOES

For the production of a profitable crop of potatoes, a complete fertilizer mixture containing nitrogen, phosphoric acid and potash is necessary in most cases. The most economical combination of these three elements of fertility, however, is not so clearly understood; and for this reason comparative trials were started in 1931 comparing varying amounts of superphosphate for the potato crop.

Five uniform plots were selected. Each plot received 300 pounds sulphate of ammonia and 300 pounds muriate of potash per acre, while the superphosphate was applied as indicated below:—

Plot 1.—No superphosphate, equivalent to 1,500 pounds of a 4-0-10 mixture per acre.

Plot 2.—400 pounds superphosphate, equivalent of 1,500 pounds of a 4-4-10 mixture per acre.

Plot 3.—600 pounds superphosphate, equivalent to 1,500 pounds of a 4-6-10 mixture per acre.

Plot 4.—800 pounds superphosphate, equivalent to 1,500 pounds of a 4-8-10 mixture per acre.

Plot 5.—1,000 pounds superphosphate, equivalent to 1,500 pounds of a 4-10-10 mixture per acre.

The following table gives the yields obtained:

EFFECT OF APPLYING VARYING AMOUNTS OF SUPERPHOSPHATE TO THE POTATO CROP, 1931, 1932, 1933

—	Yield per acre														
	300 pounds sul. of ammonia 300 pounds mur. of potash 0 pounds superphosphate equivalent to: 1,500 pounds 4–0–10			300 pounds sul. of ammonia 300 pounds mur. of potash 400 pounds superphosphate equivalent to: 1,500 pounds 4–4–10			300 pounds sul. of ammonia 300 pounds mur. of potash 600 pounds superphosphate equivalent to: 1,500 pounds 4–6–10			300 pounds sul. of ammonia 300 pounds mur. of potash 800 pounds superphosphate equivalent to: 1,500 pounds 4–8–10			300 pounds sul. of ammonia 300 pounds mur. of potash 1,000 pounds superphosphate equivalent to: 1,500 pounds 4–10–10		
	Marketable	Unmarketable	Total	Marketable	Unmarketable	Total	Marketable	Unmarketable	Total	Marketable	Unmarketable	Total	Marketable	Unmarketable	Total
	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.	bush.
Red Point	148·3	70·0	218·3	185·4	107·1	292·5	201·9	119·5	321·4	226·6	107·1	333·7	284·3	98·9	383·2
Richmond	157·4	23·3	180·7	192·4	17·5	209·9	262·3	17·5	279·8	221·5	35·0	256·5	250·7	29·1	279·8
R. Valley	168·0	12·0	180·0	180·0	18·0	198·0	216·0	24·0	240·0	216·0	18·0	234·0	246·0	18·0	264·0
St. Peters	293·6	47·7	341·3	286·3	47·7	334·0	304·6	47·7	352·3	356·0	36·7	392·7	293·6	25·7	319·3
W. Islands	249·3	37·1	286·4	321·4	33·0	354·4	360·5	24·7	385·2	317·2	33·0	350·2	358·4	28·8	387·2
Totals	1,016·6	190·1	1,206·7	1,165·5	223·3	1,388·8	1,345·3	233·4	1,578·7	1,337·3	229·8	1,567·1	1,433·0	200·5	1,633·5
Total, 1932	534·3	280·2	814·5	882·1	315·9	1,198·0	986·0	338·5	1,324·5	933·7	389·9	1,323·6	998·7	412·7	1,411·4
Total, 1931	646·7	293·5	940·2	786·9	304·9	1,091·8	979·2	289·1	1,268·3	1,051·8	299·5	1,351·3	1,134·6	295·5	1,430·1
Grand total, 1931, 32, 33	2,197·6	763·8	2,961·4	2,834·5	844·1	3,678·6	3,310·5	861·0	4,171·5	3,322·8	919·2	4,242·0	3,566·3	908·7	4,475·0
3-year average	137·3	47·7	185·0	177·1	52·8	229·9	206·9	53·8	260·7	207·7	57·4	265·1	222·9	56·8	279·7

A study of the results of these comparative tests shows that in all cases, excepting at St. Peters, there is an appreciable increase in yield, where the heavy amounts of superphosphate are applied. Apparently superphosphate is not a limiting factor as far as yields are concerned at St. Peters.

A three-year average indicates that not only are heavier yields obtained at the heavier rates, but that the increase is gradual with each succeeding increase of superphosphate applied.

The records show that under the conditions of the experiment quantities of superphosphate up to 1,000 pounds can be added to the potato crop with profit, when used with 300 pounds muriate of potash and 300 pounds sulphate of ammonia.

THE VALUE OF GROUND LIMESTONE IN SECURING STANDS OF CLOVER

In the fall of 1928, a portion of each station field on all the Illustration Stations in Prince Edward Island was given an application of ground limestone. Rates varied from one-quarter ton to two and one-half tons per acre, depending on the acidity of the soil. Since 1928, the value of the limestone on the clover has been noted and yields taken at all locations where its beneficial effects were pronounced.

At Iona, Wood Islands, Montague, Red Point, and Rose Valley, it has been found that an application of ground limestone was necessary in order to secure a satisfactory stand of red clover. The soil at the above mentioned stations is distinctly acid. At the first three it is light and sandy, while at Red Point and Rose Valley, it is a clay loam. At these latter two stations, the physical condition of the soil was noticeably improved.

Substantial increases in yields of clover have been obtained from the use of limestone. In 1933 from three stations, Montague, Red Point and Rose Valley, the average yield with limestone was 2·72 tons per acre and without limestone 1·67 tons. In 1932 from nine stations the yield of clover with limestone was 1·35 tons and without limestone 0·88 ton per acre. At Montague, the unlimed plot yielded 0·95 ton, while the limed plot gave 2·25 tons, an increase of 137 per cent. At four stations in 1931, the yield of clover without limestone was 0·60 ton and with limestone it was 1·64 tons per acre, or in other words, an increase due to the limestone of 173 per cent. Needless to say, the quality of the clover on the limed areas was much superior to that on the untreated areas.

PASTURE IMPROVEMENT BY THE USE OF CHEMICAL FERTILIZERS

The improvement of permanent pastures by the use of commercial fertilizer is a problem which is demanding a good deal of attention on the Illustration Stations at the present time.

In 1932, a pasture fertilizer experiment was conducted on the stations at Glenwood, Montague, Rose Valley and St. Peters. In this project a six acre pasture field was divided into two equal areas. One field was left in its original condition and not fertilized, as a check plot, the other field was treated with 150 pounds sulphate of ammonia, in two equal applications, 350 pounds superphosphate (16 per cent P_2O_5) and 100 pounds muriate of potash. The superphosphate and potash also 75 pounds of the sulphate of ammonia was applied early in the spring, while the remaining 75 pounds of ammonia were applied in July.

The cattle were turned into the fertilized area in the spring as soon as the grass had obtained a height of from two to three inches. They were kept on this area until it was grazed close and were then turned into the unfertilized area; here they remained until the grass became short. They were then returned to the first field, if sufficient growth had been made, otherwise, they were turned into a third pasture. During the season each pasture was grazed on an average of seven times and given as many rests.

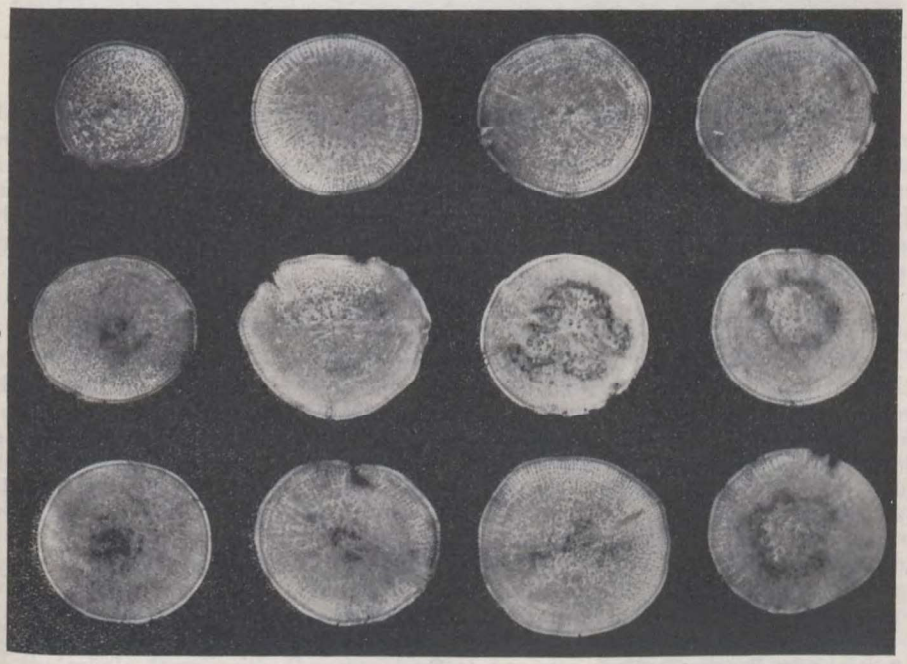
A record of the number of cattle, the number of days they were pastured on each field and the milk produced by the individual cow while on the two

fields, was kept. These show that the grazing days per acre (1 cow, 1 day) for the season was 110·2 for the fertilized pasture and 75·6 for the unfertilized. This means that the carrying capacity of the pastures was increased 46 per cent by the use of commercial fertilizer. The total quantity of milk produced per acre was 2,042 pounds for the fertilized area and 1,438 for the unfertilized area.

This experiment was continued in 1933 and the fertilized areas received an application of 150 pounds sulphate of ammonia. At St. Peters, the number of grazing days per acre was 76·7 and 63·2 for the fertilized and unfertilized areas respectively; at Montague 45 and 26·4 days respectively and at Rose Valley 111 and 53·7 days respectively. This is an average of 77·6 days for the fertilized area and 47·8 for the unfertilized. The carrying capacity of both fertilized and unfertilized was extremely low, due to the dry weather in July and August, but represent an average increase of 62 per cent where fertilizer was used.

BROWN HEART OF TURNIPS

Brown heart of turnips is a serious disease in Prince Edward Island and one of increasing economic importance. This disease is first recognized by a browning of the central tissues of the turnip and in severe cases may include practically the entire root. Such turnips are unsaleable for table use.



Cross sections of turnips showing typical brown heart condition, the subject of co-operative study on Illustration Stations.

In an endeavour to arrive at some measure of control, the stations in Prince Edward Island in co-operation with the Central Committee on Brown Heart Investigations conducted quite an extensive experiment last year. The experiment included the testing of six manurial, fertilizer and chemical combinations at ten stations, namely, Palmer Road, West Devon, Richmond, New London, Rose Valley, Rustico, De Sable, St. Peters, Montague and Wood Islands.

The variety Ditmars was used and seeding made at an early and a late date for comparative studies. In the majority of cases, one hundred turnips were cut from each plot for the determination of the disease content. The results of the trials were very interesting and considerable differences were noted between the various treatments.

The following table gives the average results obtained on eight stations, from the manurial, fertilizer and chemical treatments, as indicated:—

DISEASE CONTENT

Plot No.	Treatment per acre	Early seeding			Late seeding		
		Free	Slight	Severe	Free	Slight	Severe
		%	%	%	%	%	%
1	40 tons manure	74·2	4·9	20·9	80·6	6·9	12·5
2	10 tons manure plus 750 pounds 2–12–6 fertilizer	55·9	4·2	39·9	66·25	4·95	29·0
3	10 tons manure plus 750 pounds 2–12–6 fertilizer plus 2,000 pounds limestone	47·0	7·25	45·75	55·6	7·2	37·2
4	10 tons manure plus 750 pounds 2–12–6 fertilizer plus 1,000 pounds sulphur	65·75	7·0	27·25	76·1	5·6	18·3
5	10 tons manure plus 750 pounds 2–12–6 fertilizer plus 400 pounds salt	39·5	4·9	55·6	54·9	7·2	37·9
6	10 tons manure plus 750 pounds 2–12–6 fertilizer plus 10 pounds borax	84·0	7·25	8·75	86·1	9·9	4·4

NOTE.—No counts were made at De Sable and Rustico as all plots were free of brown heart.

A record was also kept of the yields at each station for the various treatments outlined above. They indicate that sulphur had a slight depressing effect. No appreciable difference was noted between other five treatments. A comparison was also made between yields at two seeding dates (May 26 and June 26). The average yield for the early seeding was 23·44 tons and for the late seeding 18·08 tons per acre, or a difference in favour of the early seeding of 5·36 tons per acre.

COMPARISON OF VARIETIES OF TURNIPS FOR CLUB ROOT RESISTANCE

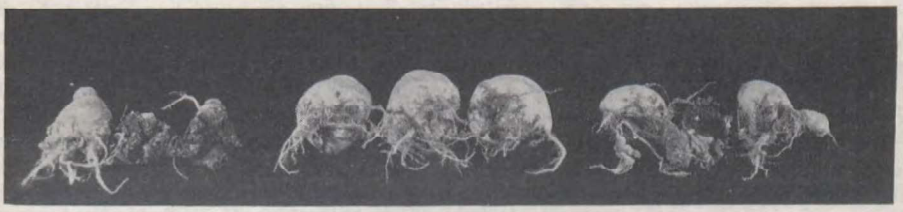
An interesting test, comparing thirteen varieties of turnips which it was claimed possessed resistance to club root, was tried at Rustico in 1933. The soil on which the test was made was very badly infested, and at harvest time, only two of the thirteen varieties were found to have no signs of club root infection on the roots. Several varieties were so badly infected that the stand was reduced to practically nothing. The following table gives the results obtained:—

CLUB ROOT OF TURNIPS—TEST OF VARIETIES—RUSTICO 1933

Name	Results
1. Ditmars, check	100 per cent badly infected; 80 per cent not fit for stock feeding.
2. Bangholm Herning D. K. L.	Free.
3. Bangholm, Experimental Station, Kentville	Trace on 100 per cent of turnips, on small rootlets only. Not sufficient to affect main part of root.
4. Bangholm Herning H. H. Co., Copenhagen	Trace on 20 per cent of roots on small rootlets only.
5. Wilhelmsburger, H. H. Co., Copenhagen	Free.
6. Bangholm, Experimental Farm, Nappan	100 per cent with slight to moderate infection, main part of roots not affected.

Name	Results
7. Bangholm, Olsgaard VII, D. K. L...	100 per cent severe infection.
8. Bangholm, Experimental Station, Charlottetown..	Trace on 100 per cent of turnips on small rootlets only, not sufficient to affect the main part of root.
9. Wilhelmsburger Otofte, B. K. L...	40 per cent of turnips slightly infected, main roots sound.
10. Bangholm Klark, H. H. Co., Copenhagen..	100 per cent slight to severe infection.
11. Green Top-General Swedish Seed Co.. ..	40 per cent slight to moderate infection; 60 per cent severe. Large turnips.
12. Bangholm Olsgaard, H. H. & Co., Copenhagen..	80 per cent severe infection, 20 per cent moderate infection.
13. Bangholm Sludsgaard, H. H. & Co..	60 per cent severe infection, 30 per cent slight and 10 per cent free.

The above test was repeated at Montague, but as no club root developed, no counts were taken.



Club root infested turnips grown in a variety test plot on the Illustration Station at Rustico, P.E.I. In the centre is a variety showing resistance.

CROP ROTATIONS USED ON THE STATIONS

A crop rotation comprises a regular succession of crops so arranged that the desired amounts of the chosen crops are grown and the soil handled in such a manner as to leave it in a better condition, as regards fertility and freedom from weeds, for the crops which follow.

There are numerous rotations in use on the Island, such as a three-year rotation, four-year rotation, six-year rotation, double rotation, etc. The advantages and disadvantages of many of these have been studied.

The four-year rotation of hoed crops, grain, clover and timothy is the one most commonly used on the Prince Edward Island stations. In this rotation one-quarter of the area under consideration is used for the growing of root crops (turnips, potatoes, corn, mangels) one-quarter for grain (wheat, oats, barley) and one-quarter each for clover and timothy. The areas for pasture have of necessity been provided for outside the station fields. This rotation has been found very valuable for demonstrating cultural practices and for securing high average yields at a reasonable cost. For example in 1933, the average yield per acre of potatoes was 278 bushels, costing fifteen cents, field run, turnips 23 tons, costing $1.86 per ton and oats 52 bushels, costing 36 cents per bushel. If the whole farm, with the exception of an area for permanent pasture was cropped, as in such a short four-year rotation, the tonnage of the various crops grown over a period of years would be substantial. The following will serve to illustrate—Field "A" at St. Peters, consisting of 2½ acres, has produced during the past nine years, the following crops—60 bushels of wheat, 318 bushels of oats, 9·5 tons of clover hay, 9·2 tons timothy hay, 1,415 bushels of potatoes, 19·3 tons of corn and 10 tons of turnips.

A five-year rotation, including an extra crop of grain preceding the root crop, has been employed at Rustico, New London, and De Sable, where more grain was

desired. This rotation has likewise proven satisfactory. A small application of commercial fertilizer for the grain crop preceding the root crop has been found necessary in order to maintain fertility.

On the majority of stations, an effort is being made to bring the operator's entire farm under a more systematic rotation. This, of necessity, is a slow and gradual process, and while few changes are anticipated at some of the stations, the changes at others will be extensive.

CULTURAL PRACTICES AND THEIR LOCAL APPLICATION

An important project carried on by the Division is that of demonstrating the practical applications of experimental findings of the Dominion Experimental Farms, dealing with cultural methods. In this connection, the securing of yields of farm crops on practical operated farms is undertaken.

The yields of all crops, with the exception of grain, are obtained by measuring and weighing the crops from representative areas of a definite size at various places throughout the fields. Samples for dry matter determinations are taken from the hay fields and yields calculated on an 88 per cent dry matter basis. Potatoes are graded into marketable and unmarketable sizes. To insure greater uniformity practically all samples and weights are taken by the supervisor.

Yearly records are kept of the following crops: Swede turnips, fodder corn, potatoes, oats, clover, timothy and timothy seed.

This section of the report includes a study of the cultural methods employed and results obtained in growing potatoes, clover and timothy for seed, while in the following section is a review of the cost of producing potatoes, oats, corn and turnips.

POTATO CULTURE

Potatoes are the main cash crop of Prince Edward Island farmers and as such a study has been directed to the various problems accompanying the practical production of this crop on the thirteen Island Illustration Stations.

Experimental results as well as general practices have clearly indicated the importance of planting certified seed. This is treated with a solution of corrosive sublimate, one part to 1,000 of water (4 ounces of the chemicals in 25 gallons of water) before cutting. The land is well cultivated, marked and the sets dropped by hand from eight to ten inches apart and then covered with a horse hoe. Farmers with large areas usually prefer a planter for this operation. About twenty bushels of sets are used per acre. As soon as the young plants begin to appear the scuffler is used. They are then covered with a horse hoe. In about a week's time they are again scuffled and covered. During the remainder of the season whenever weeds appear or a crust is formed after a rain, the scuffler and horse hoe are used to loosen the soil and to add clay to the drill. The last horse hoeing is done when the tops are so large as to make it difficult to get through, and an extra large hill is made at this time. Spraying is commenced as soon as the tops are six inches high and four or five sprayings of a 4-4-40 Bordeaux mixture are given during the season.

Records kept over a period of eleven years and covering 97 trials indicate that a yield of 300 bushels may reasonably be expected provided the necessary attention is given to seed selection, preparation of the seed bed, care of the crop while growing, and to fertility. The highest yields, over a period of years, have been secured at Montague, Red Point, Rose Valley and St. Peters. At the Montague station, potatoes have been grown since 1923 and yields have varied from 286 bushels to 509 bushels per acre with the average of 366 bushels. The seven-year average at Red Point is 360 bushels, at Rose Valley the eleven-year average is 315 bushels and at St. Peters an eleven-year average is 317 bushels. At De Sable potatoes have been grown for two years only, but very satisfactory yields have been obtained, namely, 465 bushels in 1933 and 355 bushels in 1932.

While the average for 1933 was slightly higher than for 1932, operators who grew the Irish Cobbler variety got low yields. This was true at Glenwood, New London, and West Devon, where the soil is above the average in fertility. The exceptionally dry weather in July and August caused the early potatoes to mature several weeks before the normal period, thus reducing the yield.

CLOVER HAY PRODUCTION

The season 1933 was ideal for haymaking and both clover and timothy were harvested in better condition than for many years.

When seeding down, eight pounds timothy, five pounds early red clover, two pounds alsike clover and three pounds Grimm alfalfa have been used in practically all instances. All seed has been Canadian grown and of No. 1 grade.

Seeding has always followed a hoed crop on the Prince Edward Island stations and the nurse crop has usually been oats, although wheat or barley are sometimes used.

Records kept over a ten-year period indicate that yields of clover hay on the stations have been somewhat disappointing. This was especially true in the earlier years of operation, when several of the stations lacked in fertility and lime, a condition which is being gradually overcome. The average yield on all the stations over a ten-year period is 1·54 tons and for 1933, 1·99 tons, an increase of nearly one-half ton per acre. Below are given the yields in tons per acre by stations for 1933 and in brackets the average to date: De Sable 1·30 (1·49), Glenwood 2·15 (1·63), Iona 0·82 (0·60), Montague 2·02 (1·81), New London 1·74 (1·08), Palmer Road 2·37 (1·66), Red Point 1·59 (1·04), Richmond 1·25 (1·68), Rose Valley 2·25 (1·62), Rustico 2·75 (1·85), St. Peters 3·22, two cuts (2·02), West Devon 2·68 (1·90), Wood Island 1·75 (0·93). The upward trend in production is particularly striking at Iona, Wood Island and at Red Point.

The highest average yields over a period of years have been secured at St. Peters (2·02 tons, ten-year average) and at West Devon (1·90 tons, ten-year average).

PRODUCTION OF TIMOTHY SEED

The Illustration Station operators are finding it profitable to save their own timothy seed, and for this purpose an area which is treated with a nitrate fertilizer is usually reserved, care being taken to have the area free from troublesome weeds, such as ox-eye daisy. Data so far collected indicate that 300 pounds of seed per acre at a cost of six cents per pound is the average.

In 1931, the average yield was 256 pounds at a cost of six cents, in 1932 from six stations, the yield was 405 pounds at five cents, and in 1933 the following yields were secured: Richmond, 418 pounds at five cents; West Devon, 240 pounds at six cents; and Wood Island, 200 pounds at ten cents. The comparatively high cost at Wood Island is partly due to the low yield and partly to the method of harvesting (cut with scythe and bound into sheaves by hand). The highest yield so far recorded was at Glenwood in 1932, when 640 pounds of No. 1 seed were harvested from one acre at a cost of two and one-half cents per pound.

COST OF PRODUCTION STUDIES (PRINCE EDWARD ISLAND)

In the economical management of any farm, yield and cost per unit are vital factors as they largely determine the profit or loss which is made. From a record of the labour, fertilizer, manure, seed, etc., that are used on a definite area and from the yields secured, the cost of production may be figured. Such records are carefully kept on all Illustration Stations for each crop grown.

This report gives data on the cost of producing four major farm crops in Prince Edward Island. namely, Swede turnips, fodder corn, potatoes and oats.

SWEDE TURNIPS.—In reviewing the average yields and cost of production per ton by stations, it is evident that yield is the most important factor in the low cost of producing farm crops, i.e., the higher the yield, the lower the cost per unit. The following will illustrate, the yields at Wood Island are among the lowest for the Prince Edward Island stations, 16·92 tons being a seven-year average and the average cost per ton $3.27. Compared with this an average yield of 27·19 tons has been secured at Palmer Road and the cost per ton only $1.58. At Montague, where the yield has average 27·29 tons per acre the average cost per ton is $2.02.

In 1933 the average cost per ton was $1.91, and $42.78 per acre for all stations. The largest item of expense in the above is for manure and fertilizer. Manual labour makes up the next greatest item of expense and is closely followed by horse labour. Twenty-seven per cent of the total expense was for manual labour.

FODDER CORN.—Corn is gradually proving to be a popular and valuable crop for Prince Edward Island farmers. This is due to several factors, such as quality of fodder, ease of planting and handling the crop, and the small amount of hand labour involved. In 1933 the average cost of producing turnips was $42.78 per acre and corn $34.55, a difference of $8.23. This difference is largely due to the comparatively large amount of hand labour required for the turnip crop as compared with the small amount for corn, $11.66 for turnips, and $5.01 for corn, a difference of $6.65.

The two greatest items of expense for the corn crop are manure and fertilizer and horse labour.

Yield plays an important part in producing corn at a reasonable cost per ton, as the following will indicate. The yield of corn at De Sable in 1933 was 22 tons and the cost per ton $1.43, while the yield at Wood Island was 8·27 tons and the cost per ton $3.22. The cost per acre was almost the same, $31.46 for De Sable and $27.62 for Wood Island.

POTATOES.—In the accompanying table on "Potatoes—Yield and Cost of Production by Stations" it will be noted that not only are yields and cost per bushel given for 1933, but also the average to date. These records include yields and costs on 97 separate fields covering an eleven-year period. In addition a statement of the various items of expense, such as use of land, manure and fertilizer, manual labour, horse labour, seed, etc., are included for the 1933 crop.

In examining the items of expense, it will be observed that manure and fertilizer make up the largest single item of cost, followed by horse labour, then by manual labour. The cost of seed and spray material varied from $5.50 to $10.72 per acre. The records also show that the average cost per bushel is 17 cents, when the average yield is 278 bushels per acre. This is field run and includes only those items of expense incurred in growing and storing the crop. No data have been collected of grading costs, shrinkage, truckage, bags, etc., all of which make up a large part of the actual cost of placing a bushel of potatoes on the market.

A 16-acre field of Green Mountain potatoes on the farm of Fred McIntyre, operator of the Illustration Station at Montague, P.E.I.

POTATOES—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre, 1933						Average		
	Yield per acre	Cost per bushel (field run)	Use of land and taxes	Manure and fertilizers	Manual (hand) labour	Horse labour including teamster	Seeds, spray material	Use of machinery	Number of years grown	Yield per acre	Cost per bushel (field run)
	bush.	cts.	$	$	$	$	$	$		bush.	cts.
De Sable	464·8	09	3 79	12 93	6 90	7 62	7 39	2 85	2	410·0	11
Glenwood	200·0	18	1 75	12 19	7 43	6 21	5 87	2 85	6	276·8	20
Iona	242·9	20	1 05	14 81	7 92	12 33	10 72	2 85	11	267·3	24
Montague	366·0	13	1 95	15 62	8 63	11 36	7 26	2 85	11	352·4	19
New London	168·0	25	2 60	15 66	5 10	9 23	5 73	2 85	6	251·2	24
Palmer Road*									3	290·4	16
Red Point	378·0	11	2 30	12 31	8 10	10 18	6 46	2 85	7	360·6	15
Richmond*									6	256·4	33
Rose Valley	264·0	17	2 45	15 26	7 65	9 40	6 42	2 85	11	315·2	22
Rustico	250·8	16	2 80	15 16	4 95	6 49	6 65	2·85	5	338·6	19
St. Peters	242·2	18	1 75	12 01	6 00	12 86	7 36	2 85	11	317·0	21
West Devon	161·4	25	2 10	11 61	7 50	11 00	5 50	2 85	11	276·9	25
Wood Islands	321·4	14	1 11	13 37	10 20	11 70	6 63	2 85	7	289·2	24
Averages	278·1	17								303·7	22

*No potatoes grown on these stations in 1933.

OATS.—Are the most important cereal crop in Prince Edward Island, and as such a careful record of yields and costs have been kept on all stations over a period of eight years and covering 73 separate trials.

In the following table a record of yield and costs per bushel is given for 1933 also the average to date:

OATS—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Number of years grown	Average	
	Yield per acre	Cost per bushel		Yield per acre	Cost per bushel
	bush.	cts.		bush.	cts.
De Sable	83·4	22	1	83·4	22
De Sable†	36·0	60	1	36·0	60
Glenwood	64·9	30	4	65·7	32
Iona	30·0	64	5	24·2	95
Montague	43·0	45	8	45·0	53
New London	53·7	26	6	41·2	44
Palmer Road*	.....	.....	.....	37·3	59
Red Point	64·0	33	3	56·0	38
Richmond	51·1	39	7	47·5	53
Rose Valley*	.....	.....	5	46·4	52
Rustico†	70·0	21	5	57·9	35
St. Peters	64·4	28	8	60·7	44
West Devon	30·0	65	8	34·5	69
Wood Islands	40·0	42	7	24·9	96
Averages	52·5	40	.....	44·7	57

†Oats grown after timothy.
*No oats grown on these stations in 1933.

A study of the table reveals that the cost per bushel varies indirectly with the yield per acre, as is illustrated by records at Glenwood (64·9 bushels at 30 cents), Iona (30·0 bushels at 64 cents), St. Peters (64·4 bushels at 28 cents) and West Devon (30·0 bushels at 65 cents). In the four cases, the cost per acre is very close, $20.47, $19.20, $18.03 and $19.50, for Glenwood, Iona, St. Peters and West Devon respectively. It will be further noted that the yields for 1933 in many cases are considerably higher than the average and consequently the cost per bushel is lower than the average to date. The very high yields at De Sable (83·4 bushels), Glenwood (64·9 bushels), Red Point (64·0 bushels) and Rustico (70·0 bushels), and the consequently low cost per unit is largely responsible for the low averages for 1933.

Manure and fertilizer made up the largest item of expense, as thirty per cent of the value of the manure and fertilizer applied to the preceding root crop is charged to the oats. It is estimated that the oat crop profits to this extent from the manure and fertilizer applied to the previous crop.

CHOICE OF VARIETIES OF FIELD CROPS—SALE OF SEED

The Illustration Stations in this province are doing a worthwhile work in standardizing varieties and in distributing seed of a high quality to farmers, mostly in the vicinity of the stations. The following are the varieties which have been found well adapted to the soil of the province and which are used almost exclusively on the stations:

Potatoes: Green Mountain, Irish Cobbler.
Turnips: Hazards Improved, Ditmars, Charlottetown, Bangholm Club Root Resistant.
Oats: Banner, Victory, Alaska.
Barley: Charlottetown, No. 80.
Corn: Longfellow.
Wheat: Huron, White Fife.

During 1933, the following amounts of seed were sold by eleven operators: wheat, 48 bushels; barley, 64 bushels; oats, 611 bushels; certified seed potatoes, 4,138 bushels; timothy seed, 1,963 pounds.

LIVE STOCK AND POULTRY

Steady improvement has been made in the live stock on the stations during the past three years. Seven operators have purchased pure-bred cattle and four pure-bred rams. There is, however, only one pure-bred herd, that at Rustico, which at the present time, numbers sixteen Holsteins. Operator Wm. E. Johnstone, New London, is quickly working toward a pure-bred herd of Guernseys and Hector McKay, De Sable, a pure-bred herd of Shorthorns. All are now weighing milk from their cows daily.

In tabular form is given a record of the milk and butterfat production of seventy-three cows completing a lactation period during 1933.

RECORD OF COWS COMPLETING LACTATION PERIODS DURING 1933—BY STATIONS

Station	Breed	Number of Cows	Average length of lactation	Average		Highest cows		Lowest cows	
				Milk production	Butterfat production	Milk production	Butterfat production	Milk production	Butterfat production
				lb.	lb.	lb.	lb.	lb.	lb.
De Sable	Shorthorn and Grade Shorthorn	5	231	6,236·8	239·2	7,133	284·9	3,796	154·8
Glenwood	Ayrshire Grade	8	320	5,936·2	213·2	9,836	416·6	4,161	146·4
Iona	Guernsey Grade	4	256	4,039·5	177·9	4,675	213·2	3,406	138·3
Montague	Aryshire Grade	4	399	10,044·2	340·1	12,004	415·0	7,302	273·0
New London	Guernsey and Grade Shorthorn	5	264	5,962·8	229·1	6,598	273·0	5,409	198·7
Palmer Road	Grade Ayrshire	5	305	5,942·6	222·0	7,697	245·4	4,376	183·9
Red Point	Grade Ayrshire	7	288	5,157·6	203·1	6,701	244·8	3,367	115·6
Richmond	Guernsey and Grade Shorthorn	5	229	5,336·8	202·4	5,681	215·8	4,830	191·2
Rose Valley	Grade Ayrshire	8	359	5,885·4	219·2	13,283	549·5	3,819	124·0
Rustico	Holstein	5	309	10,878·6	393·0	16,839	633·0	7,067	254·0
St. Peters	Grade Shorthorn	6	213	4,021·3	148·4	4,976	172·8	3,147	115·5
West Devon	Grade Jersey	4	339	5,532·5	192·1	8,813	318·1	3,610	126·1
Wood Island	Grade Ayrshire	7	288	5,449·9	205·2	9,051	323·6	3,460	127·0
Total		73							
Average		5·6	294	6,071·3	225·72	8,714·3	331·2	4,442·3	165·3

An examination of the above table shows that the average production for a 294-day period is 6,071 pounds milk and 225·7 pounds butterfat. These are slightly below corresponding productions for 1932 and can be attributed to the extremely dry pastures during July and August. A further study of the table shows that there is not only a great variation between the average production of the herds, but also between individuals in the same herd. The highest producing herd is that at Rustico, where the average production is 10,878 pounds of milk and 393 pounds of butterfat. The highest individual in this herd, Margaret Posch Pontiac 164033, gave in 365 days, 16,839 pounds of milk and 633 pounds of fat. This is equivalent to a daily production of 46·1 pounds of milk testing 3·76 per cent butterfat.

The average production of the highest individual cows from the thirteen herds is 8,714 pounds of milk and the production of the lowest cows from the same herds is 4,442 pounds of milk. This is a very large variation and is due to many low individuals, which will be eventually weeded out.

POULTRY IMPROVEMENT

Improvement is also being made in poultry. In the fall of 1932, Operators Grigg, Noonan, Clark, McKenzie, McKay and Daly purchased from the Experimental Station, Charlottetown, a breeding pen of ten hens and one cockerel. These are being used as foundation stock at the stations mentioned.

GENERAL IMPROVEMENT WORK

Considerable progress has been made during the past three years in improving the general layout of farm buildings, painting, etc. At Glenwood a hog house and a poultry house were moved to a new site where ample yard room is to be provided. At West Devon and at Palmer Road, the dairy barns have been remodelled. At Richmond and Rustico new poultry brooding houses have been built. At Rose Valley and at Wood Islands secure bull paddocks were constructed in 1933, and at Iona two large rotational poultry yards provided.

In 1933 Operators Peters, Clark, McEwen, Grigg and Noonan improved the appearance of their farm buildings by painting or whitewashing.

REPORT OF THE ILLUSTRATION STATIONS IN NOVA SCOTIA

FOR THE YEARS 1931, 1932 AND 1933

F. B. Kinsman, B.S.A., Supervisor

During the past season three new stations were established in this district of supervision. At the present time, there are seventeen in operation. Eleven of these are situated on the mainland of Nova Scotia, while six are situated on the Island of Cape Breton. Stations are located in each county except Shelburne, Queens, Kings and Cumberland; Kings and Cumberland Counties are served by Experimental Farms. The stations in the province are located at the following points and the work is being conducted by the parties as named—

Sydney River	Melvin Morsehead
Christmas Island	J. A. McNeil
Barra Glen	S. R. McNeil
Middle River	Forbes McDonald
North East Margaree	Tom E. Ross
Mabou	Edmund Hawley
Heatherton	D. W. Grant
Knoydart	D. M. McDonald
South Lochaber	John McDonald
Salt Springs	Fred Setchell
Upper Stewiacke	H. P. Cox
Middle Musquodoboit	R. B. McCurdy
Newport	Chas. Zwicker
Springfield	Maynard Grimm
Lilydale	W. I. Faulkenham
Meteghan Centre	Albert J. Comeau
Chegoggin	John C. Corning

From this report, it may be seen that the work has been standardized and is quite uniform at all stations, so as to ascertain local variations and the most recommendable practices. Special trials, however, have been undertaken on certain stations, relative to potato, mangel and alfalfa growing. The fertilizer trials have been extensive and included practically all classes of farm crops. It is felt that a great deal of valuable, practical information has been obtained by this work. In helping to obtain such information, credit must be given to the operators for their interest and active co-operation.

PRECIPITATION AND THE GROWTH OF CROPS

The winter of 1932 was characterized by a fairly even temperature and moderate snowfall. Very little damage was done to the clover roots from frequent thawings in the spring.

Seeding operations began about the usual time on the lighter and earlier soils. On the heavier types of soil, earlier seeding was possible, due to a lighter rainfall during May, consequently crops were sown or planted on schedule time in a well prepared seed bed. There was sufficient rainfall in June to keep crops growing well.

Splendid weather prevailed for hay-making. During the month of July, only 2·06 inches of rain fell, thus crops were housed in splendid condition and without undue labour costs from excessive rains.

91733—4½

Grain crops were unusually good. Grain sown on heavy types of soil was damaged somewhat due to heavy rains the latter part of August.

The hoed crops also gave good yields. Unfortunately, very heavy rainfalls occurred in September when 5·79 inches were recorded at Kentville and 7·25 inches were recorded at Heatherton Station. October's rainfall being 11·69 inches. Early planted potatoes were harvested without rot occurring, while the later planted potatoes on slightly heavier soil were seriously affected. The continued rainfall was most serious for the harvesting of the mangel and turnip crop. These crops were successfully housed at all the stations, yet many acres were still unharvested, when the unexpected, early snowfall occurred. This unfortunate weather condition has prevented fall ploughing in most parts of the province.

LIVE STOCK

During the past three years the live stock on the Illustration Stations has shown steady improvement. Four purebred bulls were purchased this year to still further affect the program of improvement. The operator at Lilydale purchased a purebred Jersey; at Springfield, a Shorthorn; at Knoydart, a Shorthorn; and at North East Margaree, an Ayrshire. All operators are keeping individual milk records. This procedure readily makes it possible to determine which of the cows should be weeded out. The milk, as well as the butterfat produced at each station is on the increase. The improvement of pastures, as well as growing more succulent feeds has aided greatly in bringing this about. Several of the operators have reclaimed some of their old pastures and with the knowledge as to the use of fertilizers have been able to cope successfully with the feed problem.

The following table shows the breed, number of cows milking, the average butterfat, the average milk production, also the highest, as well as the lowest producing individuals in the herds.

MILK PRODUCTION BY STATIONS—1933

Station	Breed	Number of cows milked	Average days lactation	Average milk production	Average per-cent butterfat	Highest cow production	Lowest cow production
				lb.	%	lb.	lb.
Sydney River	Holstein, grade	16	310	7,809	3·9	10,493	6,543
Christmas Island	Ayrshire, grade	7	300	4,219	4·2	5,323	3,964
Barra Glen	Guernsey, grade	6	310	4,831	4·9	6,454	4,931
Middle River	Guernsey, grade	4	305	4,912	4·0	5,934	3,944
N.E. Margaree	Aryshire, grade	14	305	5,543	4·8	6,534	4,453
Mabou	Guernsey, grade	6	300	4,614	4·1	5,612	2,943
Heatherton	Holstein, grade	11	305	7,103	4·2	8,433	6,432
Knoydart	Ayrshire, grade	8	302	4,969	4·7	6,421	4,836
Salt Springs	Jersey, purebred	18	305	6,230	5·0	7,712	5,822
M. Musquodoboit	Guernsey, grade	14	305	5,430	4·9	6,549	4,430
Upper Stewiacke	Shorthorn, grade	11	305	6,830	4·0	7,630	5,844
Newport	Guernsey, grade	15	325	7,231	5·0	8,664	6,420
Springfield	Jersey and Shorthorn, grade	7	305	5,730	4·5	8,876	5,170
Chegoggin	Jersey, purebred	18	305	5,540	5·6	9,846	4,266
Lilydale	Jersey and Ayrshire, grade	23	*	7,486	4·9	8,930	6,320

*New Station.

A survey of the above table shows the highest producing herd was at Sydney River, giving a herd average of 7,809 pounds of milk, with an individual production of 10,493 pounds. Other herds giving a fairly good average production are Heatherton, Newport, Lilydale, Springfield, Chegoggin, Upper Stewiacke and North East Margaree.

There are at a few of the stations, individuals which are low in milk production. These are being weeded out, breeding stock being saved only from the highest producers.

A useful dairy ration has been used by the operators and is as follows. This is proving practical in helping them mix, as well as grow, more of the home-grown feeds, which are contained in this ration.

DAIRY RATION FEATURING HOME GROWN FEEDS

Kind of feed	Quantity	Dry matter	Protein	Digestible nutrients, carbo-hydrates and fats
	lb.	lb.	lb.	lb.
Clover hay (at 8 cents per pound)	15	12.705	1·065	6·285
Roots (at $4 per ton)	30	3·420	0·300	2·580
Ground oats (at $1,60 per cwt.)	5	4·480	0·440	2·945
Barley (at $1.60 per cwt.)	1	0·891	0·084	0·689
Wheat bran (at $1.25 per cwt.)	2	1·762	0·238	0·952
Oil cake (at $2 per cwt.)	2	1·820	0·630	0·822
	55	25·078	2·757	14·273

NUTRITIVE RATIO—1-5-2

The meal mixture for the above ration is: ground oats, 500 pounds; barley, 100 pounds; wheat bran, 200 pounds; oil cake meal, 200 pounds; bone meal, 20 pounds, and salt, 10 pounds.

It will be noticed that all feeds are home-grown, except bran and oil cake. In this ration there are 600 pounds of the meal the farmer grows on his farm, leaving only 430 pounds to be purchased. The oil meal may be replaced by gluten, fish meal or cotton seed meal, depending upon the market price.

POULTRY IMPROVEMENT

The greatest advance in poultry improvement on the stations has taken place during the last two seasons. Each operator has erected a brooder house from plans supplied and procured fifty Barred Rock baby chicks as foundation stock. Information has been supplied the operators on the care and handling of chicks from their arrival as day-old chicks until they are put on the market. From two years' work along this line, less than three per cent of the day-old chicks have died. These chicks were obtained during the month of April; they developed rapidly and commenced laying by October.

The cockerels have been inspected at these stations and banded. They have been offered to the public for breeding purposes. The operator at Salt Springs disposed of forty, the largest number for any one operator. A total of 205 cockerels were disposed of for breeding in 1933, as well as 315 dozen eggs for hatching purposes. Many of the pullets and cockerels were entered at local exhibitions and school fairs.

HORTICULTURE

The one-half acre trial orchards set out seven years ago on the Illustration Stations have done as well as expected. These were set out to ascertain the suitability of certain varieties for the districts and the possibility of supplying early and winter apples for home use. At a few of the stations, fruit has been produced of good quality from McIntosh, Wealthy and Duchess varieties.

The orchard at Middle River, Cape Breton, has been the most productive in fruit, as well as the growth of the trees. At North East Margaree, Mabou and Heatherton a few apples of the varieties above mentioned were grown. The growth on trees has averaged approximately eight inches, which is evidently sufficient to keep the orchards in a healthy condition. There is a little moss developing on the trunks of the trees at Mabou, North East Margaree and Middle Musquodoboit, which will be remedied by a dormant spray of lime-sulphur next spring before vegetation starts.

The fertilizer used has been mainly manure with a small quantity of nitrogenous fertilizer cultivated around the fruit trees in early spring.

SMALL FRUITS

Strawberries appear to be the most popular variety of the small fruit class to grow at the stations. Each year the majority of the operators set out a new plantation. The Middle River operator finds a ready market for all the berries they grow. The farmers, however, in this district are starting to grow this crop and at present the competition has become a little more keenly felt by the operator. At North East Margaree, Middle Musquodoboit, Springfield, Lilydale, and Yarmouth, the areas are steadily increasing.

CRANBERRY INVESTIGATIONS

Cranberries grow wild in many sections in Nova Scotia. There are vast areas of such bogs scattered over the province, which if brought into productiveness would provide a cash crop for many farmers and reduce import, through the local production of the crop.

Field studies were started during the past season at three points, namely, Port Mouton, Dunvegan and Ste. Rose, in order to determine the most practical method of coping with some of the problems of cranberry development. At Port Mouton the area is being ditched, turfed, sanded and finally planted. This section contains vast areas of such bog lands. Cranberries, at one time, were planted, but through years of neglect have become practically worthless, yet those that are gathered, are of good size, colour and quality. At Dunvegan, cranberries are growing naturally, on rough land where grass and small shrubs predominate. At this point two methods of renovation are being compared. On one, the shrubs will be removed, the land fertilized and sanded on top of the sod; on another section the area was ploughed during the summer and will be sanded for planting in the spring. The area at Ste. Rose is of a low, boggy type. This was ditched and the greater part of the area scalped. The sand will be applied this winter and the vines planted in the spring.

Cost data are being collected and information gathered for the guidance of others, who may be interested in similar developments.

EFFECT OF NITROGENOUS FERTILIZERS ON GRASS LAND

The effect of applications of nitrogenous fertilizers on grass lands has been under study since the stations started in Nova Scotia. Varying forms of nitrogen have been used and ten years' results have been obtained from the use of 150 pounds of nitrate of soda, 115 pounds of sulphate of ammonia, as well as five years' results from the application of 150 pounds of nitro chalk per acre.

The practice followed has been to apply these nitrogenous fertilizers, in the early spring, as soon as vegetation starts, on a two-year sod or older. As the nitrification in the soil is slower in the spring than later, it is important that such applications should be made at the proper time.

The average increase in hay, this season, resulting from the use of nitrogenous fertilizers was at Sydney River, 838 pounds; at Christmas Island, 1,583 pounds; at Barra Glen, 1,486 pounds; at Middle River, 1,320 pounds; at North East Margaree, 238 pounds; at Heatherton, 871 pounds; at Knoydart, 3,447 pounds; at Salt Springs, 2,541 pounds; at Upper Stewiacke, 881 pounds; at Middle Musquodoboit, 736 pounds; at Newport, 1,183 pounds; at Springfield, 1,121 pounds; at Mabou, 1,088 pounds; at Meteghan Centre, 605 pounds; at Lilydale, 1,261 pounds; and at South Lochaber, 945 pounds, over the unfertilized areas, which received no application of nitrate of soda, sulphate of ammonia or nitro chalk.

At seven stations the average increase over a ten-year period, due to nitrogenous fertilizers was at Sydney River, 1,062 pounds; at Christmas Island, 1,221 pounds; at Middle River, 821 pounds; at North East Margaree, 284 pounds; at Heatherton, 1,061 pounds; at Middle Musquodoboit, 886 pounds; and at Newport, 1,637 pounds, over the unfertilized areas. Over all stations where nitrogenous fertilizers have been applied, an increased yield of 1,002 pounds of timothy hay has been obtained.

COMPARATIVE EFFECT OF COMMERCIAL FERTILIZERS AND MANURE ON POTATOES AND SUCCEEDING CROPS

The comparative tests with commercial fertilizers used in conjunction with manure was started at eleven stations in the spring of 1930. The object being to determine, if possible, which fertilizer, when used in conjunction with manure, or manure alone, would give the most economical yields.

Uniform soil was selected for this test. The past history as to its treatment was known. The soil was ploughed in early fall of 1929 to the depth of six inches. Manure was applied broadcast in early spring of 1930 and harrowed well into the soil, after which the commercial fertilizers were applied broadcast to the different areas and harrowed in just before planting the seed.

Irish Cobbler potatoes were planted in rows thirty-three inches apart and the sets being twelve inches apart, in the rows. The potato crop received the necessary cultivation and care throughout the growing season. A good crop of clean, uniform, potatoes, free from rot was harvested.

The table given below shows four years' results of this test,—

COMPARATIVE EFFECT OF COMMERCIAL FERTILIZERS AND MANURE ON POTATOES AND SUCCEEDING CROPS (BEGUN 1930) YIELDS PER ACRE

Stations	Manure, 20 tons per acre				Manure, 10 tons, 5-10-5 fertilizer, 600 pounds per acre				Manure, 10 tons, nitrophoska, 200 pounds, per acre			
	Potatoes	Oats	Clover	Timothy	Potatoes	Oats	Clover	Timothy	Potatoes	Oats	Clover	Timothy
	bush.	bush.	tons	tons	bush.	bush.	tons	tons	bush.	bush.	tons	tons
Sydney River	256·6	38·1	1·60	1·11	273·3	36·0	2·03	1·17	187·0	35·1	1·69	1·51
Christmas Island	121·0	18·5	1·10	0·99	166·2	23·4	1·48	1·25	105·5	23·0	1·40	1·21
Barra Glen	104·0	14·2	1·10	1·15	184·0	19·0	1·41	1·30	140·0	20·1	1·36	1·21
Middle River	280·0	.....	2·25	2·80	304·0	.....	2·80	2·97	320·0	.....	2·07	2·75
N.E. Margaree	403·7	48·0	2·10	1·40	444·0	48·5	2·05	1·43	430·6	47·3	1·96	1·38
Mabou	103·3	36·4	1·81	1·19	396·0	39·2	2·00	1·30	350·0	39·9	1·90	1·22
Knoydart	154·5	25·6	1·47	1·20	228·0	38·4	2·43	1·33	154·5	33·9	2·43	1·40
Upper Stewiacke	202·5	90·4	1·44	1·15	255·0	64·0	1·60	1·22	225·0	74·9	1·76	1·16
Salt Springs	258·0	60·7	2·18	1·76	319·0	66·0	2·66	1·83	334·0	62·7	2·18	1·93
Springfield	243·2	41·0	1·25	1·01	275·8	43·4	2·50	1·09	333·9	40·1	1·08	1·00
Kennetcook	210·8	36·1	.....	.....	247·5	37·0	.....	.....	229·0	36·4	.....	.....
Average	212·5	40·9	1·63	1·37	281·2	41·5	2·10	1·48	255·4	41·3	1·78	1·47

COMPARATIVE EFFECT OF COMMERCIAL FERTILIZERS AND MANURE ON POTATOES AND SUCCEEDING CROPS (BEGUN 1930) YIELDS PER ACRE—*Concluded*

Stations	5-10-5 fertilizer, 1,200 pounds per acre				Manure, 20 tons, superphosphate, 400 pounds per acre				Manure, 20 tons, superphosphate, 400 pounds nitrate of soda, 150 pounds per acre			
	Potatoes	Oats	Clover	Timothy	Potatoes	Oats	Clover	Timothy	Potatoes	Oats	Clover	Timothy
	bush.	bush.	tons	tons	bush.	bush.	tons	tons	bush.	bush.	tons	tons
Sydney River	271·1	33·0	1·32	1·17	249·3	37·1	1·49	1·20	304·5	37·6	1·60	1·23
Christmas Island	161·3	25·1	1·55	1·40	121·0	34·5	2·40	1·63	142·1	25·0	2·99	1·62
Barra Glen	152·6	23·1	1·49	1·01	136·0	22·0	1·92	1·71	151·0	23·5	2·01	1·82
Middle River	264·0	.....	2·50	2·55	298·1	.....	2·75	2·91	302·0	.....	2·81	2·99
N.E. Margaree	342·9	47·1	1·99	1·33	261·0	51·5	2·22	1·60	294·1	53·2	2·40	1·69
Mabou	337·3	41·0	2·01	1·15	374·0	42·2	2·00	1·50	341·0	44·0	2·10	1·50
Knoydart	228·3	33·9	2·04	1·11	221·0	40·9	2·36	1·81	218·3	40·9	2·43	1·83
Upper Stewiacke	180·0	53·3	1·28	1·15	277·5	48·0	1·68	1·63	210·0	48·6	1·79	1·62
Salt Springs	290·0	66·0	2·05	1·83	279·0	43·9	2·42	1·36	305·0	46·0	3·02	1·49
Springfield	308·5	42·0	1·63	1·14	225·5	42·5	1·63	1·20	312·0	44·0	1·92	1·22
Kennetcook	183·3	34·9	.....	.....	173·0	34·3	.....	.....	198·0	38·0	.....	.....
Average	247·2	39·9	1·79	1·38	237·8	39·7	2·09	1·65	252·5	40·1	2·31	1·70

Stations	Manure, 20 tons, superphosphate, 400 pounds, sulphate of ammonia, 115 pounds per acre				Not fertilized			
	Potatoes	Oats	Clover	Timothy	Potatoes	Oats	Clover	Timothy
	bush.	bush.	tons	tons	bush.	bush.	tons	tons
Sydney River	274·0	38·0	1·63	1·25	182·2	26·2	0·90	1·01
Christmas Island	149·2	24·8	2·60	1·58	98·5	13·2	1·02	0·90
Barra Glen	149·0	24·0	2·00	1·79	74·1	10·0	0·81	0·77
Middle River	296·1	.....	2·76	2·94	159·3	.....	1·15	1·28
N.E. Margaree	305·2	52·0	2·31	1·66	180·0	36·0	1·18	1·03
Mabou	349·2	43·2	2·02	1·53	173·0	30·1	1·01	0·98
Knoydart	221·6	40·9	2·56	1·79	154·8	15·3	1·15	1·02
Upper Stewiacke	195·0	48·2	1·74	1·65	120·0	37·2	1·20	1·05
Salt Springs	297·0	52·0	2·90	1·42	145·0	38·0	1·45	1·08
Springfield	304·9	40·0	1·90	1·29	157·5	36·0	0·86	0·88
Kennetcook	192·5	37·2	.....	.....	110·0	28·0	.....	.....
Average	248·5	40·0	2·24	1·72	141·3	27·0	1·07	1·00

It will be seen, that the area receiving 10 tons of manure and 600 pounds of 5-10-5 fertilizer gave the largest yield. An average of 281·2 bushels of potatoes were produced; 255·4 bushels was the next largest average, where 10 tons of manure and 200 pounds of nitrophoska were applied. The application of 20 tons of manure gave the lowest yield of any of the fertilized areas with 212·5 bushels, while the lowest yield was the unfertilized area with an average of 141·3 bushels.

The oat area was sown in the spring of 1931 at the rate of 3 bushels per acre and seeded with a grass mixture consisting of 10 pounds of timothy, 5 pounds of red clover and 5 pounds of alsike clover. The grain crop on all areas gave a good yield. Again the highest yield of grass was obtained from 10 tons of manure and 600 pounds of a 5-10-5 fertilizer, when an average of 741·5 bushels were produced. Although other fertilized areas, such as one receiving 10 tons of manure, 200 pounds of nitrophoska, with an average of 41·3 bushels, other average yields, as may be seen, were nearly as good.

The clover hay yield of 1932 was also good throughout. It will be noticed, that all areas were better than the unfertilized one, also the area receiving 20 tons of manure, 400 pounds of superphosphate and 150 pounds of nitrate of soda per acre, gave the greatest average yield of 2·31 tons, which is an increase over the area receiving 20 tons of manure alone, of 0·68 ton; this being the smallest clover hay yield of all fertilized areas.

The timothy hay yield this season was also good. It may be seen that the area receiving 20 tons of manure, 400 pounds of superphosphate and 115 pounds of sulphate of ammonia gave the greatest average yield of 1·72 tons, while the next best average yield was from 20 tons of manure, 400 pounds of superphosphate and 150 pounds of nitrate of soda, while the area receiving 20 tons of manure alone, gave the poorest average of any fertilized area.

PASTURE IMPROVEMENT BY THE USE OF COMMERCIAL FERTILIZERS

There are at present eight pasture improvement areas in operation in Nova Scotia. These pastures were infertile and unproductive, yet representative of large tracts of pasture that exist there.

In the spring of 1932, on representative pasture land, three fields of one and one-half acres each were selected and fenced separately. One area received 700 pounds per acre of a 4-8-7 fertilizer; another area received 700 pounds per acre of a 4-8-7 fertilizer and 2 tons of ground limestone, while one was left unfertilized. These areas received in the spring of 1933, 115 pounds of sulphate of ammonia, just as vegetation started.

Dairy cattle were allowed to graze on each field alternately in order to determine the increased milk yields as well as the grazing days from these areas. The table below shows stations where conducted, also the increased milk yields over the unfertilized areas, as well as the increase in grazing days per cow, due to fertilizer treatment.

The average increase in milk, as well as pasture days is also given. The average increase in milk increased from 1,529 pounds in 1932 to 2,079 in 1933. Although the average increase in grazing days was 58·6 in 1932, it decreased to 49·6 days in 1933.

The following table gives the increase in milk, also increase in pasture days due to fertilizer:

INCREASED MILK YIELDS AND GRAZING DAYS PER COW FROM FERTILIZER TREATMENTS

Station	Increase in milk due fertilizers		Increase in grazing days per cow, due to to fertilizers	
	1932	1933	1932	1933
	lb.	lb.	lb.	lb.
Chegoggin	1,732	4,074	46	83
Heatherton	1,700	176	32	0
Knoydart	1,196	3,214	45	49
Middle Musquodoboit	599	2,736	75	91
North East Margaree	2,690	1,082	81	29
Salt Springs	1,262	1,900	73	86
Mabou	.....	753	.....	6
Lilydale	.....	2,699	.....	53
Average	1,529	2,079	58·6	49·6

EFFECT OF VARYING AMOUNTS OF POTASH ON POTATOES

In order to obtain information on the potash requirements of the potato crop under varying soil conditions existing in Nova Scotia a series of comparative trials were started in 1932 with chemical fertilizers, carrying different proportions of potash. This work was conducted at four stations in 1932 and increased to five in 1933 when this project was undertaken at Lilydale, Lunenburg Co.

Two thousand pounds of a mixture in which the nitrogen and phosphoric acid were constant (475 pounds, sulphate of ammonia and 1,000 pounds, phosphoric acid) muriate of potash varied from that with none in the mixture to 640 pounds per acre.

The two-year average yields at four stations in 1932 and five stations in 1933 were as follows:

5-8-0 mixture—236 bushels per acre.
5-8-4 mixture—280 bushels per acre.
5-8-8 mixture—322 bushels per acre.
5-8-12 mixture—322 bushels per acre.
5-8-16 mixture—343 bushels per acre.

There was considerable variation in the types of soil where the tests were conducted with varying amounts of potash. The soil varied from a gravelly loam, such as found at Sydney River, light loam, such as at North East Margaree, medium loam at Chegoggin and clay loam at Newport.

Studying the individual yields obtained, there was a gradual increase in yields of potatoes up to and including a 5-8-8 fertilizer mixture at all stations. Two stations, Sydney River and North East Margaree, the yields were increased proportionately due to the heavier applications of potash. The soil at these two stations consists of a light gravelly loam. At Newport and Chegoggin, however, where the soil consists of a loam to a light clay, the yields were not consistent. The potato yields at these two stations were larger from the use of a 5-8-8 than from a 5-8-12 mixture.

From these studies, it would appear that there was a shortage of potash on the lighter types of soil, while on the heavier types the requirements for heavier applications of potash do not appear to be as great.

THE EFFECTS OF SUPERPHOSPHATE WITH MANURE IN THE PRODUCTION OF THE TURNIP CROP

Studies have been undertaken at all the Illustration Stations in Nova Scotia, to determine, if possible, the practicability of using superphosphate in the economical production of turnips in conjunction with manure.

Twenty tons of manure were used per acre applied in the spring on soil which was ploughed the fall previous. The soil was well worked up in the spring and a well prepared seed bed was established. One-half acre received superphosphate at the rate of 400 pounds in addition to manure and harrowed in lightly before seeding. It was considered a splendid study of the production of this crop. The young plants, which received superphosphate came along rapidly and had all the appearance of turnips being sown a week earlier than where grown from manure alone.

This season's yield of turnips was generally good. One outstanding yield was obtained at Middle Musquodoboit, when 25·8 tons of turnips were harvested per acre. Until this area had a tile drain laid, it was impossible to grow turnips. At Knoydart the yield was 28·4 tons. When this station was established no turnips were grown on this farm or in the district. The yield at Mabou was 22 tons; the lowest yield on the stations was obtained at Upper Stewiacke, namely, 15 tons. The average yield of turnips at the stations this season was 20 tons with an average cost of $2.98 per ton, while the average production on the stations extending over a twelve-year period has been 18·9 tons with an average cost of $3.73 per ton.

The yields from the application of superphosphate, materially increased the yield of turnips. This season's yields from 20 tons of manure gave an average yield of 20·2 tons and when in addition 400 pounds of superphosphate were applied, the yields were 24·33 tons per acre.

TEST OF TURNIP VARIETIES FOR CLUB ROOT RESISTANCE

During the past season, the Illustration Stations in Nova Scotia have co-operated with the Committee on Club Root Investigations. Fourteen varieties of turnip seed were planted at three stations, namely, Newport, Upper Stewiacke and North East Margaree, on land which was known to be hazardous for turnip growing, because of the presence of club root. These varieties were planted in alternate rows with one of Ditmars separating each as a check. The crop was fertilized and handled in the usual way until harvest time. When being pulled the per cent club root was determined in each variety and records established on the basis of the severity of the infestation and whether it was, " very severe," " severe," " slight or free."

From a review of the information assembled on the different varieties in 1933, it was found that there was a variation in the per cent resistance to club root at the different stations. Wilhelmsburger Otofte, was found to be 94 per cent free, Bangholm (Kentville Strain) 86 per cent free, Bangholm, (Nappan Strain) 83 per cent free, Wilhelmsburger, Hartman 75 per cent free. All other varieties showed a loss of over 30 per cent of the crop due to disease; in certain varieties the loss amounted to 99 per cent of the crop.

Because of their economic importance, these trials were the subject of considerable interest and discussion throughout the summer, particularly so, at the time of the field days on the stations.

CLOVER GROWING

On the Nova Scotia Illustration Stations, the production of clover hay and its economical production has been the source of considerable annual study. This has been necessary, due to the wide variation in soil types, available supply of plant food, drainage and water holding capacity. In type, these soils vary from gravelly loams, sandy loams, to clay loams. Some are acid to the degree that clovers do not thrive until corrective measures have been taken, others are low in phosphorus to the extent of its being a limiting factor in clover yields.

As a systematic cropping sequence is being followed on the stations, the seeding to grasses and clovers follows an intertilled crop, such as potatoes, turnips or mangels. The grass and clover mixture used at the present time, is made up of 5 pounds of red clover, 3 pounds of alsike, 3 pounds of alfalfa and 8 pounds of timothy. Up until two years ago, the mixture used was 5 pounds of red clover, 5 pounds of alsike and 10 pounds of timothy, and is seeded at the rate of from 18 to 20 pounds per acre. The recommended rate is 20 pounds per acre, although it is found that some seeders do not sow that heavy. The alfalfa seed is treated with nitro-culture, prior to its being added to the mixture.

In order to study the soil requirements on the different stations with respect to lime and phosphorus, a series of trials were laid down at each station. At Sydney River, the yield of clover hay from the unlimed plot was 1·4 tons, where 2 tons of lime were applied, 2·3 tons, lime and superphosphate producing 2·4 tons. At Christmas Island, where no lime was applied, the yield was 1 ton, and where lime and superphosphate were added, the yield was 1·3 tons per acre. At Barra Glen, the application of lime increased the clover yield by 1·1 tons; at North East Margaree by 1·3 tons; at Middle River, by 1·3 tons; at Mabou, by 1·5 tons; at Heatherton, by ¾ of a ton; at Middle Musquodoboit, by ¾ of a ton; and at Newport, by ½ of a ton. On the average of all stations, the clover yield in this trial averaged 1·1 tons, from the unlimed land, 1·9 tons where ground limestone was applied and 2·3 tons where lime and superphosphate were used, lime at the rate of 2 tons per acre along with 800 pounds of superphosphate.

CROP ROTATIONS (ON NOVA SCOTIA ILLUSTRATION STATIONS)

The establishment of a systematic rotation forms the basis for building up soil fertility, increasing efficiency in farm management and the establishment of a well rounded out, progressive farm improvement policy.

At the present time, there are three types of rotations in use on the Illustration Stations, namely, that of a four-year cropping cycle, a five-year cropping cycle and a six-year cropping cycle or rotation. On thirteen of the stations in this district, the following four-year rotation has been established.

Four-year Rotation—

1st year—Corn, mangels, potatoes, or oats, peas and vetch.
2nd year—Oats, barley or wheat seeded to grass and clovers.
3rd year—Clover hay.
4th year—Mixed hay.

In this rotation provision is made elsewhere for pasture, which in the majority of cases is of a permanent type and on which a study is made as to the use of chemical fertilizers in improving their productivity. This short rotation provides for an abundant supply of roots and clover hay for stock and is also advantageous in that it offers a satisfactory and systematic procedure for carrying out timely and proper cultivation; other advantages include the control of competitive plants, such as couch grass, the application of farmyard manure or fertilizers once every four years and by including clover, providing for the production of an important soil improving legume.

A five-year rotation is being followed by the operators of the stations at Newport and Middle River, which is as follows:

Five-year Rotation—

1st year—Turnips, mangels, potatoes.
2nd year—Oats, barley or wheat seeded to grass and clover.
3rd year—Clover hay.
4th year—Mixed hay.
5th year—Grain.

This rotation, although not so commonly practised, contains many of the advantages of the four-year rotation previously referred to and at the same time provides for the production of a larger proportion of grain on the farm as a means of reducing the necessity of purchasing concentrated feeds. The breaking up of the sod before the hoed crop has also been found advantageous, where mangels are being grown, which at the present time is the case in an increasing degree.

At two stations, namely, Chegoggin and Lilydale, the following six-year rotation has been adopted:

Six-year Rotation—

1st year—Potatoes, turnips and mangels.
2nd year—Oats, barley, or wheat seeded to grass and clovers.
3rd year—Clover hay.
4th year—Mixed hay.
5th year—Timothy hay.
6th year—Oats, barley or wheat.

On these heavier soils, clovers persist to a greater degree than in many other portions of the province, making it costly and not sound in practice to break up the meadow following two crops of hay. This rotation also provides a suitable medium for the production of mangel and root crops and likewise supplies a goodly proportion of concentrated mill feeds for the large dairy herds maintained at these points.

COST OF GROWING CROPS IN NOVA SCOTIA

In the development of a systematic farm improvement program, a practical knowledge as to the cost of growing crops is essential; such information makes it possible to decide the crops which can be most economically grown, also serves as a basis for checking up on rotation practices, cultural procedures, also the proper proportion of horse and manual labour in relation to the size of the farm unit.

The study of the cost of growing crops in Nova Scotia, based on a period of the past twelve years' results, indicates the close relation of cost to such factors as original state of soil fertility, number of live stock kept and supply of farmyard manure, crop sequence adopted, prevalence and types of weeds, seasonal conditions, drainage, etc. On the seventeen Illustration Stations a wide range of soil types are represented, as well as their original condition with respect to fertility. Generally speaking, they would be classed as low in fertility.

When compiling the cost as given in the undermentioned table such factors as use of land, taxes, cost of manure, fertilizer, use of machinery, cost of seed, twine, spray and other material have been taken into consideration. Each station operator keeps a daily record of the horse and manual labour employed in the production of each crop. Such labour charges are calculated on the basis of prevailing rates for both horse and manual labour in each district, thus in the per bushel or ton cost presented, the operator or his family and team has been allowed wages at prevailing rates.

The following table summarizes the cost of growing the five most important farm crops being grown on Nova Scotia farms. These crops have been grown in a four-year rotation or cropping cycle and cover a varying period as indicated, depending on the number of years each station has been in operation.

Station	Potatoes					Turnips					Oats					Clover hay					Timothy hay				
	Number of years	Yield per acre		Cost per bush.		Number of years	Yield per acre		Cost per ton		Number of years	Yield per acre		Cost per bush.		Number of years	Yield per acre		Cost per ton		Number of years	Yield per acre		Cost per ton	
		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average
		bush.	bush.	cts.	cts.		tons	tons	$	$		bush.	bush.	cts.	cts.		tons	tons	$	$		tons	tons	$	$
Sydney River	1	287	177	19	58	.....	.....	.....	.....	.....	12	42·0	43·0	54	58	12	3·5	2·6	5 13	6 76	12	2·4	2·5	6 21	1 07
Christmas Island	12	273	177	25	58	12	20·8	12·4	3 26	7 04	12	39·0	37·0	63	79	11	2·5	2·2	6 68	8 82	10	2·2	1·9	6 39	9 31
Barra Glen	11	360	222	23	52	6	17·4	19·9	3 10	4 11	5	35·0	39·0	65	58	3	2·2	2·3	7 12	8·08	4	2·0	1·9	7 33	9 68
Middle River	10	300	239	26	40	5	16·2	17·7	3 77	4 02	2	35·0	38·5	47	47	11	2·8	2·7	6 13	6 51	11	2·8	2·2	5 17	7 38
North East Margaree	12	343	395	25	29	12	18·0	22·5	2 87	3 20	12	45·0	48·7	46	58	12	3·0	3·8	5 83	5 75	11	2·7	3·0	5 41	4 91
Mabon	3	333	355	25	33	6	22·0	19·5	2 85	3 31	8	49·0	43·2	42	63	8	1·9	2·0	7 20	7 08	7	2·0	1·9	6 81	7 19
Heatherton	3	230	247	33	44	12	20·1	16·7	3 38	2 67	1	45·0	.....	46	.....	11	2·2	2·0	8 10	8 12	11	2·2	1·9	6 40	7 72
Knoydart	4	453	315	17	35	4	28·4	20·4	2 13	2 87	4	47·0	48·3	43	39	3	3·4	2·5	5 37	6 23	4	2·4	1·7	6 85	6 34
Salt Springs	4	216	282	33	35	4	21·5	20·6	2 49	3 28	.....	.....	.....	.....	.....	2	2·7	2·3	6 36	6 39	1	1·7	.....	8 20	.....
Upper Stewiacke	4	281	310	25	38	2	15·0	17·5	3 64	3 81	.....	.....	.....	.....	.....	4	2·9	2·7	6 55	7 11	4	2·2	1·9	6 85	6 34
Middle Musquodoboit	.....	.....	.....	.....	.....	1	25·9	.....	2 30	.....	8	67·0	42·5	31	66	7	2·8	2·3	6 10	6 85	6	2·1	1·8	7 20	7 71
Newport	.....	.....	.....	.....	.....	9	21·8	21·8	2 91	2 99	10	59·0	58·2	35	46	9	3·1	2·6	5 24	6 88	11	2·9	2·1	5 22	6 85
Chegoggin	1	287	.....	27	.....	.....	.....	.....	.....	.....	1	62·5	.....	37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Lilydale	.....	.....	.....	.....	.....	1	28·4	.....	3 20	.....	1	55·0	.....	40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Springfield	5	319	279	24	41	3	17·6	19·9	2 91	3 76	5	50·0	53·0	42	51	3	2·4	2·5	6 90	7 08	5	2·6	2·2	5 37	6 74
Average	.....	307·1	273·1	25	42	.....	21·02	18·92	2 98	3 73	.....	48·5	45·1	45	58	.....	2·74	2·64	6 36	7 05	.....	2·35	2·13	6·41	7 27

A review of the 1933 yields and cost of production, compared with the averages, indicates a gradually increasing yield. The increased yields are reflected in a lower production cost. The downward trend of prevailing rates for labour, seed, and materials, likewise influenced the downward trend of growing costs. Taxes and charges for use of machinery have been more constant.

POTATOES.—Seasonal variations, such as drought, excessive rains, or favourable weather have a favourable or depressing effect on yields. This season's potato yields were uniformly good, ranging from 453 bushels per acre at Knoydart to 216 bushels at Salt Springs, averaging 307 bushels per acre in comparison with 273 bushels in past years. The average cost of producing potatoes on the stations this year was 25 cents per bushel in comparison over the period represented of 42 cents per bushel.

TURNIPS.—Turnips respond favourably to fertile soils and to a cool, prolonged growing period. Halls Westbury, Ditmars or Cornings are the principal varieties grown on the stations. Planting is done as early in the spring as possible, on well compacted and slightly raised hills. Compacting assures a more uniform germination. In the production of turnips, labour, fertilizer and charges for manure represent a large proportion of the cost. On these stations the cost of horse labour, including the teamster, varied from $14.49 to $29.10 per acre; manual labour was responsible for a per acre charge of from $15.20 to $32.70. As 40 per cent of the cost of manure and 55 per cent of the cost of chemical fertilizer is charged against the crop to which it is applied, the turnip crop or any other intertilled crop is charged on that basis. The cost for added fertility, in the form of manure or chemical fertilizer ranged from $7.92 to $14.37 per acre. The average turnip yield on the stations this year was 21 tons and cost $2.98 per ton, in comparison with the average yield of 19 tons, which were produced at $3.73 per ton.

MANGELS.—The mangel crop from a cost standpoint is subject to the same variable changes as potatoes, turnips, etc., respecting labour, manures and fertilizers. As this is the first year that mangels have been grown on the stations, the information as to yields and costs was not included in the above table, having been only grown at four stations. The yields obtained were at North East Margaree, 22½ tons; Newport, 26 tons; Chegoggin, 30½ tons; Lilydale, 26½ tons; the cost varied from $3.20 to $4.80 per ton with an average for the four stations of $4.13 per ton.

OATS.—The development of a systematic farm program requires that quite a large acreage be ploughed and prepared each year for cereal crops. On the stations, Banner and Victory oats are the principle grain crops, hence, the importance of its economic production. As a crop rotation is established at each station, oats follow a cultivated or inter-tilled crop, or a substitute in the form of mixed grain, oats, peas and vetch as forage, hence, no additional manure or fertilizer is applied to the crop. Because of the residual effect of the manures and chemical fertilizers applied to the preceding crops, 25 per cent of the cost of the manure and 15 per cent of the cost of the chemical fertilizer is charged against the oat crop. Oat yields on the stations, it will be noted, vary considerably and reflect, in a general way, the condition of the respective soils with respect to type, fertility and drainage. The higher than average yield at Middle Musquodoboit can at least be partly credited to the fact that the physical condition of the soil has been improved through the installation of a few lines of tile to provide for the drainage of this heavy, clay soil. The average oat yield on the stations in Nova Scotia this year was 48½ bushels per acre, the cost was 45 cents per bushel, in comparison with the average of 45 bushels and the cost 58 cents per bushel.

CLOVER HAY.—On the stations in this province, the production of clover hay is largely dependent on the available supply of ground limestone or marl, particularly on farms where live stock are kept. At points such as Christmas Island, Barra Glen, Heatherton, Middle Musquodoboit, etc., phosphorus is also a limiting factor in clover production. On the stations, local or hardy strains of red clover seed are sown; this is of the hairy, two-cut type. The mixture used when seeding down is made up of 5 pounds red clover, 3 pounds alfalfa, 3 pounds alsike, and 8 pounds timothy per acre. When compiling the cost of growing clover hay, one-half the cost of the grass and clover seed is charged to that crop, the other half to the timothy crop in the succeeding year. The twelve-year average yield of 3.8 tons per acre at North East Margaree illustrates the possibilities in clover growing when the desired conditions with respect to lime, fertility and well directed tillage methods are provided. Other stations, not as long established as Mabou, Newport, Knoydart, Christmas Island, Barra Glen and Sydney River, etc., are also obtaining increased yields from this crop. The average yield of clover hay on the Nova Scotia stations this year was 2·7 tons, at $6.36 per ton, compared with the average over the period recorded of 2·6 tons at a cost of $7.05 per ton.

TIMOTHY HAY.—Ten per cent of the cost of manure and fertilizer and 25 per cent of the cost of the lime applied in the hoed crop year, also one-half of the grass and clover seed, is charged to the timothy crop, in addition to the other factors of cost previously referred to as affecting all crops being grown. The 1933 yield of timothy hay was 2·3 tons, the cost $6.41, the average yield of the periods indicated 2·1 tons at a cost of $7.27 per ton.

REPORT OF THE ILLUSTRATION STATIONS FOR NEW BRUNSWICK

FOR THE YEARS 1931, 1932 AND 1933

T. G. Hetherington, B.S.A., Supervisor

During the period from 1931 to 1933, one new Illustration Station was established in New Brunswick, bringing the number in operation up to nineteen. These stations are for the most part located along the Saint John, Kennebecasis and Miramichi Valleys and the North Shore. The stations are located at the following points and the work is done by the operators as named:

Baker Brook	Felix Daigle
Beresford	W. D. G. Doucet
Black River Bridge	J. Walter Cameron
Buctouche	Henry Berthe
Grand Falls	Lawrence Morin
Harvey Station	Melvin Grieves
Jacquet River	Alexander Turvey
Lower Derby	W. R. Taylor
Petersville	James Butler
Pomeroy Ridge	Burton Linton
Riordon	Thomas W. Riordon
Salisbury	Trueman Lewis
Siegas	Philias Ruest
St. Charles	Joseph L. Daigle
St. Isidore	Peter Robichaud
Sussex	Matthew Robinson
Three Brooks	Carter Edgar
Tracey Station	John H. Phillips
Whitneyville	Melvin Stewart

Throughout this report, when reference is made to work done on a particular station, it means that conducted by the operator at that station in co-operation with the Division. The above group of operators have done much to make the Illustration Stations, the valuable service they are at the present time and were it not for their approval of the plans and their painstaking work, the present accomplishments would have been impossible.

PRECIPITATION AND THE GROWTH OF CROPS

The winter of 1932-33 was very similar to the preceding one, being characterized by higher temperatures and lighter snowfall than is normally the case. The ground was bare of snow quite frequently, this, with alternate freezing and thawing during the winter and spring months, probably accounts for the light clover crop this year.

The spring opened early and growing conditions were quite satisfactory until the middle of June. From this date, dry weather prevailed until early fall. This condition favoured early sown grain and potatoes, but was detrimental to hay and root crops. Early grain harvest weather was ideal, but from the middle of September until freeze-up, rainfall was heavy and very frequent. This made conditions very unfavourable for harvesting late grain, potatoes and roots. In fact, some fields were so wet that farmers waited for the ground to dry and eventually due to an early freeze-up, lost part or all of their root crop.

The delayed grain, potato and root harvest, and early freeze-up, resulted in less ground being prepared for next year's crop, than has been the case for a great

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number of years. This condition, of course, applies to a greater extent on the wet, low lying, heavy soils.

FIELD DAYS AND COMMUNITY SERVICES

Operators report an increasing number of enquiries for information on agricultural matters. In the winter of 1932-33 an operators' correspondence course was conducted from this office, mainly to standardize the replies operators made to enquiries from farmers. During the present year, a series of nine newsletters, containing from 300 to 700 words have been issued monthly from this office. These newsletters, in addition to containing educational matter, appropriate to the season, have reported progressive activities at the various stations and this has helped to maintain a progressive spirit among the operators.

During July, field meetings were held at Petersville, St. Stephen, Sussex, Tracey and Beresford, with a total attendance of 636 and an average attendance per station of 127 persons, which compares favourably with that of preceding years and would indicate that these meetings are making worthwhile contributions to local agricultural education.

More progress has been made in roadside improvement than in any former year and almost every operator has made an effort to smarten the appearance of his premises, through painting, whitewashing or general renovation. During the year, a number of derelict buildings have been demolished, but a few yet remain.

DAIRY CATTLE IMPROVEMENT

The dairy cattle situation among New Brunswick operators is steadily improving. Every operator has made some progress and many of them substantial progress. Seven operators are using pure-bred sires owned by themselves, eight are using Agricultural Society sires, two are members of Federal Sire Clubs, and the remaining operators are purchasing a sire for 1934. Ten operators during the past two years have purchased twenty-two pure-bred females. Several of these have already freshened and are giving a good account of themselves. The Salisbury operator reports two Jersey heifers producing over 900 pounds of milk each, during the first month of their lactation period. Other operators have purchased high grade females for foundation stock.

The average production of the station herds is still quite low, however, but the operators are, in the main, fully alive to the desirability of increasing their production, but are anxious to do it as economically as possible. The present farming policy of increasing grain production to provide in so far as possible, home-grown grains is developing very satisfactorily. This, with attention to pastures, green feed for late summer, early hay-making to improve the quality of hay and to provide aftermath for grazing, and an increase in root acreage, are all having a cumulative effect in bettering dairy cattle conditions and making possible increased milk production per cow.

The following table covers the production of thirteen Illustration Station herds. The stations are listed in order of average butterfat production per cow.

MILK PRODUCTION BY STATIONS

Station	Breed or grade	Number cows on test	Total production		Average production per cow		Production of high cow		Production of low cow	
			Milk	Butterfat	Milk	Butterfat	Milk	Butterfat	Milk	Butterfat
			lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Salisbury	Grade and pure-bred Jerseys	11	60,158	2,731·0	5,469	248·3	7,090·0	361·1	3,865·0	184·6
Whitney	Grade Ayrshires	6	38,175	1,401·1	6,346	233·3	8,855·0	281·4	5,288·0	199·2
Baker Brook	Grade Holsteins	6	40,081	1,355·0	6,680	226·0	8,376·0	297·2	5,060·0	181·4
Tracey	Grade and pure-bred Jerseys	6	25,918	1,337·4	4,319	222·9	4,659·0	284·1	2,966·0	160·1
Buctouche	Grade Ayrshires	4	22,054	870·8	5,513	217·7	5,993·0	248·5	4,817·5	204·6
Lower Derby	Grade Ayrshires	12	64,240	2,540·0	5,353	211·7	7,217·0	252·0	2,426·0	102·7
Siegas	Grade and pure-bred Ayrshires	10	52,111	2,056·0	5,211	205·6	5,744·0	242·3	4,515·0	153·6
Riordon	Grade and pure-bred Ayrshires	13	59,211	2,591·5	4,554	199·3	6,365·7	251·8	2,906·0	127·8
Harvey	Grade Ayrshires	9	39,606	1,741·3	4,401	193·4	5,390·0	244·8	3,733·0	166·2
St. Stephen	Grade Jerseys	6	20,909	1,026·4	3,485	171·0	4,080·0	196·3	3,116·0	127·9
Sussex	Grade Holsteins	14	61,830	2,156·2	4,416	154·0	6,083·0	201·2	3,453·0	101·3
Beresford	Grade Ayrshires	4	13,114	537·1	3,278	134·2	4,873·0	170·6	2,012·0	110·8
Black River	Aryshire and Holstein grades	8	31,259	1,046·9	3,907	130·8	6,561·0	198·4	2,390·0	92·5
Average		8·4	40,666	1,645·4	4,840	196·0	6,252·0	248·4	3,580·0	147·0

NITROGENOUS FERTILIZERS ON HAY LANDS

The following table indicates the response that can be expected from an application of 125 pounds of nitrate of soda when applied to hay lands. These trials and demonstrations were conducted not with the expectation that the practice would come into general usage, but rather to indicate to the farmer a means of increasing hay yields in years of anticipated shortage. In certain sections of the province, principally on the light soil areas, there is periodically a short hay crop. In these sections, a light application of nitrogenous fertilizer is certainly preferable to purchasing hay. The practice, likewise, has merit on farms where the land is worked on a six-year rotation plan, that includes three hay crops in succession. The third hay crop is comparable in yield with the first and second year crops when a nitrogenous fertilizer such as nitrate of soda has been used.

NITROGENOUS FERTILIZERS ON HAY LANDS

Station	Treatment per acre	Crop	Yield per acre	Yield per acre, check plot	Increase or (—) decrease per acre	Cost per ton increase
			tons	tons	tons	$
Whitney	125 pounds nitrate of soda	Timothy	3·0	2·1	0·9	2 78
Grand Falls	" "	"	2·0	0·6	1·4	1 79
Riordon	" "	"	2·8	1·7	1·1	2 28
Beresford	" "	"	2·6	1·5	1·1	2 28
Derby	" "	"	2·1	1·9	0·2	12 55
Jacquet River	" "	"	2·1	1·9	0·2	12 55
Salisbury	" "	"	2·6	1·7	0·9	2 78
Baker Brook	" "	"	3·3	2·4	0·9	2 78
Baker Brook	" "	"	3·3	3·1	0·2	12 55
Black River Bridge	" "	"	2·4	1·4	1·0	2 51
Buctouche	" "	"	2·1	1·3	0·8	3 13
Petersville	" "	"	2·4	2·0	0·4	6 26
St. Isidore	" "	"	2·4	1·5	0·9	2 78
Average			2·54	1·77	0·77	5 15

In general, an application of 125 pounds of nitrate of soda per acre on second or third year hay can be expected to result in an increased yield of about three-quarters of a ton per acre. The best response has been secured from fields that were in fair heart and with a reasonably good bottom. The least profitable response has been received from fields that were either very fertile, very poor or with a thin bottom. It will be noted that in three cases in the above table, very slight increases were obtained—this naturally resulted in very costly hay. Generally speaking, with the price of nitrate of soda around $40 a ton, the increase in yield should not cost more than from $2.25 to $2.75 a ton.

The following is a summary of three years' work with nitrate of soda on hay land.

Year	Number of trials	Yield per acre	Yield on check plot	Increase or (−)decrease per acre	Cost per ton increase
		tons	tons	tons	$
1931	16	2·93	2·13	0·80	4 24
1932	14	2·59	1·90	0·69	5 27
1933	14	2·54	1·77	0·77	5 15

GROUND LIMESTONE

At Illustration Station field days, ground limestone demonstrations on hay lands are always of very great interest to farmers. Economic conditions in

The field on the left did not receive an application of ground limestone, that on the right shows the clover growth where one ton of ground limestone per acre was applied.

recent years have hindered a rapid increase in the use of ground limestone. Many individual farmers would like to apply a few tons each year and spread their costs over a period of years, but find it difficult to get a sufficient number of farmers to join them in the purchase of a carload and thus secure the advantage of the free freight policy. Undoubtedly, an application of ground limestone is one of the initial steps in a soil improvement program, but every user of ground limestone must be prepared to follow up the use of lime with a reasonable fertility

policy, because otherwise the stimulating action of lime will gradually use up available fertility in the soil and eventually leave it in poorer condition than it was originally.

Increases in hay yields on Illustration Station demonstrations have been greatest on the heavy clay and gravelly clay soils, such as are found at the Harvey, Salisbury, Riordon and Beresford stations. On some light soils, such as at Black River Bridge, an application of limestone has proven absolutely necessary in order to get a stand of clover; in fact, its action has been felt in every crop grown on the station. Limestone applied at the Mount Middleton station some six years ago gave no reaction until this year when its influence was very evident on the new seeded land. This goes to prove that users of ground limestone cannot always expect an immediate response to an application.

Analyzing ground limestone work on the Illustration Stations, over the four-year period 1930 to 1933 inclusive, in sixteen trials, an application of 3 tons per acre resulted in an average increase in the hay crop of 1·18 tons per acre; in eight trials where 2 tons of ground limestone were used, the average increase in the hay crop was 1·17 tons per acre; in six trials using 1 ton per acre, an average increase of 0·8 ton of hay. The average increase of hay obtained per acre from all applications of 1, 2 and 3 tons of ground limestone was 1·10 tons per acre.

RESULTS OF TESTS OF GROUND LIMESTONE ON HAY LAND

Station	Treatment per acre	Crop	Yield per acre	Yield per acre check plot	Increase or (−) decrease per acre	Cost of increase per ton
			tons	tons	tons	$
Salisbury	3 tons ground limestone	Clover	2·50	1·50	1·00	1 80
Salisbury	1 ton ground limestone	Clover	2·06	1·50	0·56	1 07
Black River Bridge	2 tons ground limestone	Timothy	2·60	1·40	1·20	1 00
Black River Bridge	2 tons ground limestone	Clover	3·20	1·20	2·00	0 60
Petersville	2 tons ground limestone	Clover	1·90	1·70	0·20	6 00
Harvey	2 tons ground limestone	Timothy	2·50	1·30	1·20	1 00
Harvey	3 tons ground limestone	Clover	3·10	1·30	1·80	1 00
Harvey	2 tons ground limestone	Clover	2·80	1·30	1·50	0 80
Beresford	3 tons ground limestone	Timothy	2·60	1·50	1·10	1 63
Beresford	2 tons ground limestone	Timothy	2·40	1.50	0·90	1 33
Average			2·56	1·42	1·14	1 62

PASTURE IMPROVEMENT STUDIES

During the year, pasture improvement demonstrations were conducted at Lower Derby, Salisbury, Sussex, Baker Brook, Black River and Riordon.

The following table provides a summary of the results obtained at the several stations:

RESULTS OF PASTURE IMPROVEMENT EXPERIMENTS

—		Sussex *complete fertilizer in 1931, 1932 and 1933	Derby complete fertilizer in 1933	Riordon complete fertilizer in 1932 150 pounds nitrate of soda in 1933	Black River complete fertilizer in 1933	Baker Brook complete fertilizer in 1933	Salisbury complete fertilizer in 1931 and 1932, 150 pounds nitrate in 1933	Average
Grazing days per acre.	Fertilized	182·6	125·0	119·1	109·3	84·0	77·0	116·1
	Check	102·6	42·7	91·0	69·3	75·0	30·5	68·5
Milk production per acre.	Fertilized	4,007·0	2,591·5	2,719·9	1,922·3	2,040·6	1,593·0	2,479·6
	Check	2,263·1	802·7	2,159·6	1,237·5	1,737·0	645·1	1,474·1
Average number cows each demonstration		14	11	13	8	9	11	11
Average production per cow per plot.	Fertilized	858·6	942·3	643·0	720·8	680·2	434·5	713·2
	Check	484·9	291·9	498·3	464·0	579·0	211·1	421·5
Carrying capacity per acre.	Fertilized	1·53	1·02	0·97	0·89	0·68	0·63	95·3
	Check	0·84	0·35	0·74	0·56	0·61	0·25	55·8

*Complete fertilizer consisted of 150 pounds nitrate of soda, 350 pounds superphosphate, 100 pounds muriate of potash per acre.

The carrying capacity of both fertilized and unfertilized pastures at Black River, Baker Brook and Salisbury was greatly reduced due to the dry season. However, the average carrying capacity in 1933 was very similar to that of 1932, as the following data indicate:

Carrying capacity of fertilized pasture in 1932—0·96 cows per acre
Carrying capacity of fertilized pasture in 1933—0·95 cows per acre
Carrying capacity of unfertilized pasture in 1932—0·559 cows per acre
Carrying capacity of unfertilized pasture in 1933—0·56 cows per acre

The greatest production per acre was obtained at the Sussex station with 4007·0 pounds of milk per acre for the grazing season. This station, as will be noted, has had three complete dressings of a complete fertilizer and has a wonderful bottom of white Dutch clover that would make a much more favourable showing if favoured with a good moist season.

BARN MANURE VERSUS BARN MANURE SUPPLEMENTED WITH CHEMICALS FOR THE TURNIP CROP

This project was undertaken this year with the primary object of determining if a lighter application of barn manure, supplemented with chemical fertilizer could replace the practice of heavy applications of manure alone for root crops and thus allow the farmer more manure for other crops, particularly hay land. In the experiment, acre plots were divided into three equal parts. The manure and fertilizer treatments, comparative yields, and costs follow—

RESULTS OF MANURE AND FERTILIZER EXPERIMENTS WITH TURNIPS

Treatment per acre	Yield per acre	Increase or (—) decrease over plot 3	Cost of barn manure per acre	Cost of chemical fertilizer per acre	Total cost of fertilizer per acre	Total cost of fertilizer per ton turnips
Plot 1—	tons	tons	$	$	$	cts.
20 tons manure 150 pounds nitrate of soda 400 pounds superphosphate	20·6	1·8	12 00	3 63	15 63	75
Plot 2—						
10 tons manure 150 pounds nitrate of soda 400 pounds superphosphate	18·4	—0·4	6 00	3 63	9 63	52
Plot 3—						
20 tons manure	18·8	.....	12 00	.....	12 00	63

NOTE.—The data assembled in the above table represent the average yields and costs obtained in trials conducted at 10 Illustration Stations.

The above data suggest that it is a good practice to supplement an average application of barn manure with chemical fertilizer both from a cost and yield standpoint. Further, it is good practice on most New Brunswick farms to supplement the farm manure with chemicals in order to build up soil fertility. In the case of turnips, it is particularly good policy to supplement barn manure with an application of phosphoric acid because manure is low in phosphoric acid and turnips readily respond to an application of this material.

The pile on the left is from land on which manure alone was applied, that on the right from land on which 150 pounds of nitrate of soda and 400 pounds of superphosphate per acre was applied in addition to manure.

BARN MANURE VERSUS BARN MANURE SUPPLEMENTED WITH CHEMICALS FOR THE MANGEL CROP

This project was undertaken with the same object as was the case with the similar project conducted with turnips, viz., to determine if a lighter application of manure supplemented with chemicals could replace a heavy application of manure alone and thus provide manure for other crops such as hay. In the experiment, acre plots were divided into three equal parts. The manure and fertilizer treatments, comparative yields and costs follows—

RESULTS OF MANURE AND FERTILIZER EXPERIMENTS WITH MANGELS

Treatment per acre	Yield per acre	Increase over plots	Cost of barn manure per acre	Cost of chemical fertilizer per acre	Total cost of fertilizer per acre	Total cost of fertilizer per ton mangles
Plot 1—	tons	tons	$	$	$	$
20 tons manure 200 pounds nitrate of soda 300 pounds superphosphate 150 pounds muriate of potash	17·7	5·1	12 00	5 72	17 72	1 00
Plot 2—						
10 tons manure 200 pounds nitrate of soda 300 pounds superphosphate 150 pounds muriate of potash	15·3	2·7	6 00	5 72	11 72	0 76
Plot 3—						
20 tons manure	12·6	.....	12 00	.....	12 00	0 95

The data in the foregoing table represent the average yields and costs obtained at 13 Illustration Stations. The results with mangels are very similar to those obtained in the turnip project. The cheapest production in each case was obtained from a combination of barn manure and fertilizer. Irrespective of the above findings the practice is one that should commend itself to the practical farmer who has in mind a soil management program. Further, the mangel crop requires an abundance of available potash which is not always present in manure of only average quality.

RESULTS OF TESTS WITH POTATOES USING POTASH AT VARYING RATES PER ACRE

With the view of determining the reaction of the potato crop to varying amounts of potash, four trials were conducted in leading potato growing areas, during the past year. A half acre plot in each case was divided into four equal parts and fertilized as indicated below. The yields at each station follow:

RESULTS FROM DIFFERENT QUANTITIES OF POTASH PER ACRE WITH POTATOES

Treatment	Yield per acre				Average yield
	Grand Falls	Riordon	Buctouche	Three Brooks	
	bush.	bush.	bush.	bush.	bush.
1 ton 4-8-4	390 M 8 C	220 M 23 C	305 M 34 C	440 T	339
1 ton 4-8-8	396 M 8 C	283 M 16 C	316 M 34 C	484 T	369
1 ton 4-8-12	404 M 8 C	260 M 20 C	340 M 23 C	484 T	372
1 ton 4-8-16	406 M 4 C	253 M 13 C	363 M 23 C	528 T	387

NOTE.—M—merchantable. C—culls. T—total.

CROP RETURNS AND PRODUCTION COSTS ON THE NEW BRUNSWICK ILLUSTRATION STATIONS

In the farm and crop improvement program instituted on the New Brunswick Illustration Stations, a practical knowledge of crop yields and production costs is essential. Such information makes it possible to decide the crops best adapted to the various districts and serves as a basis for checking up on rotation practices, cultural procedures, also its proper proportion of horse and manual labour in relation to size of farm.

In the succeeding paragraphs some of the major farm crops affecting New Brunswick agriculture are tested, based on actual trials made on the station covering a period of from two to eleven years, depending on the time the station work has been under way. The crops dealt with include potato, turnips, and mangel growing, also oat, clover and oats, peas and vetch hay production. The fact that live stock is housed or stable fed for at least six and a half months each year, makes root crops of primary importance in New Brunswick agriculture. Other succulent crops, such as corn and sunflowers have been tried, but excepting in a few favoured areas, turnips and mangels have proven the most dependable succulent crops.

In New Brunswick Illustration Station work, swede turnips and mangels have been given equal prominence and every effort has been made to stimulate interest in the two crops. Labour is the costly item in root growing, especially

if full advantage is not taken of machine and horse labour. Again the cost of production is invariably high when yields are low. Thorough preparation of the seed bed is probably more important in the case of root crops than in almost any other crop grown. A thoroughly prepared seed bed, it has been found, helps to reduce hand labour charges, and likewise is effective in increasing yields.

On the nineteen stations entering into this review and study on crop production, it should be mentioned that individual soils vary greatly in type, because of the geographic distribution of these stations by counties and in their original condition when work started would be classed as low in fertility and crop production.

When computing the cost as given in the undermentioned table such factors as, use of land, taxes, cost of manure and fertilizer, use of machinery, cost of seed, twine, spray and other materials have been taken into consideration. Each station operator keeps a daily record of the horse and manual labour employed in the production of each crop. Such labour charges are calculated on the basis of prevailing rates for both horse and manual labour in each district.

SWEDE TURNIP GROWING

Following several trials, the variety known as Hall's Westbury is now most generally grown on the New Brunswick Illustration Stations, having been found a fair yielder and a good marketable turnip, as well. The following table gives the yields and cost of production by station in 1933, as well as the averages over the period of years they have been grown at each.

TURNIPS—YIELDS AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre 1933							Average	
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Manual labour (hand)	Horse labour including teamster	Seeds and misc.	Use of machinery	Number of years grown	Yield per acre	Cost per ton
	tons	$	$	$	$	$	$	$		tons	$
Siegas	28·0	1 85	2 75	10 61	8 50	26 39	0 96	2 85	7	26·50	2 29
St. Stephen	24·9	1 99	2 90	12 38	10 75	19 79	0 96	2 85	5	25·98	2 38
Tracey	24·5	1 89	3 25	12 38	8 58	18 32	0 96	2 85	9	19·60	4 09
Petersville	24·2	1 85	2 40	12 38	10 62	15 70	0 96	2 85	6	14·40	4 13
Harvey	20·1	2 23	2 65	12 38	13 25	12 78	0 96	2 85	6	23·20	2 38
Beresford	18·4	2 19	2 50	12 38	10 37	11 37	0 96	2 85	6	19·50	3 28
Buctouche	18·2	2 33	3 05	12 38	6 50	16 78	0 96	2 85	6	21·90	2 68
Riordon	18·1	3 39	3 65	12 38	22 50	19 08	0 96	2 85	10	15·80	4 65
Baker Brook	17·8	2 59	2 90	12 38	8 25	18 82	0 96	2 85	9	24·50	2 64
Grand Falls	15·2	2 60	2 95	12 38	7 00	13 48	0 96	2 85	10	20·80	2 28
St. Charles	12·7	3 84	2 30	12 38	10 37	19 93	0 96	2 85	4	12·50	3 99
St. Isidore	11·2	3 40	2 50	12 38	7 50	11 95	0 96	2 85	6	15·80	3 95
Jacquet River	11·2	3 87	3 50	12 38	13 62	10 07	0 96	2 85	8	16·23	4 17
Whitney	10·5	4 36	2 90	12 38	17 50	9 22	0 96	2 85	5	18·00	3 39
Black River	9·9	3 96	2 50	12 38	9 87	10 66	0 96	2 85	4	19·90	2 91
Average	17·6	2 82	2 84	12 26	11 01	15 62	0 96	2 85	.....	19·60	3 28

A review of the foregoing table indicates that production costs are low when, (1) Yields are high, (2) Hand labour charges are kept low, (3) Full advantage is taken of machine and horse labour.

In general, growers should not be satisfied in normal years with less than a 25 ton yield per acre. Under present conditions, this yield can be secured at a cost of approximately $2 per ton which is not a prohibitive charge against the crop. This past year the lowest yield on record was secured, viz., 17·6 tons per acre. This was almost entirely due to dry weather. The average yield since the stations were established is 19·6 tons per acre.

MANGELS

Every Illustration Station in New Brunswick is growing mangels. The crop is becoming increasingly popular with operators and farmers and has a well defined place on a live stock farm. It is true that the crop requires more fertility and care than is the case with turnips. However, it has compensating advantages such as superior keeping qualities. As a crop it is better adapted for hog feeding than are turnips and is probably more palatable to all classes of live stock.

The variety known as Yellow Intermediate has been grown for the last few years and has given good satisfaction. The same remarks in regard to low dry matter content applies to mangels as well as to turnips and the grower must strive for large yields economically produced as regards fertility and labour expenditure, otherwise, the crop becomes rather a costly one.

An analysis of the cost of production in the case of mangels again emphasizes the necessity for high yields in order to secure low production costs. With reasonable fertility and good growing conditions it is not difficult to secure a 20 ton yield per acre. The Derby station has an 8 year average of 21·3 tons per acre.

The following table shows the yield and cost of production by stations:

MANGELS—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre—1933						Average		
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Manual labour (hand)	Horse labour including teamster	Seeds and misc.	Use of machinery	Number of years grown	Yield per acre	Cost per ton
	tons	$	$	$	$	$	$	$		tons	$
Siegas	27·6	1 88	2 75	10 61	6 75	26 35	2 80	2 85	6	18·6	3 38
Tracey	21·4	2 86	3 25	13 76	8 00	30 59	2 80	2 85	5	18·8	3 48
Derby	20·1	2 98	3 88	13 76	14 41	22 32	2 80	2 85	8	21·3	4 65
Buctouche	17·1	2 66	3 05	13 76	8 00	15 03	2 80	2 85	3	20·7	2 60
Baker Brook	16·7	3 15	2 90	13 76	11 16	19 18	2 80	2 85	3	20·6	3 33
Salisbury	16·5	3 44	2 10	13 76	10 75	24 52	2 80	2 85	3	14·1	4 18
Jacquet River	15·0	2 51	3 50	11 00	10 87	6 75	2 80	2 85	3	12·3	3 65
Riordon	14·7	3 49	3 65	13 76	15 75	12 61	2 80	2 85	3	14·7	3 39
St. Stephen	14·5	3 39	2 90	13 76	11 00	15 96	2 80	2 85	1	14·5	3 39
St. Isidore	14·2	3 41	2 50	13 76	10 24	16 28	2 80	2 85	1	14·2	3 41
Sussex	13·2	4 26	3 00	13 76	13 60	20 30	2 80	2 85	4	14·0	4 71
Petersville	13·1	3 09	2 40	13 76	7 12	11 62	2 80	2 85	1	13·1	3 09
St. Charles	12·3	4 19	2 30	13 76	10 00	19 89	2 80	2 85	2	10·28	4 77
Whitney	11·2	4 47	2 90	13 76	15 37	12 47	2 80	2 85	3	16·2	3 25
Grand Falls	10·6	3 85	2 95	13 76	6 48	12 05	2 80	2 85	2	13·4	3 26
Black River	8·0	5 00	2 50	13 76	9 00	9 10	2 80	2 85	2	10·1	4 27
Beresford	7·6	6 07	2 50	13 76	8 87	15 39	2 80	2 85	2	8·8	4 94
Average	14·9	3 57	2 88	13 40	10 43	17 08	2 80	2 85	.....	15·04	3 75

From a review of the above table it will be noted that the 1933 mangel yields varied from 7·6 tons per acre at Beresford to 27·6 tons at Siegas and the cost from $6.07 per ton to $1.88. The operators growing the crop the longest apparently succeeded the best. The use of a suitable variety, early planting, and well prepared fertile seed bed are essential for the mangel crop which is a heavy feeder and consumer of plant food. Manure and fertilizer, horse and manual labour represent the three principal charges in the cost of growing the crop. On the seventeen stations the cost of manual and horse labour varied from $8 to $30.59 and from $9 to $9.10 per acre, respectively. It will be noted in the latter instance that the yield was low and the cost high. The average

charge to the crop for manure and fertilizer was $13.40 per acre. As there is a residual effect from such applications, 40 per cent of the cost of the manure and 55 per cent of the cost of the chemical fertilizer is charged against the mangel crop, the remainder of the cost is divided over the three succeeding crops, namely, oats, clover and timothy hay.

GRAIN PRODUCTION

Considerable progress has been made in increasing grain production and yields on the Illustration Stations. In some cases production has been increased 1,000 per cent. The average grain production per farm the first year they were taken over as stations was 312 bushels. This year the production per farm was 815 bushels. Total grain production on the farms has developed from 5,928 bushels to 15,485 bushels in 1933. The use of chemical fertilizers has been very largely responsible for the progress made in grain production. Except in the case of grain following a hoed crop, some of the more progressive operators use chemicals either singly or in combination, depending on the fertility of all grain grown.

The following table provides a summary of oat yields and costs for the year 1933, and the average per station since the stations were established.

OATS—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Average		
	Yield per acre	Cost per bushel	Number years grown	Yield per acre	Cost per bushel
	bush.	cts.		bush.	cts.
Riordon (following sod)	91·7	22	1	91·7	22
Riordon (after hoed crop)	87·6	23	10	62·5	42
Derby	86·0	30	9	63·8	40
Grand Falls	82·0	23	11	67·5	35
Harvey (following sod)	78·7	25	1	78·7	25
Harvey (after hoed crop)	72·3	26	7	56·5	43
Siegas (following sod)	71·5	25	1	71·5	25
Tracey	67·0	36	10	56·9	42
Sussex (following sod)	64·5	29	4	53·1	33
Black River Bridge	63·6	35	4	43·9	54
Salisbury	58·8	35	6	49·7	56
Siegas (after hoed crop)	56·3	33	6	48·4	49
Baker Brook (after hoed crop)	56·0	40	8	39·3	54
St. Stephen	54·6	39	5	53·5	44
Beresford	53·6	43	6	39·2	48
Petersville	53·3	41	5	40·9	43
Baker Brook (following sod)	50·0	29	4	37·7	40
Whitney	38·0	31	4	47·2	38
St. Isidore	35·0	56	6	31·6	61
Jacquet River	32·0	70	8	32·9	83
Buctouche	31·5	71	5	40·9	52
St. Charles	26·1	74	3	35·1	57
Average	59·5	38	.....	50·4	47

It will be noted that in 22 trials an average yield of 59·5 bushels per acre were obtained and these cost on an average 38 cents per bushel. With good seed, a well prepared seed bed, fair fertility and early seeding, it is not difficult to secure yields ranging from 60 to 70 bushels by weight per acre. Counting all costs such as seed, labour, rent, fertility, machinery, twine and threshing, the cost should not exceed 34 cents per bushel.

For the purpose of drawing attention to the relation between yields and cost of production, the following analysis is submitted:

The 11 highest yielding fields averaged 74·8 bushels per acre and cost 28 cents per bushel.

The 11 lowest yielding fields averaged 44·2 bushels per acre and cost 48 cents per bushel.

Too few realize the part that high yields economically secured play in reducing production costs. A high yield secured economically is ordinarily spoken of as good farming. It really is efficient farming.

CLOVER AND MIXED HAY GROWING

Hay yields were somewhat lower this year. Clover killed out to a greater extent than usual and as a result dairy cattle were wintered largely on timothy and native grasses of poorer quality. The use of a small quantity of Ontario Variegated alfalfa in the regular seed mixture is still being adhered to with the hope that this crop will eventually establish itself. Experience with this crop, under New Brunswick conditions, has varied with the seasons.

In 1930 and 1931 a fair measure of success was experienced with the crop, but in 1932 and 1933 results were not as good. Best results to date have been obtained at Buctouche, Riordon, Derby and Tracey. Experience to date on the Illustration Stations suggests that the crop is a risky one to depend on when seeded alone but may have possibilities when included in the regular seed mixture.

The following table indicates the yields and costs of production by stations:

CLOVER—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Average		
	Yield per acre	Cost per ton	Number years grown	Yield per acre	Cost per ton
	tons	$		tons	$
Tracey	3·60	4 30	4	3·45	6 04
St. Stephen	3·40	5 45	3	2·82	5 40
Harvey	2·40	5 06	7	2·20	5 66
Whitney	2·40	5 88	5	2·70	6 40
Sussex	2·17	5 95	6	2·03	6 99
Riordon	2·10	7 22	9	2·56	7 32
Siegas	1·90	5 80	7	2·23	6 54
Petersville	1·80	5 77	6	2·00	7 42
Salisbury	1·80	6 52	5	1·92	7 20
Baker Brook	1·70	8 32	8	2·36	7 34
Beresford	1·70	6 62	4	1·98	6 82
Grand Falls	1·60	6 71	8	2·18	6 70
Buctouche	1·40	10 35	4	2·00	7 60
St. Isidore	1·40	9 48	5	1·20	12 19
Jacquet River	1·30	8 84	6	2·57	7 36
Black River Bridge	1·20	10 15	2	1·45	8 24
Average	1·99	7 02	.....	2·22	7 20

The more progressive farmers in the province are supplementing farm manure with chemical fertilizer and as a result more manure is available for hay land, and hence, hay yields are slowly increasing and improving in quality. No fixed policy is adhered to in regard to applying manure to hay land. If the new seeded is showing a vigorous stand in the fall it may be advisable to use the available manure on some field in greater distress; on the other hand, if the new seeded looks puny and thin in the fall, it may be advisable to apply manure after the nurse crop has been harvested. The manure will thicken it up and also to a certain extent serve as a winter protection.

PEA, OAT HAY

Peas and oats are being grown on the New Brunswick stations quite extensively and successfully as a soiling crop, i.e., for the dry pasture season. Any surplus acreage over and above summer feeding requirements have been allowed

to ripen for grain. In few instances has the crop been grow specifically as a hay crop. In a province with a limited capacity as regards the production of feeds rich in protein, any crop that promises an improvement in this situation is at least worthy of a trial. The following comparison in protein content of pea, oat hay and the common hay crops of the province may prove of interest:

Pea, oat hay..... 8·3 per cent digestible protein
Red clover hay..... 7·6 per cent digestible protein
Mixed timothy and clover..... 4·0 per cent digestible protein
Timothy hay..... 3·0 per cent digestible protein

It will be noted that pea and oat hay contains more than double the amount of protein found in mixed timothy and clover. A very large part of the hay fed, however, is a much lower grade than mixed timothy and clover and it is quite reasonable to expect that the difference between pea oat hay and the quality of hay usually fed would be much greater than is noted above. The argument against pea, oat hay is that it is regarded as an expensive crop. The expense is made up largely of labour charges, and as this does not always constitute an out of pocket expense, it should not be held out as a too serious drawback against the crop.

In the following table pea and oat hay is compared with clover and timothy from a cost as well as protein-producing standpoint:

Crop	Yield per acre	Cost per ton	Yield of protein per acre	Cost of protein per cwt.
	tons	$	lb.	$
Peas and oats	3·08	8 29	511·28	4 99
Clover	1·99	7 02	302·48	4 61
Timothy	2·00	5 53	120·3	9 21

POTATOES

The acreage devoted to potatoes on the Illustration Stations has gradually decreased as root crop acreage has increased. Potatoes, however, remain an important cash crop with many operators. Potato yields were generally higher than last year and production costs were somewhat lower. Late blight was not as serious as in the previous year, prevention and control being correspondingly cheaper.

The following table indicates yields and costs at the various stations.

POTATOES—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre 1933						Average		
	Yield per acre	Cost per bushel	Use of land and taxes	Manure and fertilizer	Manual (hand labour)	Horse labour including teamster	Seed and spray	Use of machinery	Number years grown	Yield per acre	Cost per bushel
	bush.	cts.	$	$	$	$	$	$		bush.	cts.
St. Stephen	281	19	2 90	10 01	10 74	14 26	12 81	2 85	3	251	25
Black River Bridge	197	22	2 50	10 01	7 06	7 07	14 58	2 85	4	261	24
St. Charles	179·8	26	2 30	16 06	6 62	9 00	11 04	2 85	4	206·2	25
Grand Falls	330	15	2 95	10 01	6 24	16 65	12 81	2 85	10	288·6	20
Beresford	356	13	2 50	10 01	7 12	12 72	12 81	2 85	4	271·0	20
Average	268·7	19	2 63	11 22	7 55	11 94	12 81	2 85	.....	265·5	23

REPORT OF THE ILLUSTRATION STATIONS FOR EASTERN QUEBEC

FOR THE YEARS 1931, 1932 AND 1933

Rosemond Caron, B.S.A., Supervisor

In Eastern Quebec there are at present nineteen Illustration Stations operated by the Dominion Experimental Farms System. They extend from Bellechasse County in the West to Gaspe Peninsula in the East and include four stations on the north shore of the St. Lawrence River. These stations aim to supplement the work being carried on by the Experimental Stations and Farms in the testing of suitable varieties of farm crops, cultural practices, use of manure and fertilizer, the improvement of live stock, etc., and at the same time by applying the information thus obtained, aid greatly in making the many findings of the system useful.

In the general management of the stations the operators play an important part. Were it not for their approval of the scheme and their careful and painstaking labour in carrying out the plans, it would be impossible to obtain the desired results.

The locations of the stations and the names of the operators are as follows:—

St. Fabien	Louis Albert
St. Vallier	Elzear Aube
Luceville	Jos. Belanger
Sayabec	Joseph Pierre Belanger
St. Lazare	Adelard Brochu
Maria	Adhemar Cyr
Ste. Anne des Monts	Octave Deschenes
St. Eleuthere	Damase Dumont
Montmagny	G. Fortunat Fournier
St. Hilarion	Adjutor Gilbert
St. Paul de Montminy	Ernest Gosselin
St. Simeon	Arthur Harvey
St. Camille	Polydore Labbe
Ste. Angele de Merici	Rene Langlais
Nouvelle	Leon Lavoie
L'Islet	J. C. Lemieux
St. Pierre, I.O.	Adelard Rousseau
Sacre Coeur	Johnny Tremblay
Causapscal	Joseph Valois

Throughout this report reference will be made from time to time to work being carried on on at the above named stations. Where this is done it will refer to that being conducted by the operator of the station in co-operation with the Division.

LIVE STOCK IMPROVEMENT

Continual progress is being made from year to year in improving the quality of the live stock being kept on each station in this district of supervision. This improvement is being brought about by the purchase of purebred sires of the desired quality by culling the low producers and by better feeding methods. During the past year, two registered Ayrshire heifers were purchased by L. Albert at St. Fabien, three registered Ayrshire cows by J. P. Belanger at Sayabec, two cows by G. F. Fournier, Montmagny, and one cow by J. C. Lemieux at L'Islet. In addition four operators, namely, Messrs. Brochu, Lemieux, Fournier and Belanger, purchased purebred bulls, the one purchased by Mr. Lemieux being

champion at the Royal Winter Fair in 1933. With the purchase of the above four bulls, all operators now have purebred sires heading their herds. Four of these are Canadian, while the others are Ayrshire. The names, breed and registration number of the various animals are given below.

Stations	Breed	Name of bulls	Registration number
St. Fabien	Ayrshire	Alcide	122837
St. Vallier	Ayrshire	Sosthene	87588
Sayabec	Ayrshire	Ste. Anne Lord Kyle 39	139755
Luceville	Canadian	Negro	7J-13254
St. Lazare	Ayrshire	Ste. Anne Supreme 46	160659
Ste. Anne des Monts	Ayrshire	Ste. Anne Supreme 47	158598
St. Eleuthere	Ayrshire	Ste. Anne Supreme 35	151459
Montmagny	Ayrshire	Ste. Anne Reflection 2	107191
St. Hilarion	Ayrshire	Ottawa Supreme 58	132751
St. Paul	Ayrshire	Blanc de la Caille A.	145087
St. Simeon	Canadian	Oscar de Mailloux	3K-14034
L'Islet	Canadian		
Ste. Angele	Ayrshire	Supreme Poupon de Nazareth.	141834
Nouvelle	Ayrshire	Ste. Anne Supreme 34	151459
St. Pierre I.O	Ayrshire	Colia	138657
Sacre Coeur	Canadian		
Causapscal	Ayrshire	Ste. Anne Supreme 28	151454

In addition to the purchase of purebred bulls, cows and heifers, all operators carefully weighed each day the milk produced by the cows in their herds. This testing showed that there were many unprofitable cows in the various herds and as a result 25 of these cows were culled and slaughtered during the past season. Their places will be taken by purebred animals and young heifers coming on.

The table below shows the milk and butterfat production by herd for 1933. For comparison, the corresponding records for 1932 are also given.

SUMMARY OF MILK AND BUTTERFAT PRODUCTION ON ILLUSTRATION STATIONS FOR EASTERN QUEBEC FOR THE YEAR 1933 COMPARED WITH THE YEAR 1932.

NUMBER OF COWS IN 1932: 155, IN 1933: 188

Stations	Breed	*Number of cows in herd		Average days in lactation		Average production				Highest production				Lowest production			
						1932		1933		1932		1933		1932		1933	
		1932	1933	1932	1933	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat	Milk	Fat
				days	days	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
St. Fabien	Ayrshire grade	17	15	294	291	5,681	203	5,375	236	7,285	269	8,348	385	4,010	140	4,161	191
St. Valier	Ayrshire	9	8	300	288	5,899	230	6,350	240	8,330	374	9,593	374	4,532	190	4,675	163
Luceville	Canadian grade	.....	10	.....	299	.....	.....	3,975	176	.....	.....	4,937	232	.....	.....	2,613	130
Sayabec	Ayrshire grade	10	11	306	296	5,062	199	5,584	229	9,075	290	8,369	334	4,525	153	4,628	212
St. Lazare	Ayrshire grade	.....	17	.....	319	.....	.....	6,323	244	.....	.....	8,929	302	.....	.....	4,451	218
Maria	Grade	5	6	184	311	3,322	130	5,168	201	3,878	150	6,123	232	2,883	115	4,320	172
Ste. Anne des Monts	Ayrshire grade	8	8	289	312	8,755	338	8,353	333	11,258	405	11,799	483	3,618	148	6,495	246
St. Eleuthere	Ayrshire grade	9	11	258	308	4,579	171	5,762	222	6,852	225	9,441	330	3,146	113	4,446	133
Montmagny	Ayrshire	9	11	270	340	6,278	270	6,232	244	7,181	287	7,312	241	4,663	191	4,277	239
St. Hilarion	Ayrshire grade	5	6	271	269	4,705	180	4,282	165	6,121	238	5,267	205	3,669	132	3,692	166
St. Paul de Montminy	Ayrshire grade	8	9	296	257	3,972	163	3,568	137	4,532	181	3,890	155	3,398	132	2,851	108
St. Siméon	Canadian grade	5	4	280	329	3,685	163	5,222	227	4,222	285	5,897	241	3,477	156	4,413	211
St. Camille	Grade	.....	8	.....	258	.....	.....	3,341	.....	.....	.....	3,889	.....	.....	.....	2,806	.....
Ste. Angèle	Ayrshire grade	20	19	282	278	4,895	204	5,130	193	6,758	297	7,463	261	3,845	173	2,881	126
Nouvelle	Ayrshire grade	7	6	280	309	3,821	155	4,858	190	4,326	177	5,766	224	2,876	117	3,938	177
L'Islet	Canadian	14	13	336	296	7,705	338	8,659	369	11,054	464	11,373	454	4,578	206	5,506	258
St. Pierre I.O	Ayrshire grade	14	11	291	266	5,767	206	5,697	194	8,423	277	6,858	192	3,745	146	4,909	157
Sacré Coeur	Canadian grade	2	2	275	319	4,090	.....	5,244	.....	4,090	.....	5,244	.....	4,090	.....	5,244	.....
Causapscal	Ayrshire grade	13	13	270	334	5,451	213	5,990	240	6,530	261	7,753	317	2,447	102	3,284	120

*Number of cows completing lactation period during year 1933–147.

An examination of the table shows that, although the average production per herd in most cases is not high, there is a decided improvement in 1933 over 1932. This is in spite of very dry pastures in July and August. In ten of the fifteen herds, where comparisons are possible, the average production of milk and butterfat is higher than in 1932. In twelve of the fifteen herds the highest cows in 1933 are considerably above the highest for 1932, also in thirteen of the fifteen herds the lowest individuals are well above the lowest for 1932, showing the upward trend and the result of weeding out the poorer individuals, as previously mentioned.

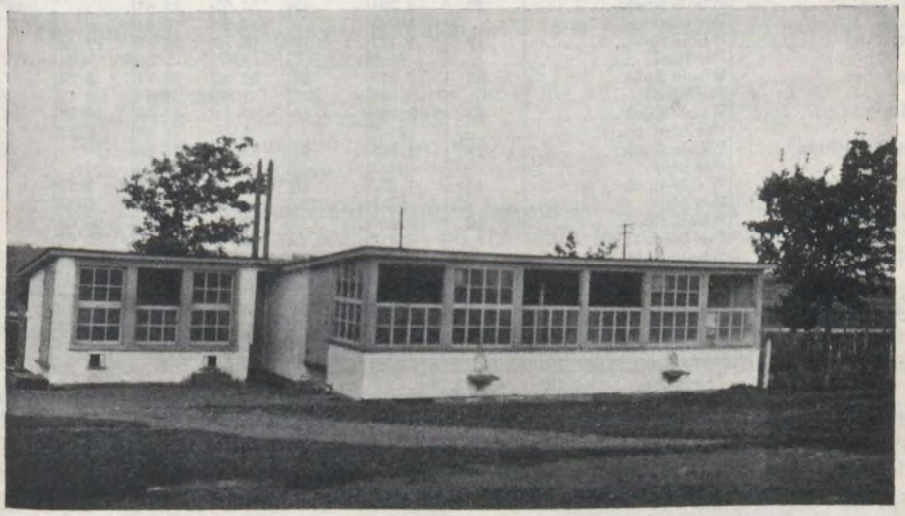
The highest producing herd in the district is that owned by Mr. Jos. C. Lemieux, at L'Islet, composed of thirteen purebred Canadian cows in addition to the young stock. The eight cows completing a lactation period during the year averaged 8,659 pounds of milk and 454 pounds butterfat.

SWINE.—Slow but steady improvement is being made in the quality of the swine kept on the stations. The operators at St. Eleuthere, St. Fabien, Ste. Angèle, Sayabec and Causapscal raise registered Yorkshire hogs of good quality and supply quite a few young pigs for breeding purposes to their neighbouring farmers.

Operators at St. Pierre, I.O. and St. Lazare raise grade Yorkshires with success. Only a few hogs for home consumption are at the present time raised by operators at Ste. Anne des Monts, Montmagny, L'Islet and St. Vallier, as they sell their whole milk in the nearby towns.

A STUDY OF FLOCK MANAGEMENT AND POULTRY IMPROVEMENT

All poultry flocks on the older Illustration Stations in Eastern Quebec are composed of Barred Plymouth Rocks of high quality, most of them having



Front view of a henhouse on the Illustration Station at Montmagny, P.Q.

originated from foundation stock secured from the Experimental Station at Ste. Anne de la Pocatiere. The newer stations do not all have purebred flocks, but have made a start by securing purebred cockerels.

During the year splendid work was carried on by the operators in the improvement of their poultry houses, chiefly in respect to providing more light and more efficient ventilation. More attention was also given to providing

proper laying mashes, green feed, milk and mineral to the poultry. At each station a record was taken last year of the number of birds kept, eggs laid, expenses, revenue, etc.

The following table gives, in detail, the data collected:—

EGG PRODUCTION ON ILLUSTRATION STATIONS

Stations	—	Number of birds	Total number of eggs	Average price per dozen	Revenues	Expenses	Net profit	Loss
				cts.	$	$	$	$
St. Fabien	Whole flock	52	8,007	26	173 49	57 10	116 39	
	Per bird		154		3 33	1 09	2 24	
L'Islet	Whole flock	25	3,704	23	71 00	44 57	26 43	
	Per bird		148		2 84	1 78	1 06	
St. Lazare	Whole flock	27	3,938	19	62 35	28 20	34 15	
	Per bird		145·8		2 30	1 04	1 26	
Ste. Anne des Monts	Whole flock	34	4,487	27	100 95	48 20	52 75	
	Per bird		132		2 97	1 42	1 55	
St. Hilarion	Whole flock	22	2,908	24	58 16	41 10	17 06	
	Per bird		132		2 64	1 87	0 77	
St. Pierre	Whole flock	45	5,719	27	128 68	79 92	48 76	
	Per bird		127		2 86	1 78	1 08	
Luceville	Whole flock	38	4,559	21	79 78	33 71	46 07	
	Per bird		120		2 09	0 88	1 21	
St. Camille	Whole flock	31	3,542	20	59 04	47 06	11 98	
	Per bird		114·2		1 90	1 51	0 39	
Ste. Angele	Whole flock	53	5,974	22	109 53	68 10	41 43	
	Per bird		112·7		2 06	1 28	0 78	
Causapscal	Whole flock	35	3,944	24	78 88	32 02	46 86	
	Per bird		112·6		2 25	0 91	1 34	
St. Valier	Whole flock	44	4,644	19	74 53	47 57	26 96	
	Per bird		105·5		1 69	1 08	0 61	
Nouvelle	Whole flock	22	2,251	19	35 65	53 81		18 16
	Per bird		102·3		1 62	2 44		0 82
St. Paul	Whole flock	12	1,181	19	18 70	7 12	11 58	
	Per bird		98·8		1 55	59	96	
Sayabec	Whole flock	33	3,238	23	62 05	55 71	6 34	
	Per bird		98		1 88	1 69	0 19	
Maria	Whole flock	40	3,793	15	47 41	43 08	4 33	
	Per bird		94·8		1 18	1 08	0 10	
St. Eleuthere	Whole flock	14	1,323	21	23 16	25 65		2 49
	Per bird		94·5		1 65	1 83		0 18
Sacré Coeur	Whole flock	12	1,053	25	21 94	20 19	1 75	
	Per bird		87·7		1 82	1 68	0 14	
Montmagny	Whole flock	42	3,426	23	65 67	38 61	27 06	
	Per bird		81·5		1 56	0 92	0 64	
St. Simeon	Whole flock	18	218	10	1 82			
	Per bird		12·1		0 10			
Average	Whole flock	31·5	3,574	21	66 98	42 87	32 49	
	Per bird		113·4		2 12	1 36	1 03	

An examination of the table reveals that hens were kept with profit at all but two stations. At St. Fabien the average profit per bird was $2.24 and the average production 154 eggs. Where the production per bird falls below 100 it will be noted that in most cases the profit is very small. Production therefore appears to be one of the main factors in the profitable raising of poultry. Economy in the purchase of expensive feeds, also plays an important part. The table shows that where the expenses per bird were high, the profit was small.

IMPROVEMENT OF FARM BUILDINGS

An effort is made each year to have all operators improve not only the appearance and surroundings of farm buildings, but also their usefulness. In this connection each operator is requested to whitewash all buildings that are not painted. This applies to the inside of cow stables and poultry houses as well.

Attention is also directed to increasing the light and bettering the ventilation in stables. During the year improvements in this line were made at Ste. Anne des Monts, St. Simeon and Sacre Coeur. At Ste. Anne des Monts a new concrete floor was put in the stable and a modern manure shed built with a concrete foundation. This will prevent loss of the liquid manure.

PRECIPITATION AND THE GROWTH OF CROPS

While the spring of 1933 opened a few days later than last year the fine weather conditions that prevailed during the whole spring enabled farmers to finish seeding earlier than in 1932.

Exceedingly dry weather conditions prevailed throughout the greater part of the summer and fall months, but the yield of all crops was greater than expected, pastures being the only crop that suffered excessively.

Clover and hay were injured in some localities from winter frosts.

The freeze-up came earlier in the fall of 1933 than usual. Consequently, considerable field work such as ploughing, drainage, and clearing stones could not be satisfactorily completed.

CULTURAL PRACTICES AND THEIR LOCAL APPLICATION

Considerable work is done each year on the Illustration Stations in connection with soil improvement, such as opening drains, levelling, removing stone piles, etc., as well as conducting cultural practices considered best for the particular crop and district.

All stations have an open drain system, excepting Montmagny which is partly underdrained. The low areas are divided into ridges 45 feet apart. This distance has been found more effective and more economical than the narrower lands.

The majority of stations are operated on a four-year rotational system, the crop sequence being as follows:—

1st year—Hoed crops, including potatoes, turnips and O.P.V.
2nd year—Grain (usually oats).
3rd year—Clover and alfalfa hay.
4th year—Mixed hay.

In this rotation, pastures are arranged for outside the station fields.

Not only on the station fields, but on the main farm, is a definite cropping sequence outline. Five operators, those at L'Islet, Montmagny, St. Fabien, Ste. Angele and Sayabec are now operating their entire farms under a definite rotation system. Last season the farms at St. Pierre, St. Lazare, St. Vallier, St. Eleuthere, Ste. Anne des Monts and Causapscal were measured and a definite cropping plan and rotational system decided upon, after a careful study of the need of each farm, soil conditions, markets and labour available.

Care is taken on the stations to grow crops under approved methods. In the following paragraphs, the methods of handling the potato crop and clover hay is outlined.

Potato Culture

In preparing the soil for potatoes in the above four year rotation, the fourth year field (timothy hay) is ploughed shallow as soon as the hay is removed, generally by the first of August. During the balance of the season the land is harrowed from time to time on dry warm days in order to destroy weeds. Late in the fall, it is ploughed deeper and in the following spring a deep, mellow seedbed is worked up. Barnyard manure is applied in the fall or early spring.

Planting is usually well underway during the first week of June. Certified seed is used. The sets are freshly cut just prior to planting and about 20

bushels used per acre. In most cases the sets are dropped by hand from 8 to 10 inches apart and covered with the horse hoe. As soon as the young plants appear above the ground they are scuffled and horse hoed. This operation is repeated from two to four times throughout the season, depending on the amount of weeds present, the number of rains and the formation of crust.

Spraying is commenced when the tops are six inches high and continued at intervals of ten days or two weeks throughout the season. The 4-4-40 Bordeaux mixture is used, i.e. four pounds bluestone (copper sulphate), and four pounds burnt lime, carefully slaked, or high quality hydrated lime to 40 gallons water. The lime solution and copper sulphate solution are poured together in a diluted form. If the two concentrated solutions are put together, a coarse mixture will result. The ideal method is to dissolve four pounds of bluestone in 20 gallons of water and thoroughly stir four pounds of lime in another 20 gallons of water. Then pour the diluted mixtures together in the spraying tank, preferably at the same time. The spray should be used immediately it is prepared, because the Bordeaux mixture looses its strength if kept overnight.

Insect poison is added to the spray as required. One-half pound of Paris green along with two pounds arsenate of lime in 40 gallons controls the Colorado potato beetle or bug.

Digging is done by the potato digger, by the plough, or by the hand digger. In all cases digging and picking are greatly simplified when the drills are free from weeds.

An experiment comparing 16 tons of manure with 8 tons of manure and 375 pounds of an 8-16-8 fertilizer mixture per acre was conducted at the following stations in 1933: St. Fabien, Luceville, Sayabec, Ste. Anne des Monts, St. Paul, St. Simeon, St. Camille, Ste. Angele, St. Pierre, I.O., and Causapscal. The average yield with manure alone was 169 bushels, costing 29 cents per bushel, and when a combination of manure and chemical fertilizer was used, it was 212 bushels, costing 24 cents per bushel.

LEGUME HAY PRODUCTION

In order to increase the winter milk production on the Illustration Stations in Eastern Quebec the growing of legume hay, including red clover and alfalfa, has been given special attention.

The two main obstacles, which were generally responsible for low yields in the past, were excess of soil moisture on flat land and accompanying high degree of acidity. These conditions have been corrected by proper drainage and by the application of ground limestone. Both have given very satisfactory results.

In seeding down, the following mixture is used per acre: 8 pounds timothy, 5 pounds early red clover, 5 pounds alfalfa (Grimm or Ontario Variegated) and 2 pounds alsike clover. In most cases the grass and clover seed is sown with oats following the root crop.

The following yields were secured in 1933: St. Fabien, 2·4 tons; St. Vallier, 2·7 tons; Sayabec, 3 tons; St. Lazare, 1·2 tons; Ste. Anne des Monts, 3·25 tons; Montmagny, 1·1 tons; St. Hilarion, 1·4 tons; St. Paul de Montminy, 1·5 tons; St. Simeon, 1·2 tons; Nouvelle, 1·8 tons; L'Islet, 2·5 tons; St. Pierre, I.O., 1·3 tons; Sacre Coeur, 2·0 tons, and Causapscal, 2·6 tons per acre. At St. Fabien, Sayabec, Ste. Anne des Monts and Sacre Coeur, the hay was composed almost entirely of clover and alfalfa, but winter killing destroyed the clover and alfala at the other stations and the harvested crop was composed of about 60 per cent timothy.

SUPPLEMENTARY USES OF CHEMICAL FERTILIZER

In the older settled areas of Eastern Quebec commercial fertilizer, as a supplement to barnyard manure, is becoming more important and more essential each year. Realizing its value, a series of experiments, comparing manure with manure and fertilizer combined for potatoes and turnips, was outlined last year

and conducted on all stations. The results of the two treatments on turnips are given in the table below.

RESULTS OF EXPERIMENTS CONDUCTED ON ILLUSTRATION STATIONS WITH FERTILIZERS ON SWEDE TURNIPS

MANURE *vs* MANURE AND FERTILIZERS COMBINED

Stations	8 tons of manure and 375 pounds of 8-16-8 per acre		16 tons of manure per acre	
	Yield per acre	Cost per ton	Yield per acre	Cost per ton
	tons	$	ton	$
St. Fabien	21·0	2 29	17·0	2 71
St. Vallier	.....	.....	.....	.....
Luceville	16·9	2 59	11·7	3 03
Sayabec	16·5	2 59	12·5	3 23
St. Lazare	12·3	4 43	18·2	3 19
Maria	25·0	1 92	20·0	1 87
Ste. Anne des Monts	22·7	2 28	15·0	3 09
St. Eleuthere	25·0	1 54	16·0	2 26
Montmagny	19·5	2 28	18·0	2 41
St. Paul	18·0	2 99	15·0	3 33
St. Simeon	25·0	2 10	21·7	2 36
St. Camille	22·0	3 36	15·0	4 02
Ste. Angele	30·4	1 97	23·1	2 30
Nouvelle	28·3	1 42	19·6	1 96
L'Islet	26·6	1 43	18·2	1 99
St. Pierre I.O.	12·0	3 20	9·0	4 01
Sacre Coeur	.....	Failure due	to drought	.....
Causapscal	19·5	2 28	14·5	2 91
Average	21·3	2 41	16·5	2 79

The above table shows that the yield of turnips was on the average 4·8 tons per acre heavier on the plots treated with 8 tons manure plus 375 pounds of an 8-16-8 fertilizer mixture than on the plots which received an application of twice as much manure and no fertilizer. It is also interesting to note that the cost of production per ton was on the average 38 cents lower on the plots which received a mixed application of manure and fertilizer.

IMPROVEMENT TO PASTURES WITH FERTILIZERS

In the spring of 1932 a project was begun at five stations, St. Pierre, I.O., St. Lazare, St. Vallier, L'Islet and Causapscal, for the improvement of permanent pastures by the application of commercial fertilizers. In this experiment, six acre fields were selected and divided into two equal areas. One area received an application of 700 pounds of a 3-8-7 fertilizer mixture per acre, while the other area was left as a checkplot. The above amount of fertilizer was applied early in the spring and in June an application of 50 pounds nitrochalk (15½ per cent N) was also made. Comparative records were kept of the grazing days and milk produced while on the two areas.

The results of the first year's trials showed that there was not a very significant increase in the growth of grass, probably because the soil was so impoverished, that the fertilizer was ineffective and also probably due to the dry weather conditions that prevailed during the beginning of the vegetative period.

In 1933, the treated plot was given an application of 50 pounds nitrate of soda per acre early in the spring and another fifty pounds early in June. The weather was extremely dry during July and August and growth was greatly retarded, but the records show that the average number of grazing days per acre was 56 for the fertilized plot and 37 for the unfertilized plot. The milk production was 1,199 pounds per acre for the fertilized area and 840 pounds for the unfertilized area.

COST OF PRODUCTION STUDIES (EASTERN QUEBEC)

An important project carried on by the Division is that of securing the cost of producing farm crops under different soil conditions and under different cultural practices. This is important because the average cost of producing a crop,

Stations	Potatoes					O.P.V. hay					Clover and alfalfa					Timothy					Oats				
	No. of years grown	Yield per acre		Cost per bushel		No. of years grown	Yield per acre		Cost per ton		No. of years grown	Yield per acre		Cost per ton		No. of years grown	Yield per acre		Cost per ton		No. of years grown	Yield per acre		Cost per bushel	
		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average
		bush.	bush.	cts.	cts.		tons	tons	$	$		tons	tons	$	$		tons	tons	$	$		bush.	bush.	cts.	cts.
St. Fabien	9	147	187	38	30	7	2·5	2·71	8 07	7 42	12	2·4	2·6	5 72	5 88	11	1·2	1·47	8 90	7 50	5	44·0	36·5	48	65
St. Valier											4	2·7	3·1	5 74	6 00	3	2·3	1·90	5 51	6 79					
Luceville	1	173	173	22	22																1	23·0	23·0	73	73
Sayabec	3	182	203	23	26						3	3·0	2·9	5 02	5 19	2	2·0	1·87	5 84	6 76	4	29·0	30·3	70	76
St. Lazare											3	1·2	1·5	11 80	8 85	2	1·7	1·72	6 26	6 60	4	61·0	46·9	35	43
Maria						2	2·75	3·47	7 41	7 28											2	57·0	48·0	34	37
Ste. Anne des Mts	3	150	206	31	29	4	2·0	2·00	9 71	8 91	3	3·25	2·1	3 94	9 04	1	1·5	1·5	6 32	6 32	4	22·5	31·7	83	65
St. Eleuthère						2	2·5	2·61	7 89	8 85											2	50·0	47·0	40	46
Montmagny						6	3·0	3·0	7 76	7 52	11	1·1	2·0	10 38	8 72	11	1·5	2·25	7 78	6 35	11	71·0	70·0	30	32
St. Hilarion						1	2·0	2·0	10 81	10 81	4	1·4	1·3	9 00	11 64	4	0·9	1·0	10 92	12 51	4	37·0	29·0	51	80
St. Paul de Montminy	1	275	275	22	22	1	3·0	3·0	6 91	6 91	1	1·5	1·5	9 09	9 09	2	1·0	1·0	10 68	9 93					
St. Siméon	1	181	181	31	31	2	2·0	2·0	11 12	10 14	1	1·2	1·2	11 60	11 60	2	1·0	1·8	11 04	10 10					
St. Camille	2	172	191	38	37	2	3·0	3·50	7 57	7 46						5	1·0	0·91	9 58	8 36	2	60·0	51·0	36	46
St. Angèle Merici	1	277	277	16	16											2	2·0	2·50	5 49	4 75	2	58·0	53·0	38	45
Nouvelle						7	3·0	3·01	7 61	7 95	7	1·8	1·7	7 43	8 49	3	2·0	1·80	5 34	6 26	7	48·6	48·0	41	42
L'Islet						4	2·2	2·10	9 04	11 34	4	2·5	2·3	6 15	7 05	4	2·0	1·88	5 69	6 77	2	54·0	54·0	35	39
St. Pierre, I.O	6	140	212	31	26						5	1·3	1·9	10 73	8 81	3	1·3	1·40	8 44	9 18	5	20·0	26·0	94	76
Sacré Coeur	1	95	95	41	41	3	2·0	2·0	9 64	9 20	2	2·0	1·7	6 41	9 46	2	1·3	1·10	7 25	9 37	4	20·0	21·0	89	90
Causapscal	5	229	262	23	20						6	2·6	2·2	5 39	6 02	5	1·2	1·72	9 31	6 91	7	51·0	43·0	43	56
Average		184	208	29	27		2·50	2·65	8 63	8 45		2·0	2·1	7 74	7 78		1·49	1·65	7 77	7 65		44·1	43·7	52	55

whether high or low, really determines if a crop can be grown with profit in a particular locality or not. The cost of production is determined by keeping a record of labour, seed, manure, fertilizer, etc., that are used on a particular crop. From these data and from the yields obtained, the cost per unit is determined. All labour costs are calculated on the prevailing rates for the district and all work which the operator, his family and team do on a particular crop is charged against the crop at these rates. Manure is valued at $1.50 per ton, spread on the land. Forty per cent of the value of the manure and 55 per cent of the value of the fertilizer is charged to the crop in the rotation to which it is applied. The remaining 60 per cent and 45 per cent for manure and fertilizer respectively, is charged to the succeeding crops in proportion, depending on the length of the rotation. This report gives a record of the cost of producing turnips, potatoes, O.P.V., clover and alfalfa hay, timothy hay, and oats.

TURNIPS.—Turnips are unquestionably one of the most important crops for the winter feeding of dairy cattle in this district, as seasonal conditions are not conducive to the production of succulent crops, such as corn.

Turnips have been grown on all stations in this district since their organization and records kept of the yields and cost of production. Below is given in tabular form, not only the yields and costs for 1933, but the average yield and costs by stations to date, as well as a statement of the various items of expense entering into the cost of production for 1933.

TURNIPS—YIELD AND COST OF PRODUCTION BY STATIONS

Stations	1933		Itemized statement of cost per acre, 1933						Number of years grown	Average	
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Manual labour	Horse labour including teamster	Seed and miscellaneous	Use of machinery		Yield per acre	Cost per ton
	tons	$	$	$	$	$	cts.	$		tons	$
St. Fabien	19·0	2 49	3 00	9 77	7 40	23 58	84	2 85	12	20·5	2 57
St. Vallier	10·9	3 41	4 00	9 77	5 70	14 00	84	2 85	5	15·9	2 75
Luceville	14·3	2 97	3 00	9 77	15 00	11 07	84	2 85	1	14·3	2 97
Sayabec	14·5	2 89	3 75	9 77	8 77	16 00	84	2 85	4	18·3	3 28
St. Lazare	15·6	3 58	2 50	9 60	24 27	15 75	84	2 85	3	23·7	2 95
Maria	22·5	1 74	2 50	9 77	11 72	11 47	84	2 85	1	22·5	1 74
Ste. Anne des Monts	18·8	2 35	2 00	9 77	16 05	17 52	84	2 85	4	15·4	3 25
St. Eleuthere	20·5	1 82	2 00	9 77	11 40	10 55	84	2 85	2	15·7	3 42
Montmagny	18·7	2 35	4 00	9 77	11 40	15 17	84	2 85	12	23·8	2 09
St. Hilarion	12·2	3 44	2 00	9 95	12 60	13 75	84	2 85	3	13·8	3 44
St. Paul	16·5	3 15	2 00	9 77	20 62	15 87	84	2 85	1	16·5	3 15
St. Simeon	23·3	2 23	2 25	9 77	24 90	11 40	84	2 85	2	18·7	3 05
St. Camille	18·5	3 79	2 00	9 77	24 30	30 40	84	2 85	2	15·6	4 05
Ste. Angele	26·7	2 11	2 75	9 77	24 30	16 00	84	2 85	2	23·3	2 22
Nouvelle	23·9	1 62	2 25	9 77	10 87	12 75	84	2 85	7	19·2	1 93
L'Islet	22·4	1 65	3 00	9 77	11 92	8 75	84	2 85	4	20·2	3 03
St. Pierre, I.O	10·5	3 57	3 00	9 77	9 90	11 12	84	2 85	6	16·0	3 23
Sacré Coeur	.....	Failure due to drought				.....	.....	.....	3	11·2	4 52
Causapscal	17·0	2 58	2 50	9 77	12 40	15 60	84	2 85	6	17·2	2 89
Average	18·1	2 65	2 69	9 77	14 64	15 04	84	2 85	.....	18·8	2 80

An examination of the table reveals that the average yield at all stations for 1933 was 18·1 tons and the average cost per ton $2.65. Yields ranged from 10·5 to 26·7 tons per acre and costs per ton from $1.62 to $3.79. In general, the higher the yields the lower the cost per ton. For example, at all locations, where the yield is 16 tons or less, the cost per ton is approximately $3 and in some cases considerably more. On the other hand, turnips were produced at L'Islet, Nouvelle, St. Eleuthere and Maria for less than $2 per ton

In examining the various items of expense, it will be noted that horse labour, including teamster, makes up the largest single item of expense and charges range from $8.75 to $30.40 per acre. Manual labour also varies, depending on the type of soil and method of handling the crop. Expenses range from $5.70 to $24.30 per acre.

POTATOES.—Potatoes are an important cash crop in Eastern Quebec and were grown on eleven stations in 1933. Owing to the dry weather, yields were comparatively low, 184 bushels per acre being the average at a cost of 29 cents per bushel. The cost per bushel ranged from 16 cents at Ste. Angele with a yield of 277 bushels to 41 cents at Sacre Cœur with a yield of 95 bushels per acre. (See table " Cost of Growing Crops in Eastern Quebec.")

In growing the potato crop, horse labour, including teamster, is the largest item of expense making up on the average $17.07 of the total expense of $50.62 per acre. Manual labour on an average costs $11.08 and manure and fertilizer $9.86. Use of land, machinery, and seed are smaller items of expense. Between stations, manual labour varies more than any other item, from $3.80 at Causapscal to $26.10 at St. Paul de Montmagny. This great variability is due partly to the difference in local wages and partly to the different methods of handling the crops, chiefly digging.

OATS, PEAS AND VETCHES.—The high value of O.P.V., as a protein, rich fodder for winter live stock feeding, as well as its usefulness as a green feed for supplementing dry pastures, has made it one of the most popular of crops among the operators and farmers in this district of supervision.

The 1933 records, as given in the table " Cost of Growing Crops in Eastern Quebec," show that an average yield of 2·5 tons of cured hay was secured and in no case was the yield less than 2 tons per acre. The cost per ton ranged from $6.91 to $11.12 with an average of $8.63. This is only slightly more than the average cost of growing a ton of timothy hay ($7.77). The total cost of growing one acre of O.P.V. on the average was $21.02. This cost was made up of the following items: manure $6.93, manual and horse labour $6.35, machinery $2.85, seed $2.50, and use of land and taxes $2.39.

CLOVER AND ALFALFA HAY.—The table on " Cost of Producing Crops in Eastern Quebec " shows that the average yield of clover and alfalfa hay on fifteen stations was 2 tons and the average cost $7.74 per ton. This yield is high when it is realized that a good deal of winter-killing occurred and that the season was unusually dry.

It will be noted that the cost per ton ranges from $3.94 at Ste. Anne des Monts, where the yield was 3·25 tons per acre, to $11.80 at St. Lazare, where a yield of 1·2 tons was secured. In all cases, there is very close relationship between yield and cost per ton. The cost per acre varies but slightly.

In the production of clover and alfalfa hay manure and fertilizer makes up the largest item of expense; seed is the smallest item, but one which might be reduced considerably by the growing of the greater part of the clover and grass seed on the farm.

TIMOTHY HAY.—The average yield of timothy hay on the sixteen stations in Eastern Quebec in 1933 was 1·49 tons per acre and the average cost $7.77. The yield was slightly lower and the cost per ton slightly higher than the average to date

Yield, more than any other factor, determines whether the crop is to be produced cheaply or not. The various items of expense which enter into the cost of production vary but little between stations, but the yield varies from 0·9 ton to 2·3 tons, and it is largely due to this variation that the cost per unit is so different at the stations.

OATS.—Oats are the most important cereal crop in Eastern Quebec and records of yield and cost of production have been kept over a period of eleven years and covering sixty-six trials.

A study of the table " Cost of Producing Crops in Eastern Quebec " shows that the cost per bushel varies indirectly with the yield per acre, as is illustrated by record at Sayabec (29 bushels at 70 cents) St. Lazare (61 bushels at 35 cents), St. Pierre (20 bushels at 94 cents), and Causapscal (51 bushels at 43 cents). In the four cases the cost per acre is very close $20.30, $21.35, $18.80 and $21.93 at Sayabec, St. Lazare, St. Pierre and Causapscal respectively.

In growing a crop of oats under illustration station conditions manure and fertilizer make up the largest item of expense, as 30 per cent of the value of the manure and fertilizer applied to the preceding root crop is charged to the oats. It is estimated that the oat crop profits to this extent from the manure and fertilizer applied to the preceding crop.

FIELD DAYS

The Illustration Stations in Eastern Quebec are being used more and more as centres where lectures and practical demonstrations on local farm problems are given.

During the year, a public meeting or field day was held at each station in operation. The total attendance at these 19 meetings was 1,370 people, giving an average of 72 per meeting. The attendance varied from 25 at St. Fabien to 200 at St. Hilarion.

These field days were organized in co-operation with the Provincial District Agronome who assisted the supervisor in the undertaking. The program at all stations included a visit to the station fields where the methods of growing all crops were outlined and demonstrations explained. The many questions asked by farmers, dealing with their individual problems, and the discussions which followed made an interesting and useful part of the program.

REPORT OF THE ILLUSTRATION STATIONS IN CENTRAL QUEBEC AND LAKE ST. JOHN

FOR THE YEARS 1931, 1932 AND 1933

J. D. Belzile, B.S.A., Assistant to Chief Supervisor

There are, in the Central Quebec and Lake St. John District, fifteen Illustration Stations. The area covered by this district of supervision comprises six of the twenty provincial divisions of the Quebec Department of Agriculture. The stations are distributed as follows. In Provincial Division number four, there are five stations; in number five, two stations; in number six, three stations; in number eight, one station; in number ten, one station and in number twenty, three stations.

Each Illustration Station aims to serve a certain agricultural area in its vicinity. Farmers residing in this area, which usually does not extend more than fifteen miles from the station, are invited to attend the annual meeting organized by the supervisor in co-operation with the county agronomist.

The following indicates the location of the station, name of the operator, together with the list of parishes served by each:—

BLACK LAKE STATION..... Operator, A. Dallaire.	Black Lake and surrounding district.
BROMPTONVILLE STATION ..... Operator, V. Messier.	Bromptonville, Windsor Mills and St. Francois Xavier de Brompton and St. Georges de Windsor.
HEBERTVILLE STATION ..... Operator, Jos. Gervais.	Hebertville Station, Notre Dame d'Hebertville, St. Jerome and St. Gedeon.
JONQUIERE STATION ..... Operator, E. Brassard.	Jonquiere, Kenogami and Arvida.
LAC MEGANTIC STATION..... Operator, A. Trudel.	Lac Megantic, St. Ludger, Ste. Cecile de Whitton, St. Samuel, Springhill and Milan.
LAURIERVILLE STATION ..... Operator, A. Vachon.	Lauriervile, Ste. Julie, St. Anastasie de Lyster, Leeds Village, Notre-Dame de Lourdes, Inverness and Pennington.
LOTBINIERE STATION ..... Operator, M. Moraud.	St. Louis de Lothbiniere, Ste. Croix, St. Edouard, St. Jean Deschaillons, St. Philomene de Fortierville, St. Pierre les Becquets, Ste. Emelie and Parisville.
NORMANDIN STATION ..... Operator, A. Hebert.	Normandin, Albanel, St. Thomas Dydme, St. Methode, St. Felicien and Notre Dame de la Doree.
PLESSISVILLE STATION ..... Operator, E. Jutras.	Plessisville, Ste. Sophie, St. Pierre Baptiste and Princeville.
RUISSEAU A L'EAU CHAUDE STATION ..... Operator, Alphee Goupil.	St. Leon de Standon, St. Malachie, St. Edouard, St. Nazaire de Buckland, Frampton and Ste. Marguerite.
ST. APOLLINAIRE STATION ..... Operator, J. Cote.	St. Apollinaire, St. Nicholas de Levis, St. Antoine, St. Agapit, St. Giles, St. Flavien, Ste. Agathe, St. Narcisse and Sacre Coeur.

ST. EVARISTE STATION ..... Operator, C. Veilleux.	St. Evariste de Forsyth, St. Ephrem de Beauce, St. Honore de Beauce, St. Hilaire de Dorset, Courcelle, St. Sebastien, Lambton and St. Romain.
SCOTT JUNCTION STATION ..... Operator, E. Lacroix.	St. Maxime de Scott, St. Bernard, St. Sylvestre, St. Narcisse de Beaurivage, Ste. Marie de Beauce, St. Elzear de Beauce, St. Lambert de Levis, St. Anges de Beauce and Ste. Marguerite de Dorchester.
SOUTH ROXTON STATION ..... Operators, A. F. Sanborn & Son.	Roxton Falls, Valcourt, St. Valerien de Milton, Roxton Pond, South Roxton, Ste. Cecile de Milton, Granby, North Stukely and St. Joachim de Shefford,
ST. PROSPER STATION ..... Operator, E. Larochelle.	St. Prosper, Ste. Aurelie, Ste. Rose, St. Zacharie.

PRECIPITATION AND THE GROWTH OF CROPS

Weather conditions in general were favourable for the growth of crops during last season. June, however, was very dry in Central Quebec and the west side of Lake St. John district and pastures and hoed crops consequently suffered considerably. During the latter part of the season an abundance of rain fell. This was well distributed and aided greatly in the production of an average crop.

CROP ROTATIONS USED ON THE STATIONS

On each Illustration Station a systematic rotation is operated in order to increase production and to provide more desirable feed for live stock.

Three rotations are now in operation in the district of Central Quebec and Lake St. John. Five stations follow a four-year rotation of hoed crops, grain, clover and timothy; nine stations are operated under a five-year rotation of hoed crops, grain, clover and alfalfa, clover and alfalfa, and alfalfa, and one station. namely, Plessisville, follows a six-year rotation. In this rotation one or two fields are allowed to stay in alfalfa as long as the stand is satisfactory.

Clay soils have been found suitable for long rotations, while the sandy soils do well with shorter rotations. A study of conditions existing on the different stations indicates that no one rotation may be standard for all conditions. The main thing to consider when planning a rotation for a farm is to lay out the fields in such a way as to provide the best soil condition for the desired crops. On all stations where dairy farming is practical the aim is to obtain an abundant production of legume hay, ensilage, roots, green feed and also an adequate quantity of grain such as oats and barley. Short rotations have been found more productive than long ones, but they require more labour, fertilizer, manure and seed.

PASTURE IMPROVEMENT BY THE USE OF COMMERCIAL FERTILIZER

There are at present four pasture improvement experiments in operation on the Illustration Stations in Central Quebec. These tests are conducted on infertile and unproductive areas, representative of large tracts of land in the district. On uniform permanent pasture land, two adjoining fields of three acres each were selected and fenced separately. One was left unfertilized and served as a check plot, while the other received early in the spring an application of 100 pounds nitrochalk, 350 pounds superphosphate and 100 pounds muriate of potash per acre. In June, an additional application of 50 pounds per acre of nitrochalk

was made. The above demonstration was started in 1932 at Plessisville, Scott and St. Evariste.

In order to determine the value of the fertilizer in this experiment, the two fields were grazed alternately and a record kept of the number of days the herd was on each pasture as well as the amount of milk produced. In the table which follows the results are expressed in three ways—

1. Grazing days per acre—a grazing day means one cow, one day.
2. Carrying capacity per acre—meaning the number of cows an acre can carry for the pasture season of 122 days.
3. Milk production per acre.

PASTURE DEMONSTRATION, CENTRAL QUEBEC, 1932

Station	Grazing days per acre		Carrying capacity per acre		Milk production per acre	
	Fertilizer	Check	Fertilizer	Check	Fertilizer	Check
	days	days	cows	cows	lb.	lb.
Plessisville	64·6	48·0	0·53	0·39	1,800	1,080
Scott	127·1	68·4	1·04	0·56	3,944	2,124
St. Evariste	77·0	36·6	0·63	0·30	1,585	769
Average	89·6	51·0	0·73	0·42	2,443	1,324

It will be seen from the table that the use of the fertilizer increased the grazing days by 38·6 per acre on the average, also the carrying capacity per acre was increased from 0·42 of a cow to 0·73 of a cow. The milk production per acre for the unfertilized area was 1,324 pounds and for the fertilized area 2,443 pounds or an increase of 1,119 pounds in favour of the fertilized plots.

In 1933, on the South Roxton station a special experiment was laid down on a permanent pasture field badly infested with hardhack. The control of hardhack and the improvement of the carrying capacity of such pasture lands were the two principal objects in undertaking this trial. Fifteen acres of representative land were selected and divided into the areas of five acres each. The following treatment was given each field: Field "A" was fenced and left in its natural condition as a check plot; Fields " B " and " C " were cleaned by hand pulling the hardhack in the early spring, while the land was moist and by mowing at different periods. Pasture grasses and clovers were seeded on the bare spots, in addition Field " C " received an application of 100 pounds nitrochalk, 300 pounds superphosphate, 100 pounds of muriate of potash and 2½ tons of ground limestone per acre, Field " B " received no fertilizer treatment. Dairy cattle were allowed to graze each area and a record was kept of the milk produced. This season, records were incomplete from Field "A"; however, complete records were obtained from Fields " B " and " C," which were as follows:—

—	Land cleared not fertilized	Land cleared and fertilized
Production of milk per acre	767 pounds	1,053 pounds
Grazing days per acre	45 days	60 days
Carrying capacity per acre	0·50 cow	0·32 cow

Pasture growth was quite seriously affected because of drought, as well as the general condition of the land. A decided thickening of the herbage could be noted in the fall, particularly where lime and chemical fertilizer were applied; where the heaviest grazing took place, the growth of the young hardhacks were scarce and less vigorous.

IMPROVEMENT OF THE DAIRY HERDS

In this district of supervision considerable attention is given to the improvement of the dairy industry and all major field operations are directed to assist in this undertaking. All operators are using purebred bulls. They are keeping individual milk records and making butterfat tests in order to determine the production of each cow.

At the end of each milking period, a careful study is made of the production of each cow in order to find out the individuals which produce profitably. The low producers are disposed of and replaced by young heifers of better breeding. During the past year twenty-five low producing cows were sold. Another economical method followed by the operators of building up a better dairy herd has been the giving of more careful attention to the selection, raising and feeding of the young calves. In this connection the feeding of an abundant supply of good quality legume hay and grain has been of great assistance in raising thriftier young stock.

Special attention has been given during the past few years to the improvement of pastures, to better winter feeding, which have had the tendency to increase production and to lengthen the lactation period. The progress, which has been made in three representative herds during the past five years is given in the following table.

RESULTS OF FIVE YEARS' PROGRESS IN DAIRY HERD IMPROVEMENT

—	Lac Megantic		Plessisville		South Roxton	
	1928	1933	1928	1933	1928	1933
Number of cows in herd	8	22	10	17	16	21
Average days in lactation	221	371	279	317	302	328
Average production per cow, pounds milk	6,183	7,018	9,049	9,966	7,088	7,121
Average production per cow, pounds fat	233·5	298·0	317·6	340·7	295·7	288·8
Lowest cow's production, pounds milk	4,942	4,420	5,920	7,193	5,784	5,628
Lowest cow's production, pounds fat	167·0	185·6	208·0	236·7	265·0	202·6
Highest cow's production, pounds milk	8,944	11,019	10,221	15,180	10,516	9,050
Highest cow's production, pounds fat	315·0	527·4	309·0	488·4	444·0	344·0
Total herd production, pounds milk	49,464	154,408	90,490	169,421	113,408	149,540
Total herd production, pounds fat	1,868·0	6,555·2	3,176·0	5,792·4	4,731·2	6,061·5

The table shows that the number of cows kept by the operators at Lac Megantic, Plessisville and South Roxton have been greatly increased during the past five years. This increase in numbers is chiefly responsible for the great increase in total milk produced. At Lac Megantic, for example, more than three times as much milk was produced in 1933 as in 1928. Not only is the total production much higher at all three stations, but both the average milk production and the average butterfat production is higher in 1933 than in 1928.

FLOCK IMPROVEMENT AND POULTRY RECORDS

The improvement of the poultry flocks on the Illustration Stations has a beneficial effect upon the poultry industry of the neighbourhood, because the surplus of breeding stock and a certain quantity of hatching eggs are sold at reasonable prices. In Central Quebec, 50 pullets, 21 cockerels, and 43 settings of eggs were disposed of by the operators to the adjoining farmers during the past season.

During the year a complete record of the income and expenses from poultry, were kept by the operator in co-operation with the Division in order to find out the exact profit obtained from this branch of farming.

Following is a table giving the results of the findings from all stations, where the poultry flock is over 30 hens.

SUMMARY OF POULTRY RECORDS—1933

Station	Per poultry flocks								Per hen	
	Number of hens	Number of eggs	Average price per doz.	Value of eggs	Other sales	Total income	Total expenses	Net profit	Number of eggs	Net profit
			cts.	$	$	$	$	$		$
Bromptonville...	77	7,653	24	151 37	161 03	312 40	119 89	192 51	99	1 56
Jonquière.....	188	26,268	32	699 00	222 92	921 93	522 55	399 38	140	2 12
Laurierville.....	33	4,258	21	95 14	4 51	79 65	42 27	37 38	129	1 13
Plessisville.....	71	11,154	19	175 71	131 56	307 27	223 89	83 38	157	1 17
St. Apollinaire...	38	3,529	31	91 04	20 06	111 10	58 02	53 08	93	1 40
St. Evariste.....	31	2,479	13	27 71	34 36	62 07	54 12	7 95	80	0 26
South Roxton....	78	9,678	18	143 35	38 47	181 86	92 13	89 73	124	1 15
Average.....	74	9,288	23	194 77	87 56	282 32	158 98	123 33	117	1 26

A review of the table shows that the most striking feature is the great variability in the production and profit between the different flocks. The total income varies from $62.07 at St. Evariste to $921.93 at Jonquiere. The number of hens kept, their production and the prices obtained for the poultry products are the main factors, influencing the income. The fact that the average production per flock varies from 80 to 157 shows the possibilities for improvement.

FARM ACCOUNTING

A simple farm accounting system is being kept by each operator of an Illustration Station in this district. The receipts and expenses of each department of the farm are entered in the account books in order to determine the profit or the loss of each.

The objects of keeping the account books are threefold, 1st, to demonstrate the importance of farm accounting, 2nd to make the operator more acquainted with the financial side of his farm business and 3rd, to serve as a guide to the operator and to the Division for future developments.

FIELD DAYS

During the past summer, eleven field days were held on the Illustration Stations in Central Quebec with an average attendance of 165 and a total attendance of 1,810. These field days were organized by the supervisor in co-operation with the local agronome.

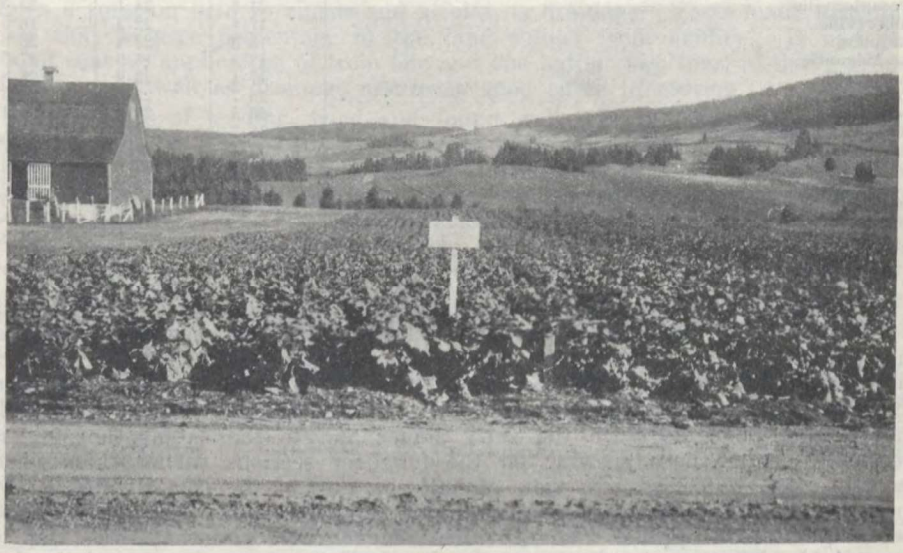
The program at each field day included an explanation of all types of work being carried on in the field and the discussion of individual farm problems. At the conclusion of the field work lectures and demonstrations were given on agricultural topics of local interest.

The increasing attendance and interest shown at the field days is most gratifying and to meet the requests of those attending an effort will be made to have a field day at each station annually.

MANURE ALONE VERSUS MANURE AND CHEMICAL FERTILIZER ON TURNIPS

To study local soil conditions with respect to fertility in relation to crop growth and to obtain data as to the most practical means of improving the general productivity of farm lands, a series of comparative trials were conducted on thirteen stations in Central Quebec, during 1932 and 1933.

In each case, the land was prepared for a hoed crop, as it occurs in the four- or five-year rotation, which is being followed on these farms. The field in question was divided into three areas one receiving each of the following manurial or fertilizer treatments: Plot 1, received a dressing of 16 tons of farmyard manure; Plot 2, 8 tons of farmyard manure in addition to 750 pounds of a 4-8-4 fertilizer per acre; Plot 3, received an application of 8 tons of manure and 375 pounds of a 8-16-8 fertilizer. The double strength of 8-16-8 fertilizer was used in order to test its comparative response with one of a standard formula, as is more generally used, such as the 4-8-4 in question, the concentrated fertilizer being featured because of the lighter applications, which naturally are made to the land and consequently the lower proportionate charge for freight and haulage to distant points. Hall's Westbury turnips were planted on the three areas, planting being completed as early in the spring as possible on slightly raised drills. The distance between the drills varied from twenty-eight to thirty inches; these were made and rolled one day before seeding, as it aids in securing an evener germination of the seed. In order to simplify thinning, special attention was given to the time of starting this work, this commencing as soon as the second set of leaves appeared, or in other words, when the young seedlings are from one to one and one-half inches high.



General view of turnip field showing plots receiving varying manurial and chemical fertilizer treatments.

The yields of turnips obtained during the two years 1932-33 were as follows:—

MANURE ALONE VERSUS MANURE AND CHEMICAL FERTILIZER ON TURNIPS
RESULTS OF TWO YEARS' TRIALS (1932-1933)

Station	16 tons of manure per acre	8 tons manure plus 750 pounds of 4-8-4 fertilizer per acre	8 tons manure plus 375 pounds of 8-16-8 fertilizer per acre
	tons	tons	tons
Black Lake	16·0	25·6	22·4
Bromptonville	24·8	24·1	25·5
Hébertville	17·4	22·3	16·5
Jonquière	13·8	23·4	23·9
Lac Mégantic	13·9	15·9	17·6
Laurierville	17·4	23·9	28·8
Lotbinière	18·7	23·0	24·3
Plessisville	26·5	29·0	30·4
Ruisseau à l'Eau Chaude	18·7	22·6	18·7
Scott	14·1	20·1	20·7
St. Apollinaire	20·7	33·6	34·6
St. Evariste	30·1	29·2	28·3
South Roxton	18·6	32·3	30·5
Average	19·2	25·0	24·8

It will be noted that the light application of manure, supplemented by the 4-8-4 and the 8-16-8 chemical fertilizer substantially increased the yield over land which received the manure alone; the average yield from the manured land being 19·2 tons in comparison with 25 and 24·8 where the above chemical fertilizers were used in addition to 8 tons of manure. Growth was noticeably more rapid, particularly in the early stages and to the extent that it was possible to thin those growing on the fertilizer sections earlier than where manure alone was used. In view of half the rate of the concentrated 8-16-8 mixture being used in comparison with the 4-8-4, it will be observed that the actual plant food applied was equivalent in each case and that there was no appreciable difference in the crop response resulting from the use of the low and high fertilizer formulae.

THE PRACTICE OF AFTER HARVEST CULTIVATION

In order to obtain a well prepared seed-bed for hoed crops, the practice of ploughing the sod land twice, once early in the summer and again later in the fall has been generally followed on these stations. On sandy soils, the land is ploughed on the removal of the hay, but is not fall ploughed as is the case in the heavier soils.

To secure the desired results, summer ploughing is done early in August. The furrow slice is wide and light (3-4 inches) and turned flat. In order to make a satisfactory job of ploughing at this season of the year, it is necessary to have a new or a sharp plough share. Better results are also secured if the ploughing is done immediately after the hay crop is removed.

In order to prevent the drying up of the bottom of the furrow, rolling immediately follows ploughing, in fact, it is desirable to roll all ploughed land the same day it is ploughed. When the roller is not heavy enough to thoroughly pack the newly turned furrows, it is loaded with large stones or sand bags. Thorough rolling is necessary to pack the sod against the furrow, while it is still moist. This will assure a more rapid and complete decomposition of the sod.

The summer ploughed fields are harrowed throughout the remainder of the season, particularly on hot sunny days, in order to control weeds such as couch grass, the land is much cleaner for the turnips and other root crops, that follow and much valuable time is saved in weeding and hoeing.

In the fall, ordinarily in October, the second ploughing is done to a greater depth, generally six to seven inches.

LEGUME HAY PRODUCTION

The production of legume hays and the study of conditions most conducive to its growth under the varying soil and seasonal conditions existing at the stations, form an important phase of Illustration Station activities in this district.

As many fields are wet, one of the first things considered when seeding down a rotation field to clover and alfalfa, is drainage. Tests made also indicate that a large percentage of the land suffers from acidity. It has been found that an application of from one and one-half to two tons, of finely ground limestone, as well as drainage assures a good catch of clovers.

The rates of seeding, tried and found well adapted to seeding to farms, where a four- and five-year rotation is being practised is made up of, 8 pounds timothy, 5 pounds red clover, 5 pounds alfalfa, and 2 pounds alsike clover per acre. The early two-cut type of red clover seed produced in Eastern Canada is used, frequently coming from other Illustration Stations located in areas suited to its production. When the establishment of a permanent alfalfa field has been decided upon, twenty pounds of alfalfa seed per acre are sown with a nurse crop. Where alfalfa has not been grown the seed is inoculated with nitroculture, obtained from the Bacteriological Division, Central Experimental Farm, Ottawa.

The following table gives the yield and cost of production of clover and alfalfa hay for 1933, together with the main factors of cost. The table also gives the average yield and cost of production for each station, covering a period of years, from one at Ruisseau a l'Eau Chaude to eleven years at Brompton-ville station.

CLOVER AND ALFALFA HAY—YIELD AND COST OF PRODUCTION BY STATION

Station	1933		Itemized statement of cost per acre—1933					Number of years grown	Average	
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Seed	Use of machinery	Labour		Yield per acre	Cost per ton
	tons	$	$	$	$	$	$		tons	$
Black Lake	2·50	5 05	3 32	3 90	1 33	2 85	1 23	6	2·50	6 18
Bromptonville*	2·10	6 16	2 54	4 80	1 33	2 85	1 42	11	1·81	8 67
Hébertville	2·60	7 13	4 11	6 60	1 37	2 85	3 60	5	2·70	7 06
Jonquière	3·10	5 85	3 16	6 60	1 49	2 85	4 00	5	2·80	6 91
Lac Mégantic*	4·03	4 10	4 73	5 43	1 33	2 85	2 16	6	3·05	5 97
Lauriervillle	1·70	9 58	3 04	8 00	1 33	2 85	1 07	2	1·87	9 54
Lotbinière	1·36	8 38	2 29	3 55	1 33	2 85	1 37	2	1·38	6 80
Normandin	2·50	6 28	3 05	6 60	1 20	2 85	2 00	3	2·50	6 27
Plessisville*	2·90	5 40	4 90	2 85	1 33	2 85	1 56	2	2·25	5 92
Ruisseau à l'eau Chaude	2·05	5 42	1 47	4 35	1 33	2 85	1 12	1	2·05	5 42
St. Apollinaire	2·30	5 74	3 26	3 91	1 33	2 85	1 86	8	1·74	8 35
St. Evariste	0·90	13 52	2 15	4 89	1 33	2 85	0 95	2	1·00	13 12
Scott	0·65	18 66	2 76	4 20	1 33	2 85	0 99	9	1·41	12 53
South Roxton*	4·65	2 79	2 65	4 80	1 33	2 85	1 35	4	3·00	5 13
Average	2·38	7 43	3 10	5 03	1 34	2 85	1 76	.....	2·15	8 08

*Two cuts.

From the above table it is interesting to note, that an average yield of 2·38 tons of legume hay was obtained in 1933, in spite of the damage done to clover during the winter 1932-33. The average yield of clover and alfalfa hay grown on these fourteen stations, for several years, and including a total of sixty-six tests, is 2·15 tons.

At the Plessisville station, alfalfa hay has become well established and has practically replaced red clover. At the Bromptonville station, alfalfa has done especially well on all areas, that have been limed in recent years at the rate of two tons per acre.

OATS, PEAS AND VETCHES FOR GREEN FEED AND HAY

As a supplementary feed for stock, when pastures start to dry up and become short during the latter part of August and throughout the fall months, as an annual hay and as a concentrated grain when ripened and threshed, oats, peas and vetch growing, is being studied and developed on the stations. The mixture seeded is composed of 2 bushels Banner oats, ¾ bushel peas and ¼ bushel vetches and seeded at the rate of three bushels per acre. The presence of a goodly percentage of legumes, such as peas and vetches increase the protein and improve the quality as feed for milk production.

On the stations, land intended for growing oats, peas and vetch is prepared as for hoed crops and in fact enters into the rotation as a hoed crop substitute as on the large majority of farms it is impracticable to grow a sufficient acreage of turnips, mangels, corn or potatoes to maintain the cropping sequence, as it occurs in systematic rotation; this being the case, grasses and clovers are not seeded with the crop the following year. The land is seeded to grasses and clovers with a nurse crop of either oats or barley.

The following table gives the results of the work underway for 1933 as well as for the period of years grown on each station.

OAT, PEA AND VETCH HAY—YIELD AND COST OF PRODUCTION BY STATION

Station	1933		Average		
	Yield per acre	Cost per ton	Number of years grown	Yield per acre	Cost per ton
	tons	$		tons	$
Hébertville	3·60	7 39	2	3·27	8 70
Lac Mégantic	4·03	6 81	2	3·43	12 07
Laurierville	3·97	6 32	2	3·80	7 85
Lotbinière	3·20	7 33	2	3·02	8 53
Ruisseau à l'eau Chaude	2·40	10 20	2	2·61	10 06
St. Apollinaire	2·68	10 33	4	2·82	10 93
St. Evariste	3·91	6 45	2	4·27	6 55
St. Prosper	1·75	12 51	1	1·75	12 51
Average	3·19	8 42	.....	3·17	9 64

A review of the results shows quite a wide variation in yields, ranging from 1·75 to 4·27 tons per acre. This can best be accounted for because of the existing condition of the soil with respect to fertility and to insufficient seed-bed preparation; the land at St. Prosper having been spring ploughed, it being a new station only started in the spring. The average cost of production of $9.64 per ton is made up of $2.90 for use of land and taxes, $10.05 covering cost of manure and fertilizer, $6.56 for labour, $2.86 for seed and $2.85 per acre for use of machinery.

COST OF GROWING CROPS IN CENTRAL QUEBEC AND LAKE ST. JOHN DISTRICT

The securing of data on the cost of producing crops under different conditions and treatments is an important project carried on by the Division. Such information makes it possible to decide the crops, which can be grown most

YIELD AND COST OF PRODUCTION OF CROPS IN CENTRAL QUEBEC AND LAKE ST. JOHN DISTRICT

Station	Potatoes					Turnips					O.P.V. hay					Oats					Timothy hay				
	Number of years grown	Yield per acre		Cost per bushel		Number of years grown	Yield per acre		Cost per ton		Number of years grown	Yield per acre		Cost per ton		Number of years grown	Yield per acre		Cost per bushel		Number of years grown	Yield per acre		Cost per ton	
		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average		1933	Average	1933	Average
		bush.	bush.	cts.	cts.		tons	tons	$	$		tons	tons	$	$		bush.	bush.	cts.	cts.		tons	tons	$	$
Black Lake	1	280	280	17	17	4	22·5	22·2	1 48	3 03	.....	.....	.....	.....	.....	7	56·5	43·7	31	54	5	2·00	1·82	5 81	6 90
Bromptonville	1	280	280	15	15	5	23·0	29·5	1 17	2 04	.....	.....	.....	.....	.....	9	50·0	56·0	31	57	9	1·25	1·94	8 78	6 02
Hébertville	.....	.....	.....	.....	.....	3	16·5	22·3	2 12	2 39	2	3·60	3·27	9 39	8 70	4	.....	38·9	.....	68	4	1·88	2·30	8 21	7 14
Jonquière	.....	.....	.....	.....	.....	3	17·3	22·8	2 78	2 42	.....	.....	.....	.....	.....	3	.....	35·9	.....	69	5	2·59	2·60	5 12	6 26
Lac Mégantic	2	277	242	14	21	4	16·2	21·8	2 23	2 93	2	4·03	3·43	6 81	12 07	2	62·0	54·9	28	38	5	2·25	2·76	5 73	6 11
Laurierville	2	241	387	18	16	2	20·8	21·9	1 54	2 97	2	3·97	3·80	6 32	7 85	5	64·0	60·1	23	35	2	1·17	1·12	9 31	10 93
Lotbinière	.....	.....	.....	.....	.....	2	20·0	22·0	1 22	2 12	2	3·20	3·02	7 33	8 53	2	29·4	28·2	47	49	2	1·64	1·72	6 68	6 53
Normandin	1	82	82	57	57	.....	.....	.....	.....	.....	2	.....	2·90	.....	8 92	1	.....	44·8	.....	52	2	1·86	1·60	7 42	7 74
Plessisville	.....	.....	.....	.....	.....	5	22·5	27·4	1 38	1 78	.....	.....	.....	.....	.....	5	69·0	65·0	26	34	.....	.....	.....	.....	.....
Ruisseau à L'eau Chaude	2	265	214	17	25	2	20·2	20·5	1 51	2 17	2	2·40	2·61	10 20	10 06	2	47·1	39·0	31	42	2	0·51	0·96	12 57	10 51
St. Apollinaire	.....	.....	.....	.....	.....	3	27·5	33·6	1 37	1 50	4	2·68	2·82	10 33	10 93	2	50·0	42·7	31	43	8	2·50	1·36	5 05	8 28
St. Evariste	2	416	378	12	17	2	26·1	29·4	1 20	1 75	2	3·91	4·27	6 45	6 55	2	45·0	47·5	35	40	6	0·80	1·26	12 41	11 68
St. Prosper	.....	.....	.....	.....	.....	1	14·0	14·0	1 93	1 93	1	1·75	1·75	12 51	12 51	1	60·7	60·7	23	23	.....	.....	.....	.....	.....
Scott	2	327	361	16	19	5	15·3	26·2	2 25	3 11	.....	.....	.....	.....	.....	10	32·0	34·1	54	65	6	0·63	1·40	19 83	9 94
South Roxton	.....	.....	.....	.....	.....	5	24·9	27·2	1 50	2 04	.....	.....	.....	.....	.....	6	47·0	38·1	34	52	.....	.....	.....	.....	.....
Average	....	271	293	21	22	....	20·5	25·3	1 69	2 34	....	3·19	3·20	8 42	9 41	....	51·1	45·8	33	52	....	1·59	1·79	8 74	7 07

economically, also serves as a basis for checking up on the rotation practices, cultural procedures, etc., and often indicates the possibilities of lowering the costs of producing certain crops. The cost of production is determined by keeping a record of labour, seed, manure, fertilizer, etc., that are used on a particular crop. From these data and from the yield obtained the cost per unit is determined. All labour costs are calculated on the prevailing rates for the district, which are $1 per day for a man and 60 cents per day for a horse. All work which the operator, his family and team do on a particular crop is charged against the crop at the above rates. Manure is valued at $1.50 per ton spread on the land. Forty per cent of the value of the manure and 55 per cent of the value of the fertilizer is charged to the crop to which it is applied. The remaining 60 per cent and 45 per cent for manure and fertilizer respectively is charged to the succeeding crops in proportion, depending on the length of the rotation.

This report gives a record of the cost of producing potatoes, turnips, O.P.V. hay, oats and timothy hay under conditions found in Central Quebec and Lake St. John District and as described in this report.

POTATOES.—While farmers in this district of supervision are not specializing in the production of potatoes as a cash crop for sale on the markets of our large cities, the growing of this crop is necessary for home consumption and for that of nearby small towns and villages.

In 1933, potatoes were grown on eight stations in this district and yields obtained as indicated in the table of "Yield and Cost of Producing Crops in Central Quebec and Lake St. John District." As shown in the table, yields vary from 82 bushels at Normandin to 416 bushels at St. Evariste with an average of 271 bushels costing 21 cents per bushel. It will be seen that the cost per bushel largely depends on yield, for example, 82 bushels costing 57 cents per bushel at Normandin and 416 bushels, costing 12 cents per bushel at St. Evariste.

The average cost of growing one acre of potatoes was found to be $43.39 and includes the following items: use of land taxes, $2.88; manure and fertilizer, $10.37; seed, $8.32; use of machinery, $2.85 and labour, $18.97.

TURNIPS.—The average cost of growing turnips on the fourteen stations in 1933 was $32.98 per acre made up of the following items, use of land and taxes, $3.04; manure and fertilizer, $10.35; manual labour, $7.45; horse labour, including teamster, $8.69; seed, $0.60 and use of machinery, $2.85. The average cost per ton was $1.69. Costs varied from $1.17 to $2.78 per ton, largely depending on the yield and amount of labour expended. Over a period ranging from two to five years and covering some forty-six trials, the average cost per ton has been found to be $2.34 when the yield was 25·3 tons per acre.

O.P.V. FOR HAY.—O.P.V. for hay was grown on eight stations in 1933 at an average cost of $8.42 per ton, the average yield being 3·19 tons per acre. Costs per ton varied from $6.32 at Laurierville to $12.51 at St. Prosper. At the first named station the yield was 3·97 tons, while at St. Prosper it was only 1·75 thus showing the importance of securing a large yield if the cost per unit is to be low.

The cost per acre varies but slightly between stations, the lowest being $21.90 and the highest $27.77. The average for eight stations is $25.22.

OATS.—The principal cereal crop grown in Central Quebec and the Lake St. John District is oats, but unfortunately too many farmers do not grow a sufficient quantity to meet their live stock feed requirements. The same holds true for wheat and barley.

Oats were grown on thirteen stations in 1933 and an average yield of 51·1 bushels secured at an average cost of 33 cents per bushel. A study of the table on "Yield and Cost of Production of Crops in Central Quebec" shows that the

cost per bushel varies indirectly with the yield per acre as is illustrated by the records at Scott (32 bushels at 54 cents) and at Plessisville (69 bushels at 26 cents). In both cases the cost per acre is almost the same being $17.28 and $17.94 for Scott and Plessisville respectively. A further study of the table shows that at the four stations namely Laurierville, Plessisville, St. Prosper and Lake Megantic, where the yield is over 60 bushels per acre the cost per bushel ranged from 23 cents to 28 cents.

TIMOTHY HAY.—On stations where alfalfa is not yet established the second crop of hay in the four-year rotation and the third crop in the five-year rotation is usually a mixed hay, but composed mostly of timothy. In this report such hay is classed as timothy hay.

The average yield of timothy hay on twelve stations in 1933 was 1·42 tons per acre, and the average cost of production $8.74 per ton. The main factors entering into the cost per acre were on the average as follows: use of land and taxes, $2.99; manure and fertilizer, $2.34; seed, $1.95; use of machinery, $2.85, and labour $1.54, making a total cost of $11.67. This shows the importance of having a good yield per acre in order to grow hay at a satisfactory cost per ton. The average yield over a period of nine years on the stations varies from 0·96 ton, costing $10.51 per ton, at Ruisseau a l'Eau Chaude to 2·76 tons, costing $6.11 per ton at Lac Megantic. The first named station was established in 1931 and Lac Megantic in 1926.

CORN.—Corn for ensilage was grown at three stations in this district, Plessisville, Laurierville and South Roxton. In Lake St. John District and in Dorchester County the season has been found to be too short for the profitable growing of this crop.

The yields and cost of production obtained in 1933 were as follows:—

Plessisville—yield per acre 17 tons, cost $1.83 per ton.

Laurierville—yield per acre 6 tons, cost $4.05 per ton.

South Roxton—yield per acre 13·3 tons, cost $2.09 per ton.

At Laurierville, the field had to be re-seeded a second time on account of the drought. This explains the low yield obtained at this station and consequently the rather high cost of production.

WHEAT.—Huron wheat was grown on four stations, Hebertville and Jonquiere in the Lake St. John District and Ruisseau a L'Eau Chaude and St. Evariste in the Eastern Townships and the following yields obtained:—

Hebertville—32·5 bushels per acre at cost of 69 cents per bushel.

Jonquiere—15·5 bushels per acre at cost of $1.37 per bushel.

Ruisseau a L'Eau Chaude—16·7 bushels per acre at cost of 72 cents per bushel.

St. Evariste—23·0 bushels per acre at cost of 72 cents per bushel.

In spite of the high cost of producing wheat, the operators at the above four stations find that it has many uses and that considerable expenditures for flour and feed are saved by producing it at home.

REPORT OF THE ILLUSTRATION STATIONS IN WESTERN QUEBEC AND EASTERN ONTARIO

FOR THE YEARS 1931, 1932 AND 1933

W. L. Chauvin, Supervisor

During the last three years, there has been a reduction of one station in this district of supervision. At the present time, there are nineteen in active operation. Fourteen of these are located in Western Quebec, which district extends to St. Casimir, Portneuf County and St. Simon in Bagot County and to Campbell's Bay in the west and l'Annonciation in the north. Five stations are also located in Eastern Ontario between Ottawa and Montreal. Two of these stations are conducting work of a special nature, one pertaining to the production of crops, suitable for canning, also home-canning methods, and the other deals with investigations relating to the reclamation of peat land. The stations in this district of supervision are located at the following points and the work is being conducted by the operators named:—

Bourget, Ont.	Jules Potvin.
Bourget, Ont.	Napoleon Martel.
Caledonia Springs, Ont.	Arthur D. Gauthier.
Casselman, Ont.	Hector Lafleche.
St. Eugene, Ont.	Albert Seguin.
Aubrey, Que.	Samuel Reddick.
Campbell's Bay, Que.	W. J. Hayes & Son.
Clairvaux, Que.	Donat Rivard.
Kazubazua, Que.	Ephriam Anderson.
Lachute, Que.	S. R. Smith.
L'Annonciation, Que.	Didyme Cote.
Papineauville, Que.	J. E. Bonhomme.
St. Casimir, Que.	Eloi St. Germain.
St. Clet, Que.	Louis Besner.
St. Constant, Que.	Roch Boule.
St. Etienne des Gres, Que.	Origene Bournival.
St. Jerome, Que.	Wilfrid Guay.
St. Leonard Jct., Que.	Mrs. E. Carter.
St. Paul d'Industrie, Que.	Geo. E. Bazinet.

In this report reference will be made from time to time to the work being conducted at the above named points. When this is done, it will also refer to that being conducted co-operatively by the Division with the operators whose names are as given. The results enumerated would not be possible if it were not for the active and loyal co-operation given by this group of farmers, who have turned over a portion of their farm for a comparative and co-operative study of local agricultural problems.

PRECIPITATION AND THE GROWTH OF CROPS

In this district, during the three years under review, seasonal conditions have been subject to and marked by extremes to more than the usual degree. In 1931, early spring conditions were favourable and seeding was completed from two to four weeks earlier than usual. In the Montreal area, growing conditions were quite favourable throughout the summer. July and August, however, were very droughty in the Eastern Ontario section. The winter of 1931-1932 was characterized as rather mild, with little snow remaining on the

ground until the month of March. The lack of snow and the presence of ice on the fields, caused more than usual damage, resulting in the serious winter-killing of clovers. During June and July, the most severe drought in years was experienced in this district. Unfavourable weather conditions, winter and spring, were again experienced in 1932-1933, resulting in considerable damage to clover stands. Late spring and cool weather interfered with seeding, particularly on clay soils. The first seeding of turnips took place at Bourget on May 16, and occurred as soil conditions permitted, until at St. Simon the latest seeding was completed on June 3. On the light soils at Lachute, seeding was possible on May 5 and at St. Leonard, not until May 23. A severe frost at l'Annonciation on June 14 made the re-seeding of turnips necessary and had a serious effect on other crops, such as corn. Droughty conditions prevailed during June and the early part of July, seriously affecting pastures, as well as hay and root crops. Cereals were short in the straw, but threshed out a good quality crop.

HERD IMPROVEMENT AND SALE OF BREEDING STOCK

On the Illustration Stations in Eastern Ontario and Western Quebec, the main source of revenue comes from the sale of dairy produce, hence, the economic importance of giving careful and detailed study to the systematic improvement of the dairy herds on each farm, the object being, the development of typy, pure-bred, herds, having a herd average of 8,000 pounds of milk per year. The production of suitable feeds, the use of herd sires from qualified dams, and the keeping of individual milk records is the Illustration Station operator's practical approach to this objective. On these stations, Ayrshires and Holsteins predominate and all have very creditable herd sires, excepting St. Jerome and Bourget, where at the present time, an effort is being made to correct this condition.

The following table gives the average milk production for each herd, as well as the individual production in milk and butterfat for the highest and lowest producing cows in these herds.

MILK PRODUCTION OF THE STATION HERDS

Lactation	Breed	Number of cows	Average days of lactation	Average		Highest cows		Lowest cows	
				Milk production	Butterfat production	Milk production	Butterfat production	Milk production	Butterfat production
				lb.	lb.	lb.	lb.	lb.	lb.
Aubrey	Holstein grades	18	296	7,157	280	9,725	314	4,523	167
Bourget	Ayrshire grades	17	267	4,982	174	8,033	281	2,265	79
Campbell's Bay	Ayrshire grades	8	254	4,570	178	5,074	192	3,943	173
Casselman	Ayrshire	11	276	5,384	192	6,315	246	3,416	133
Lachute	Ayrshire	15	310	8,012	302	16,566	596	5,307	196
L'Annonciation	Ayrshire grades	9	258	3,936	162	4,705	188	3,335	180
Papineauville	Ayrshire grades	11	371	6,519	252	9,503	342	4,889	190
St. Casimir	Ayrshire	9	317	6,426	293	9,476	331	3,916	176
St. Clet	Holstein	16	314	6,546	202	8,251	223	4,467	138
St. Constant	Ayrshire	14	364	8,901	298	11,776	423	6,341	200
St. Eugene	Holstein grades,	14	325	6,269	200	8,403	268	3,896	124
St. Jerome	Ayrshire grades	8	363	5,542	221	9,610	307	3,881	163
St. Leonard Jct	Ayrshire	11	302	4,693	176	6,543	215	2,327	111
St. Simon	Ayrshire	7	326	8,025	324	9,803	323	5,582	290
Bourget Can. Sta.	Grades	11	254	4,500	.....	5,624	.....	3,977	.....
St. Etienne	Grades	6	291	6,051	.....	7,116	.....	4,471	.....
Joliette	Ayrshire	10	270	7,019	.....	13,778	.....	4,037	.....

A review of the average production of the different herds indicates, that at three stations the herd objective, of 8,000 pounds has been reached and passed. These, namely, Lachute, St. Constant and St. Simon are some of the earliest

stations to undertake systematic breeding and demonstrate to other operators, as well as farmers the possibilities along this line by persistence in pursuing an aggressive live stock improvement policy, such as must be the case. Within the other herds, such as at Joliette, St. Etienne des Gres, Papineauville, and Bourget, it will be noted that quite high producing individuals are present in the herds, thus will serve as useful foundation stock for future developments. Although the herd average at these stations is not as high as at the four first named, nevertheless, definite progress is being made. Within these herds, frequently a high percentage of heifers has the effect of somewhat lowering the herd production, although superior to several of the older females, which they have replaced. Dry weather in June and July adversely affected pastures and caused somewhat lower production.

A STUDY OF FLOCK MANAGEMENT AND POULTRY IMPROVEMENT

A study and analysis of results being obtained in egg production, poultry improvement and flock management was carried out on sixteen stations during the past year in this district of supervision. Daily egg records were kept, also the feed consumed, whether grown on the farm and if purchased. The flocks ranged in number from 25 to 136 birds as an average throughout the year. As in all lines of work undergoing improvement and systematic breeding, it will be noted that considerable variation occurred, five flocks giving a production per bird of 140 eggs and over, seven flocks producing between 100 and 140 eggs per bird, with four flocks laying less than 100 eggs per bird during the year. The lowest flock average was 91 eggs per bird. While daily records are available concerning the various items of the expenses and returns, it may be of interest to indicate the profit per bird over cost of feed, which was as follows: Aubrey, $1.06; Bourget (Martel), $1.44, Bourget (Potvin), $1.97; Campbell's Bay, $1.11; Casselman, $1.39; Papineauville, $0.66; St. Casimir, $1.06; St. Clet, $1.43; St. Constant, $1.98; Ste. Etienne des Gres, $1.96; St. Eugene, $0.70; St. Jerome, $1.85; St. Leonard Jct., $0.23; St. Paul d'Industrie, $1.33; St. Simon, $1.54; Lachute a loss of $0.62. It will be observed that at all stations excepting Lachute, the poultry flock yielded a profit. At this station a very fine herd of Ayrshire cattle is in process of development. Interest and attention to poultry has not been on the same standard as with the dairy herd, as often proves to be the case. The average prices obtained for eggs varied from 16 to 31 cents per dozen, depending on the locality and market, those marketing direct to the larger centres enjoying a higher price.

Barred Plymouth Rock is the principal breed kept on the Illustrated Stations and from these points as centres 58 cockerels and 112 pullets were sold to farmers for breeding purposes.

CULTURAL PRACTICES AIMING TO CONTROL COUCH GRASS

In this district, the economical production of succulent crops, such as corn, turnips and mangels is of great concern, because of their importance in the feeding of dairy cattle, the main source of revenue on these Illustration Stations. The variation in soil types and the prevalence of annual and perennial weeds, including couch grass, makes a study of methods of control essential to successful dairy farming. On the nineteen stations, a wide range of soil types exist, varying from heavy clays and clay loams to very light, unproductive sandy soils. As a control measure, the basis of study centres around the practice of after-harvest cultivation, this being a standard project at all points. By this practice, sod land is ploughed shallow on the removal of the hay crop, rolled so as to compact the soil and hasten decomposition of the sod, then given a disking to mulch the soil and close up air pockets. After an interval

of ten days, when the sod has commenced to heat, the stiff-toothed cultivator or spring-toothed harrow is used lightly at first and worked deeper with succeeding cultivations, the idea being to loosen up and bring to the surface the couch grass roots, that they may be killed by the sun. Trials show the superiority and the importance of cultivating and working couch grass when favourable, sunny, weather exists; cultivation during showery and rainy periods being quite ineffective. Such cultivation was conducted with sufficient frequency to keep down green growth until late fall. On the heavy clay soil, such as at Aubrey, St. Simon, Campbell's Bay and St. Casimir, deep fall ploughing, prior to freeze-up has been found essential. On the lighter soils, such as on the stations at Lachute, L'Annonciation, St. Etienne des Gres and on the canning station at Bourget, fall ploughing has not been found essential on soils of this type, the early summer ploughing being the only ploughing done.

Ten years' results, in a study of couch grass control, following this practice has been effective as a practical, farm control measure with the result that couch grass is steadily being more easily handled on the station fields and farms in general. The ripening of seed and the return of manure to the land is always a continuous source of contamination. When couch grass exists on any portion of the farm, control measures prove almost an annual necessity.

ROTATION STUDIES AND THEIR SYSTEMATIC INCORPORATION INTO FARM PRACTICES

On the Illustration Stations in Eastern Ontario and Western Quebec, the establishment of a systematic rotation or cropping sequence forms the basis for building up soil fertility. The adoption of a rotation in farm practice increases efficiency in farm management, establishes a suitable balance and the proper proportion of the different classes of farm crops to meet the requirements in the way of winter feed for cattle, and increases efficiency in the use of horse and manual labour and in the control of weeds and competitive plants.

These farms are primarily interested in dairying, necessitating an abundant supply of succulent crops for winter feed, hay containing a high protein content, as well as a satisfactory proportion of home-grown concentrates so as to economize in the purchase of these when making up the dairy rations. Soil variations and the individual needs, naturally must form the basis for the type of a rotation which is to be established on any farm. On the seventeen stations now in operation, one has established a three-year rotation, fourteen have adopted a four-year cropping sequence and two that of a five-year duration.

At Bourget, the following three-year rotation is under study. The soil is a light unproductive, sandy loam.

Three-year Rotation—

1st year—Tomatoes, beans and sweet corn, for home-canning purposes.
2nd year—Oats, seeded to grass and clovers.
3rd year—Clover hay.

The seed-bed preparation is as referred to under the project entitled "Cultural Practices Aiming to Control Couch Grass." In the second year, oats are seeded at the rate of 2½ bushels per acre, along with 8 pounds of red clover, 2 pounds of alsike and 10 pounds of timothy. The frequent incorporation of clover into the soil, also frequent and light applications of farmyard manure are the principal agencies by which this soil is being brought into a high state of fertility and productivity. On this type of a soil, this short-year rotation is proving quite effective.

On fourteen of the stations in this district, the following four-year rotation has been established.

Four-year Rotation—

1st year—Corn, turnips, mangels, potatoes or oats, peas, and vetch.
2nd year—Oats, barley or wheat, seeded to grasses and clovers.
3rd year—Clover hay.
4th year—Mixed hay.

In this rotation, provision is made elsewhere for pasture. In some cases permanent pasture is available and all tillable land is used for systematic cropping. At some of the older stations, as the farms become better organized, an extra division is made in the farm layout and one field set aside for pasture, either permanently or for a period of years, interchanging this field with the one listed as growing "mixed hay." Where Illustrations Stations are established, usually the fertility problem is of some considerable concern, for these the four-year rotation has distinct advantages by offering a satisfactory and systematic organization for carrying out timely and proper cultivation, which is one of the first essentials for satisfactory crop growth. Other advantages include the control of competitive plants, application of such farmyard manure as may be available every four years, as well as the fertilizing effect of clovers and the incorporation of the roots into the soil. The following table reflects the yields obtained on each station from the adoption of this system of cropping.

YIELDS OF CORN, OATS, CLOVER AND TIMOTHY ON THE DIFFERENT STATIONS

Station	Corn		Oats		Clover hay		Timothy hay	
	Number of years grown	Average yield	Number of years grown	Average yield	Number of years grown	Average yield	Number of years grown	Average yield
		tons		bush.		tons		tons
Aubrey	14	15·60	14	62·0	14	2·03	14	1·54
Bourget	10	14·45	10	41·7	8	2·07	10	1·92
Campbell's Bay	13	12·32	13	45·0	8	2·00	11	1·79
Kazubazua	3	8·00	5	26·9	3	1·22	4	0·86
Lachute	14	14·93	14	34·0	8	1·85	8	1·44
L'Annonciation	8	10·84	6	18·7	6	0·92	5	0·66
Papineauville	9	14·29	13	42·5	7	2·34	11	2·14
St. Casimir	12	13·56	14	47·0	8	1·98	12	1·76
St. Clet	14	11·88	13	36·8	11	1·68	8	1·00
St. Constant	6	12·32	13	38·0	12	1·86	11	1·34
St. Etienne des Gres	13	11·33	13	27·0	11	1·15	12	1·19
St. Eugene	8	15·14	7	46·0	6	2·14	6	1·79
St. Jerome	13	13·59	13	34·0	8	1·77	10	1·86
St. Paul	10	10·96	10	36·0	9	1·72	9	1·56
St. Simon	13	12·92	.....	.....	11	1·74	10	1·66

In a study of this table, reference should be made to the fact that these represent a wide variation in soil types, ranging from a sandy soil, such as at Kazubazua, St. Etienne des Gres and L'Annonciation, where this condition is reflected in the yields obtained. At Lachute, and Papineauville, the soil is a light sandy loam and ranges up to the more productive types of soil as at Aubrey, Bourget, St. Simon, etc.

At two stations, namely, Casselman and St. Eugene, the following five-year rotation has been adopted:—

Five-year Rotation—

1st year—Corn, turnips and potatoes.
2nd year—Oats, barley, or wheat seeded to grass and clover.
3rd year—Clover hay.
4th year—Mixed hay.
5th year—Pasture to August, then ploughed.

At Casselman the prospects are that this rotation will have to be extended further, leaving the hay down for a longer period, because of the satisfactory results being obtained recently in the growing of alfalfa.

VEGETABLE GROWING AND HOME CANNING

While the growing of a plentiful supply of vegetables, for summer and winter use, is an objective at all stations, this practice has taken on a commercial aspect on the Illustration Station at Bourget. Here the main station activities centre around the production of vegetables for canning, also a study of home-canning methods and demonstrations pertaining thereto. In this district there are two soil types, clays and sandy loams. The sandy loam type predominates and on these considerable interest has been developed in the home-canning of vegetables, as a cash crop. A three-year rotation forms the basis of the cropping system. A clover sod is broken up on the removal of the hay, the land is then summer-cultivated to control weeds, in preparation for planting to vegetables the following season. In 1932, the operator, Mr. Jules Potvin, produced for the market approximately 20,000 cans. In 1933, 5,040 cans of tomatoes, 6,488 cans of beans and 3,150 cans of corn were produced. The six-year average cost of growing and canning tomatoes was 6¼c., beans 6¼c. and corn 7½c. per can. The total output graded "choice" and was marketed through one of the wholesale grocery houses.

A Field Day is held on the station each year at canning time, and a canning demonstration put on. The results of the work and the problems connected with it are thus discussed with those present.

RECLAMATION OF PEAT LANDS AND A STUDY OF CROPPING PRACTICES

(Investigations under way at Caledonia Springs, Ont.)

In their original state, the peat soils of the Alfred Bog, like most others of this type, are too wet to produce cultivated crops. A municipal drainage canal, with its outlet at Caledonia Springs, has been excavated to provide the necessary drainage for the individual holdings. In the initial reclamation undertakings, it was necessary to dig a boundary ditch around the whole area under experiment, with outlet into the canal. Shallower laterals were installed and connected to the boundary ditches in order to lower the water table and to permit teams and other implements to work, preparatory to tillage. Due to the rapid and uneven settling of bog lands, tile drains are not to be recommended, as the tiles get out of alignment and become ineffective. Although hundreds of acres of raw peat lands remain undeveloped in this area, adjoining land, cleared in 1931 and under experiment, is now producing excellent crops.

BURNING COMPARED WITH CLEARING WITHOUT BURNING

When clearing peat lands for cultivation, the common practice in the Caledonia District, as in many other districts, is to brush, plough and burn off the top five to seven-inch layer, the ash thus formed supplying plant food to stimulate crop growth. This practice is wasteful of organic matter, in that after two or three crops, it has been found necessary to make additional burnings to provide necessary plant food. In 1931, an experiment comparing methods of preparing peat lands for cultivation was undertaken. On half of the area under investigation, the above outlined practice of burning was employed. On the other half, the land was brushed, cleared and ploughed in the usual way. The comparative results obtained to date, as reflected in crop yields, are as follows:—

YIELDS ON BURNED AND UNBURNED PEAT LANDS

Crop	Cleared by burning		Cleared usual way (not burned)	
	Check—no manure or fertilizer	10 tons manure and 750 pounds 4–8–10 mixture	Check—no manure or fertilizer	10 tons manure and 750 pounds 4–8–10 mixture
Potatoes	79 bushels	205 bushels	145 bushels	349 bushels
Corn	2·5 tons	6·5 tons	5·9 tons	12 tons
Celery	4,700 pounds	10,450 pounds	8,482 pounds	11,875 pounds

From a review of the results obtained, it will be noted that higher corn, potato and celery yields have been obtained on the unburned land. In fact, the unburned and unfertilized land has given almost double the yield of potatoes, corn and celery, as where the burning occurred. The use of a small dressing of manure to stimulate bacterial activity in such a soil, combined with 750 pounds of a 4-8-10 chemical fertilizer mixture has been very effective in promoting growth; the potato yield being increased by 171 bushels on the burned and 204 bushels on the unburned area. This study is being extended to include other crops.

CROP RESPONSE TO MANURE AND FERTILIZER ON PEAT SOIL

To ascertain the essential plant food requirements of the Caledonia peat soils, plots representative of the area were laid out and each given separate treatment, including the use of manure alone, manurial and chemical fertilizers, chemical fertilizer alone, also with the different fertilizing elements combined in such a way that one element, such as nitrogen, phosphorus and potash was lacking on each plot.

Of the single plant food elements, the yields obtained would indicate that potash gave the greatest response in crop growth followed by superphosphate. The largest return from turnips, mangels, and clover hay came from the application of 20 tons of farmyard manure. The potato crop responded most favourably to the application of 10 tons of manure and 750 pounds of a 4-8-10 chemical fertilizer. Farmyard manure appears very beneficial even though the dressing be comparatively light, particularly in the initial stages of reclamation. In addition to supplying plant food, it promotes beneficial bacterial activity, which in the original state of the soil is lacking. Heavy or frequent applications, however, tend to lodge the crop, hence, a combination of manurial and chemical fertilizer on peat soil, such as that at Caledonia Springs, has proven sound in practice, fertilizers carrying a high percentage of potash and superphosphate being most responsive. In the garden crops grown, which included beets, carrots, celery, onions, and corn, the same plant food deficiency was indicated.

CROPS ADAPTED TO CALEDONIA PEAT SOILS

Crops which thrive on the mineral soils in this locality have been found most successful, when grown on peat. Being more liable to summer frosts and conducive to longer periods of normal growth, the question of early maturing crops is important. In the study of crops at Caledonia Springs, tomatoes have not ripened satisfactorily, due to delayed maturity. In the limited trials to date, oats and barley have proven more satisfactory than wheat. Hay and root crops, including turnips, mangels and potatoes have given very satisfactory returns and produced crops of excellent quality. In vegetables, beets, celery, carrots and corn have responded very favourably to this type of soil.

PASTURE IMPROVEMENT DEMONSTRATION

On the farms in this district, three main types of pasture land exist, namely, rough land pastures, those of a more permanent nature which have been seeded after being cleared, and three-year-old meadows which are regularly ploughed during the cycle of the rotation. On the stations in this district the three-year-old meadows supply the main grazing areas, as the larger proportion of these farms are cleared and are operating on a systematic cropping plan.

In 1932, comparative fertilizer demonstrations were laid out at four stations aiming to study their effect in promoting the growth of grass, as well as thickening up the pasture by stimulating desirable species of grasses and clovers for pasture purposes. On representative pasture land two adjoining fields of three acres each were selected and fenced separately. One served as a check

plot, being unfertilized, the other received, early in the spring, an application of, or the equivalent to, 100 pounds of nitrate of soda, 350 pounds of superphosphate and 100 pounds of potash. In June, an initial application of 50 pounds of nitrate of soda was made. Dairy cattle were allowed to graze on each field alternately, in order to obtain the comparative carrying power in each field in animal units or grazing days. In the spring of 1933, an additional application of 100 pounds of nitrochalk was made to the same fields as were fertilized in 1932.

The months of June and July were extremely dry, having an adverse effect on both fertilized and unfertilized pasture lands; however, the average grazing days per acre from the fertilized pasture land were 106, and 70 from the unfertilized land. In 1933, the months of July and August were very droughty again adversely affecting pastures. At Lachute, the fertilized pasture supplied 106 grazing days per acre, as compared with 60 on the unfertilized land. At St. Constant, on heavy clay land, fertilized pasture supplied 79 grazing days, unfertilized 60. At St. Etienne des Gres, on light sandy land, fertilized pasture supplied 59 grazing days, the unfertilized 48. At St. Simon, on clay, loam soil, fertilized pasture supplied 111 grazing days, the unfertilized land 89. On the average of the four comparative trials, the fertilized pasture gave an increased production of 742 pounds of milk per acre.

SUPPLEMENTARY VALUE OF CHEMICAL FERTILIZER

While the conservation of the fertilizer and the farmyard manure produced is of primary importance on the Illustration Stations, as on farms in the districts they serve, a study is being made of the supplementary value of chemical fertilizer, when combined with manure. In this trial an application of 10 tons of manure, compared with 10 tons of manure and 750 pounds of a 4-8-4 chemical fertilizer was conducted this year on nineteen stations. The manure was applied during the late fall or early spring, the fertilizer being broadcast in the spring and harrowed in lightly. The crops grown consisted of corn, turnips and potatoes.

Of the fifteen stations growing corn, the application of 750 pounds of a 4-8-4 chemical fertilizer increased the yield by 2·13 tons or from 13·5 tons to 15·6. The wide variation of soils and the season resulted in more than usual variations. The lowest yield of clover was obtained at L'Annonciation, where on June 14 there was a killing frost. The yields ranged up to 22 and 22·5 tons respectively at St. Eugene and Casselman. At the first named point the soil is sandy, at the latter, a fertile clay loam, which has been under a systematic crop rotation and has received the fertilizing effect of abundant clover growth.

The use of fertilizer on turnips stimulated early growth very noticeably, making singling possible from seven to ten days earlier. As the season advanced, the crop grown on land receiving manure alone picked up to the extent that at harvest time on the ten stations where grown, the average increase from the use of fertilizer amounted to 1·4 tons per acre. At Casselman, St. Eugene, St. Leonard Jct. and Joliette, yields ranging from 21 to 23·8 tons were obtained. However, at other points, such as St. Simon, St. Jerome and Bourget, yields were considerably below the average. It should be mentioned that this is accounted for largely by the unfavourable growing conditions prevailing during the months of June and July. The previous twelve-year average yield of turnips, in this district, was 19·9 tons.

The potato crop has responded more favourably to the use of chemical fertilizer and the yields at L'Annonciation, Papineauville, Ste. Etienne des Gres and St. Jerome averaged 203 bushels on the manured land and 274 bush-

els on that which received 10 tons of manure and 750 pounds of a 4-8-4 fertilizer, or an increase of 71 bushels of potatoes from the application of fertilizer.

RED CLOVER SEED GROWING

A study of cultural methods aiming to stimulate the production of red clover seed has been for the past fifteen years and still continues to be an active and effective project on the Illustration Stations in this district. The early, two-cut, hairy-stemmed type of red clover is being featured. Experience has shown the importance of cutting the first crop early, in order to give the second time to mature before damaging fall frosts occur. When the second growth appears at the base of the plants and is about an inch and one-half in length, this has proven a satisfactory indication as to the time of cutting. In this area this condition is usually obtained from the 19th to the 25th of June, depending on the earliness of the season. Results over the fourteen year period indicate that clover for seed in this district should be cut as near as possible to these dates for most satisfactory results. The cropping seasons of 1932-33 were most unfavourable for clover seed growing, because of the damage resulting from winter and spring killing, mainly resulting from ice. The 1933 yield of red clover seed on the stations varied from 40 to 88 pounds per acre. The following average yields obtained, at the different stations, over the past 8 to 13 year period, indicate somewhat the possibilities: Bourget, 105 pounds; Campbell's Bay, 112; St. Clet, 118; St. Leonard Jct., 118; St. Simon, 114; Aubrey, 96; Casselman, 160; Papineauville, 100; St. Constant, 97; St. Jerome, 112; and St. Eugene and St. Paul, where the crop has been grown but two years, the average yield was 120 and 35 pounds, respectively. The cost of production throughout this period has varied from 7 cents at Campbell's Bay to 12¾ cents at St. Jerome. The highest cost was at St. Paul, namely, 18 cents per pound, on account of the low yields obtained, resulting from lack of maturity in the crops when fall frosts occurred.

At the present time, red clover seed is a well established crop in several of these districts and as the above yields and costs would indicate, not only supplies for local need, hardy, clean seed, equal to that which may be obtained anywhere but in addition has proven a useful cash crop in conjunction with dairy farm operations.

COST OF PRODUCTION STUDIES (Eastern Ontario and Western Quebec District)

In a study of regional agriculture and relative suitability of the different classes of farm crops to each, cost of production data have been assembled and compiled for each crop grown. The actual time taken to perform the different field operations, as well as the quantity of seed, twine, manure and fertilizers are taken into consideration. In addition, such items as rent of land, taxes, use of machinery, are charged against each crop when compiling the cost of growing the different crops.

COST OF PRODUCING TURNIPS

Eleven of the nineteen stations in this district grow turnips for the fall and winter feeding of their stock and hogs, a considerable proportion of which is fed to hogs and as early fall feed for dairy cattle, as corn is quite extensively grown and ensiled throughout this area. Seasonal variations in precipitation and heat influence yields and favourably or adversely affect production costs. A well prepared seed-bed, an abundance of available plant food, and proper and timely cultivation have been found the best assurances of withstanding unfavourable seasonal conditions. On the longest established stations, it has been found possible to reduce the manurial applications for cultivated and succeed-

ing crops without adversely reducing yields. This is attributed to the short rotation used and the high proportion of legume hays which is produced in this cropping sequence. Twelve to sixteen tons of farmyard manure are now used, in comparison with from sixteen to twenty in earlier years. The turnip yields obtained on the different stations are as follows: Casselman, 22 tons; L'Annonciation, 11 tons; Papineauville, 16 tons; St. Clet, 18 tons; St. Etienne des Gres, 9½ tons; St. Eugene, 19½ tons; St. Jerome, 7 tons; St. Leonard Jct., 18 tons; Bourget, 5 tons; St. Paul d'Industrie, 21 tons; and St. Simon, 9 tons, per acre.

Particularly low yields, it will be observed, were obtained at Bourget, St. Etienne des Gres, St. Jerome and St. Simon in 1933. This was largely the result of seasonal conditions, as the average yield over a period of from eight to thirteen years was 17 tons, 12 tons, 19 tons and 21 tons per acre respectively. The cost of production varied in 1930, from $1.51 per ton at St. Paul, where the yield was 21 tons to $4.54 per ton at Bourget, where the yield was 5 tons per acre. The ten-year average cost of growing turnips at this latter station was $3.16 per ton. The average cost of growing turnips by stations has been as follows: Casselman, $2.36; L'Annonciation, $3.93; Papineauville, $3.10; St. Clet, $3.92; St. Etienne des Gres, $1.34; St. Eugene, $3.14; St. Jerome, $2.76; St. Leonard, $2.50; St. Simon, $2.47 per ton.

A study of the itemized cost factors obtained from the different stations, indicates an increased production cost where weeds were prevalent and where the summer ploughing of the sod land was delayed the previous year to the extent that couch grass, etc., was not sufficiently controlled, necessitating additional manual labour, when thinning and hoeing.

COST OF GROWING CORN SILAGE

Corn is grown on the Illustration Stations in this district mainly for silage purposes. Early Leaming, Wisconsin No. 7 and Longfellow are the three principal varieties grown. All of the operators growing this crop now have silos, with the exception of seven. On these farms the corn is stooked and used as stover for fall and winter feeding. In order to permit of a careful study of the various items of cost, relating to the growing of this important crop, the following detailed statement of 1933 yields and costs, and the average for the period of years as indicated, is listed by stations.

CORN SILAGE—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre—1933						Number of years grown	Average	
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Manual labour	Horse and tractor labour	Seed, twine and ensiling	Use of machinery		Yield per acre	Cost per ton
	tons	$	$	$	$	$	$	$		tons	$
Aubrey	15·04	1 61	3 06	6 67	0 26	7 44	4 02	2 85	14	15·69	2 19
Bourget	16·45	1 38	4 50	5 59	1 40	4 18	4 17	2 85	10	14·45	2 44
Campbell's Bay	12·00	2 03	2 60	6 65	0 60	9 29	2 33	2 85	13	12 32	3 22
Lachute	15·70	1 49	1 76	6 95	0 70	6 87	3 40	2 85	14	14·93	2 22
Papineauville	16·62	2 16	2 96	8 38	6 60	7 80	6 61	2 85	9	14·29	3 18
St. Casimir	17·18	1 77	4 66	7 39	4 02	8 13	3 46	2 85	12	13·56	3 19
St Clet	10·31	2 79	2 46	7 79	0 40	11 01	4 29	2 85	14	11·88	3 44
St. Constant	11·28	2 59	2 94	8 31	1 23	8 42	5 52	2 85	6	12·82	2 33
St. Leonard Jct	15·16	1 52	3 53	6 59	0 80	6 49	3 13	2 85	8	12·66	3 34
St. Simon	14·90	1 84	3 07	6 94	0 96	7 70	6 39	2 85	13	12·92	3 13
Casselman*	20·05	1 17	5 06	8 37	1 50	4 31	1 37	2 85	9	15·66	2 22
L'Annonciation*	6·87	4 29	1 43	10 96	5 20	7 54	1 50	2 85	8	10·84	2 82
St. Etienne des Gres*	11·35	1 62	1 05	4 80	2 10	5 80	1 88	2 85	13	11·13	1 81
St. Eugene*	21·31	1 17	3 39	7 42	1 90	7 63	1 85	2 85	1	21·31	1 17
St. Jerome*	12·76	2 05	4 82	7 58	1 00	8 80	1 17	2 85	13	13·59	3 03
St. Paul d'Industrie*	10·52	2 93	2 33	8 18	0·66	15 44	1 45	2 85	10	10·96	3 58
Kazubazua*	7·44	3 30	1 74	12 53	1 60	4 00	1 84	2 85	3	8·0	3 66

*Represents yield and cost of corn stover rather than silage.

A review of the 1933 yields shows a more than normal variation and in the majority of cases a cost of production below the average. The low cost for 1933 is partly due to the reduced rates prevailing for both manual and horse labour, also land values; seed and twine have likewise been subject to lower prices.

Field of corn on the Illustration Station at Campbell's Bay, P.Q., averaging 14·45 tons per acre.

Taxes and charges for use of machinery have remained more constant. Proximity to towns and variations in soil types, affect land values and taxes, accounting for variation in this cost factor ranging from $1.05 to $5.06 per acre. The stations having the less fertile soils and naturally those which are likely to give the lower yields, require a heavier manurial and fertilizer treatment, resulting in this charge against the crop at different stations varying from $5.59 per acre at Bourget, on a well-handled and quite fertile clay soil, to $10.96 per acre at L'Annonciation, where the soil is a light sandy loam. At St. Etienne des Gres, crops would benefit from higher manurial applications. Here charges for manure

and fertilizer amount to $4.80 per acre; however, all the available farmyard manure is applied and by the use of clovers there is steady progress in building up this light sandy loam soil.

COST OF GROWING HAY

When growing clover on the stations in this district, the aim is twofold. Good quality protein hay is required for the feeding of dairy cattle and in addition clover seed growing is the objective of most of the farmers operating these stations, as a cash crop. The mixture used when seeding down is made up of 5 pounds of red clover, 5 pounds of alfalfa, 2 pounds of alsike, and 8 pounds of timothy. The red clover seed used is of the hairy-stemmed, two-cut type. The first crop is cut early and utilized as hay, the second is harvested and threshed as seed. When two crops are grown in this way, the annual charge for use of land, taxes, manure, fertilizer, use of machinery, seed, etc., are divided equally between each of the two crops, hence reducing their cost of production proportionately. At Lachute, St. Casimir, St. Jerome, and Papineauville, where red clover seed is not grown, all charges are made against the hay crop and the cost of production per ton has averaged $6.95, $9.77, $5.68, and $8.55 per ton. When the cost is calculated on one cutting, as when saving seed from the second crop, the early cutting results in a lower hay yield, which logically increases the cost per ton, on the stations. This has varied on an average from $7.39 to $12.55 per ton. While the hay crop in itself costs more in the latter case, an additional cash return is obtained for the seed, which compensates for the loss of hay. The average of twelve stations, over a period ranging from two to eleven years, is 110 pounds of red clover per acre at an average cost of growing of 10½ cents per pound. In compiling these costs, it should be borne in mind that the farmers doing the work have been allowed wages at the prevailing rate for time spent in growing and harvesting the crop.

REPORT OF THE ILLUSTRATION STATIONS IN NORTHERN ONTARIO AND NORTHERN QUEBEC

FOR THE YEARS 1931, 1932 AND 1933

F. X. Gosselin, B.S.A., Supervisor

In Northern Ontario and Northern Quebec, fourteen Illustration Stations were in operation during the year 1933. Five of these stations are in the Cochrane district, in the great clay belt, three in the Abitibi (Quebec) district, three in Timiskaming district, surrounding Timiskaming Lake, one in the Nipissing district, one on Manitoulin Island and one in the Algoma district.

On these stations, rotations are established and cultural practices carried on which have been found by the Experimental Farms and by the Illustration Stations to meet local conditions. Live stock and poultry are also given their share of attention.

The locations of the stations and names of the operators are as follows:—

Barraute, Abitibi district	Herve Marcotte.
Belcourt, Abitibi district	Eugene Robitaille.
Cochrane, Cochrane district	E. D. Carrere.
Earlton, Timiskaming district	Michel Paiement.
Mindemoya, Manitoulin Island	Wm. A. Hare.
Moonbeam, Cochrane district	Albert Gaudreault.
Notre Dame du Nord, Timiskaming district	Adelard Grenier.
Ramore, Cochrane district	Jeremie Herard.
St. Isidore de Laverlochere, Timiskaming district	Albert Trudel.
Ste. Rose de Poularies, Abitibi district	Jos. Lemoine.
Thessalon, Algoma district	Richard Seabrook.
Val Gagne, Cochrane district	Hector Labreche.
Verner, Nipissing district	Andre Beaudry.

Four of these stations, Notre Dame du Nord, Ramore, St. Isidore de Laverlochere and Thessalon were established in the spring of 1932, while the remaining ten have been in operation for periods ranging from three to ten years.

In this report reference will be made from time to time to work being conducted at the above named points. When this is done, it will refer to work being conducted co-operatively by the Division with the parties whose names are as given.

PRECIPITATION AND THE GROWTH OF CROPS

Precipitation has a great effect on the growth of crops in Northern Ontario and Northern Quebec and in the clay districts of Cochrane and Abitibi it greatly influences the ease of performing the regular farm operations of seeding, cultivating and harvesting.

In the spring of 1931 and in 1932, seeding operations commenced at the usual time and were satisfactorily completed, but in 1933 conditions were not quite so satisfactory. The fall of 1932 was particularly wet and very little ploughing was completed. This naturally retarded spring operations considerably and while a few were able to seed wheat and peas during the first two weeks of May, when it was dry, the majority of farmers did not have their soil prepared. At Val Gagne and Ramore, where the weather kept wet during two weeks from May 20 to June 6, seeding was not completed until the middle of June. At Mindemoya, Thessalon and Verner, seeding was delayed fifteen days.

In the districts of Timiskaming and Abitibi, the weather was quite favourable for seeding, but the first part of the summer was rather dry and caused a reduction in the yield of hay. Frosts on two occasions caused damage to potatoes and corn.

In all districts the weather in the fall of 1933 was favourable for the early maturing of grain and an above-average crop was harvested under favourable weather conditions. Ploughing was completed in good time in the fall on all Illustration Stations and throughout the various districts served by the stations.

VARIETIES OF FARM CROPS FOR NORTHERN DISTRICTS—SALE OF SEED

The careful selection of suitable varieties of farm crops is of prime importance if success is to be obtained in the Northern districts of Ontario and Quebec. In most cases, earliness is the deciding factor. The following varieties have been found well suited for the districts and are used almost exclusively on the stations.

Oats—Alaska.
Barley—O.A.C. No. 21.
Potatoes—Irish Cobbler.
Turnips—Hall's Westbury.
Wheat—Garnet.
Clover—Early, two-cut strains.
Alfalfa—Ontario Variegated.

Alaska oats are on the average fourteen days earlier in maturing at Kapuskasing, than either Banner, Victory or Gold Rain and for this reason have been selected. O.A.C. No. 21 barley is a six rowed variety and one of the earliest, being twelve days earlier than Charlottetown No. 80 at Kapuskasing. Irish Cobbler potatoes are much earlier in maturing than Green Mountains and less subject to late blight.

The importance of using good seed has been demonstrated at each Illustration Station and some of the operators are now making a specialty of producing seed grain. There are two cleaning plants in this district, one at Earlton, Ontario, and one at Macamic, Abitibi, Quebec, where all classes of seed may be tested, cleaned and sold for the farmers. Small clipper fanning mills are also used with satisfaction by some.

Each year the Illustration Stations are becoming more important as centres for the production of good seed of suitable varieties. In 1933, the fourteen operators sold to their neighbours a total of 1,440 bushels of Alaska oats, compared with 641 bushels in 1932, 541 bags of potatoes, compared with 358 in 1932, and 178 bushels of Chancellor peas compared with 102 in 1932.

CROP ROTATIONS AND THEIR SELECTION

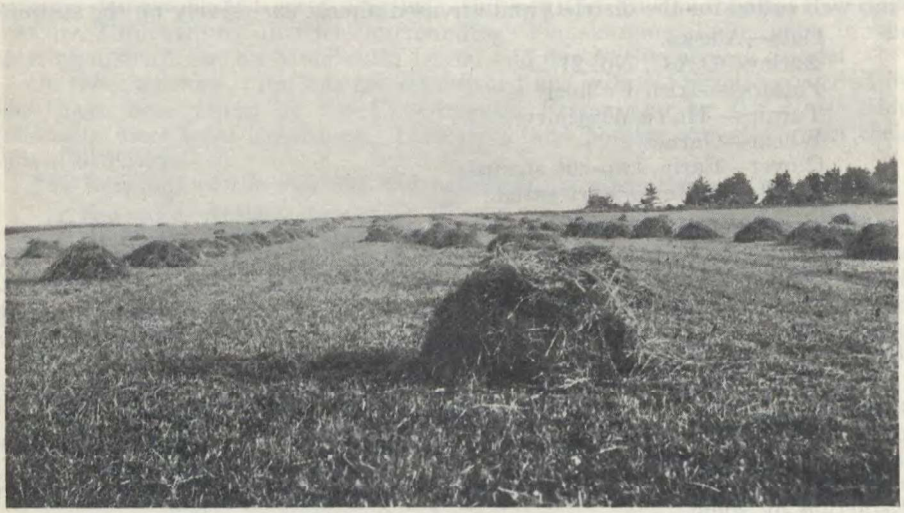
For the new fertile soils surrounding the Illustration Stations in Northern Ontario and Northern Quebec, the establishment of a systematic cropping sequence is somewhat different from establishing one in the older settled areas. Soil fertility is not the major issue and excessive rains in the spring and fall often make it difficult to get on the land when desired. Furthermore, the ease of growing clovers makes the longer rotations the more practical ones. In such rotations there is a minimum of tillage required and a saving of grass and clover seed.

When the stations were first organized ten years ago, a four-year rotation of hoed crops, grain, clover and mixed hay was established on all stations, but this has now been replaced by the following six-year rotation in most instances.

Six-year Rotation—
1st year—Hoed crop.
2nd year—Grain and seeded.
3rd year—Clover.
4th year—Mixed hay.
5th year—Mixed hay.
6th year—Mixed hay.

In this rotation, one-sixth of the area under consideration is used for growing hoed crops such as potatoes, turnips and a substitute oats, peas and vetches. Corn is not grown on the most northern stations. One-sixth of the area is sown to early maturing grains and seeded down and two-thirds of the area is used for growing clover and mixed hay.

Early seeding is essential and on account of the season, early maturing varieties, such as those mentioned are invariably used. Large areas of grain are not grown because of the difficulty often experienced in harvesting.



The coiling of clover hay is essential to the securing of a high quality stock feed.

In seeding down the common mixture used is composed of timothy, 10 pounds, early red clover, 8 pounds, and alsike clover, 2 pounds, but at Belcourt, Earlton, Notre Dame du Nord, Ste. Rose de Poularies, Thessalon, Val Gagne and Verner, where alfalfa shows promise, the following mixture is used per acre, timothy, 8 pounds, red clover, 5 pounds, Ontario Variegated alfalfa, 5 pounds, and alsike clover, 2 pounds.

CULTURAL PRACTICES AND THEIR LOCAL APPLICATION

An important project carried on by the Division is that of demonstrating the practical applications of experimental findings of the Dominion Experimental Farms, dealing with cultural methods. In this connection, the securing of yields under field conditions is undertaken on the stations.

The yields of all crops, with the exception of grain, are obtained by measuring and weighing the crops from representative areas of a definite size at various places throughout the fields. The yields are ordinarily taken by the operator, but when possible by the supervisor in charge of the district. Yearly records are kept of the following crops, oats, barley, O.P.V., clover and alfalfa, mixed hay, turnips, corn and potatoes.

This section of the report includes a study of the cultural methods employed and results obtained in growing oats, clover and alfalfa, while in the following section is a review of the cost of producing barley, timothy hay, O.P.V., turnips, corn and potatoes.

Oats are the most important cereal crop in Northern Ontario and Northern Quebec and the variety, Alaska, an early maturing sort, has proven to be

more satisfactory than other varieties tested. Three bushels are sown per acre as early in the season as weather will permit.

Yields were lower in 1933 than in 1932 and there was a great variability between stations as the following will show, Barraute, 25 bushels; Belcourt, 40 bushels; Cochrane, 30 bushels; Earlton, 53·3 bushels; Mattice, 26 bushels; Mindemoya, 50 bushels; Moonbeam, 15 bushels; Notre Dame du Nord, 30 bushels; Ramore, 54 bushels; St. Isidore, 25 bushels; Thessalon, 15 bushels; Val Gagne, 32 bushels and Verner, 25 bushels per acre. Seeding dates ranged from May 11 to June 13 and the low yield in most cases was due to the wet weather at this time. At Moonbeam, for example, the oats were sown on May 17, but the weather continued wet and cold and the ground became very hard. Consequently growth was very slow and a light crop harvested. At Thessalon, oats were sown on May 25, but dry weather in July retarded growth and was largely responsible for the light crop.

In general, all grain was harvested under satisfactory weather conditions and the new seeding suffered very little from harvesting operations.

CLOVER AND ALFALFA PRODUCTION

Clover may easily be considered one of the most sure crops for the northern districts and comparatively high yields are usually secured. Yields in 1933 ranged from 0·88 ton to 3·33 tons per acre with an average of 1·73 tons for twelve stations. Best yields were secured at Earlton (3·25 tons), Mindemoya (1·75 tons), Ste. Rose de Poularies (2 tons), Val Gagne (3·33 tons), and Verner (2·55 tons per acre). At Earlton a two-acre field of red clover was cut for hay on June 16 and the second growth cut for seed on Sept. 15. The first crop gave one ton clover hay per acre and the second 250 pounds of seed per acre.

In seeding down care is taken to use a sufficient quantity of suitable grass and clover seed. Two mixtures have been used, No. 1 composed of 10 pounds of timothy, 8 pounds of early red clover and 2 pounds of alsike clover per acre at stations, Cochrane, Mindemoya, Moonbeam, Ramore and St. Isidore, and No. 2 composed of 8 pounds of timothy, 5 pounds of early red clover, 3 pounds of alfalfa (Grimm and Ontario Variegated) and 2 pounds of alsike clover per acre. At the latter group of stations alfalfa has shown promise of becoming a very important forage crop and for this reason a fair proportion of alfalfa seed has been added to the grass and clover mixture. Where satisfactory stands of alfalfa are secured, two cuttings are usually possible. This was true at Verner, Val Gagne and Earlton in 1933. When first sown on a field, the alfalfa seed has always been treated with nitroculture.

COST OF PRODUCTION STUDIES (NORTHERN ONTARIO AND NORTHERN QUEBEC)

On each Illustration Station a careful record is kept of the yield of all farm crops grown. A record is also kept of the labour, fertilizer, manure, seed, etc., that are used on a definite area and from this information the cost of producing a unit of each crop is determined. This study is important as the cost per unit really determines whether a certain crop can be grown in a particular district or not.

This report gives data on the cost of producing barley, timothy hay, O.P.V., potatoes, turnips and corn.

Barley.—Barley was grown for the first time in 1933 at four stations in this district and the following yields obtained: Mindemoya, 30 bushels, at a cost of 71 cents per bushel; Moonbeam, 30 bushels, at a cost of 63 cents per bushel; St. Isidore, 27 bushels, at a cost of 68 cents per bushel and at Ste. Rose, 31 bushels, at a cost of 45 cents per bushel. These yields are considered very satisfactory and give an idea as to the possibilities of this crop. O.A.C. No. 21, a six-rowed variety, was used at all locations.

OATS, PEAS AND VETCHES.—Oats, peas and vetches were grown on ten stations in 1933 with satisfactory results, the average yield being 2·90 tons of cured hay at a cost of $10.17 per ton. This crop is grown on the areas prepared for the various hoed crops and receives an application of barnyard manure. In seeding down, two bushels of Banner oats, one bushel of peas and one peck of common vetch are sown per acre.

The principal objection to this crop has been the high cost of the peas for seeding. To overcome this condition, each operator is now growing a small area of peas alone, which may be used to make up the desired mixture. Each operator seeded two bushels of Chancellor peas for this purpose in the spring of 1933.

Oats, peas and vetches may be used as a green feed, as a hay crop or as a grain crop.

Below is given in tabular form, the yield of cured hay obtained in 1933 at each station and also a statement of the various items of expense.

O.P.V. HAY—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre, 1933					Number of years grown	Average	
	Yield per acre	Cost per ton	Use of land and taxes	Manure and fertilizer	Manual and horse labour	Seed, and miscellaneous	Use of machinery		Yield per acre	Yield per ton
	tons	$	$	$	$	$	$		tons	$
Barraute, Que.	2·50	8 65	3 00	6 00	5 35	4 45	2 85	4	2·19	10 77
Belcourt, Que.	3·00	9 35	3 00	6 00	11 76	4 45	2 85	2	2·75	11 00
Cochrane, Ont.	3 25	10 77	3 00	4 20	20 51	4 45	2 85	8	2·70	14 11
Earlton, Ont.	4·00	9 34	3 00	9 00	18 06	4 45	2 85	3	4·30	8 89
St. Isidore de Laverlochere, Que.	3·00	12 05	3 00	9 00	16 84	4 45	2 85	2	2·75	14 86
Mattice, Ont.	2·50	13 29	2 00	6 00	17 90	4 45	2 85	5	3·03	12 90
Moonbeam, Ont.	2·50	11 32	3 00	6 00	11 98	4 45	2 85	6	2·78	11 42
Notre Dame du Nord, Que.	3·00	11 22	3 00	9 00	14 36	4 45	2 85	2	3·00	15 21
Ramore, Ont.	2·50	9 19	3 00	6 00	6 68	4 45	2 85	2	2·75	9 74
Ste. Rose de Poularies, Que.	3·33	5 52	3 00	3 00	5 08	4 45	2 85	5	4 16	6 47
Thessalon, Ont.	2·50	10 45	3 00	6 00	9 82	4 45	2 85	2	2·68	10 98
Val Gagne, Ont.	2·66	12 23	3 00	10 80	11 43	4 45	2 85	5	2·61	9 59
Average	2·90	10 28	2 92	6 75	12 48	4 45	2 85	3·8	2·97	11 29

An examination of the table shows that in all cases a satisfactory yield was secured, but that in several instances the yield was somewhat below the average to date. In growing this crop, manual and horse labour make up by far the largest single items of expense, this is followed by manure and fertilizer and then by cost of seed. It will be noted that there is a considerable variation in the cost of manure and fertilizer at the stations named. This is due to the different amounts of manure applied, for example, 18 tons per acre at Val Gagne and 7 tons per acre at Cochrane. Manure is charged at the rate of $1.50 per ton applied to the land, and 40 per cent of the total cost is charged to the first crop in the rotation, in this case O.P.V.

The manual and horse labour required to grow the O.P.V. crop also varied considerably at the different stations. This difference is largely due to extra harrowing required at certain locations and to difficulty experienced at harvest time.

TURNIPS.—Turnips were grown on six stations only in 1933, and an average yield of 19 tons produced at a cost of $3.20 per ton. The average yield secured to date from the six stations is 19·46 tons at an average cost of $3.30 per ton. Trials made over a period of years have shown that turnip growing farther north than Earlton is uncertain.

Turnips follow timothy hay in the rotation. The sod is ploughed shallow early in the summer as soon as the timothy crop is removed, harrowed sufficiently to keep all weeds in check for the remainder of the season and reploughed late in the fall. Farmyard manure is applied in the spring at the rate of 10

to 15 tons per acre, and the seed sown on ridges as soon as the soil can be thoroughly prepared. Commercial fertilizer has not been used to supplement the manure.

Yield and cost of production in 1933 were as follows:—

Earlton	20 tons	at $3.10	per ton
Notre Dame du Nord	14 tons	at $6.73	per ton
Mindemoya	22 tons	at $1.93	per ton
St. Isidore	12 tons	at $3.30	per ton
Thessalon	20 tons	at $2.28	per ton
Verner	26 tons	at $1.86	per ton

In the production of turnips in this district manual labour makes up the largest single item of expense, this is closely followed by horse labour, including the teamster, and then by manure and fertilizer. Seed, use of machinery and use of land are only minor items of expense.

CORN.—Fodder corn was grown at two stations in 1933, at Mindemoya, where 12 tons were produced at a cost of $2.81 per ton and at Thessalon, where 4 tons were produced per acre at a cost of $8.80 per ton. Over a seven year period at Mindemoya, the average yield has been 11·51 tons per acre, at an average cost of $3.63 per ton, while at Thessalon, a two-year average has been 7·75 tons per acre at an average cost of $5.75 per ton.

Corn was planted at both stations on June 7. Rainy weather delayed planting somewhat and at Thessalon frosts and drought during the summer months were responsible for the low yield obtained.

COST OF PRODUCING POTATOES.—Irish Cobbler potatoes were grown at eleven stations in 1933 and average yields obtained. Planting dates ranged from May 12 to June 16 and in general the heavier yields were obtained from the earlier plantings.

The following table gives the yields by stations and also an itemized statement of the various costs which enter into the production of the crop.

POTATOES—YIELD AND COST OF PRODUCTION BY STATIONS

Station	1933		Itemized statement of costs per acre, 1933						Number of years grown	Average	
	Yield per acre	Cost per bushel	Use of land and taxes	Manure	Manual labour	Horse labour including teamster	Seed, and miscellaneous	Use of machinery		Yield per acre	Cost per bushel
	bush.	cts.	$	$	$	$	$	$		bush.	cts.
Barraute, Que	120	46	3 00	6 00	9 60	19 20	14 40	2 85	4	166·0	45
Earlton, Ont	300	23	3 00	9 00	16 88	21 42	16 20	2 85	3	221·7	31
Mattice, Ont	200	49	2 00	6 00	43 47	18 58	24 30	2 85	3	183·0	53
Mindemoya, Ont	203	30	3 00	12 00	7 04	17 74	18 20	2 85	3	229·5	32
Moonbeam, Ont	150	33	3 00	6 00	14 56	10 04	13 50	2 85	2	216·0	33
Notre Dame du Nord, Que	135	45	3 00	9 00	14 40	15 66	16 20	2 85	2	125·0	69
Ramore, Ont	122	40	3 00	6 00	8 32	12 16	16 64	2 85	2	113·5	55
St. Isidore de Laverlochere, Que	172	35	3 00	9 00	11·40	17 55	16 20	2 85	2	161·0	41
Ste. Rose de Poularies, Que	250	21	3 00	3 00	9 76	14 77	18 00	2 85	2	212·5	31
Thessalon, Ont	135	35	3 00	9 60	5 43	15 95	11 00	2 85	2	142·5	43
Val Gagne, Ont	210	25	3 00	10 80	12 70	13 12	10 80	2 85	9	185·8	40
Average	181·5	35	2 91	7 85	13 80	16 17	15 95	2 85	3	181·8	42

An examination of the above table on "Potatoes—Yield and Cost of Production by Stations" indicates that there are two main factors which chiefly influence the variability in cost per bushel. These are yield and manual labour. In all cases, excepting at Mattice, where the yield is over two hundred bushels per acre, the cost per bushel is very reasonable. At Mattice the high cost per bushel is due largely to the large amount of manual labour employed. This was mainly for hoeing, and digging. It took three men, forty hours to dig the crop and the charge was 18 cents per hour, making a total of $21.60 for digging

alone. At Thessalon, on the other hand, the potato digger was used and it took only three men one day to harvest the crop, consequently the low charge for manual labour.

DAIRY HERD IMPROVEMENT

The improvement of the dairy herd on the stations is one of the main projects of the Division. To accomplish this, attention is directed especially to the selection of purebred sires, the rearing of the best heifers only, to better feeding methods and culling the low producers. All operators weigh milk from their cows daily.

Some of the operators have interested their sons in Calf Clubs, which call for careful feeding and handling methods. Much is expected from this co-operation.

Below is given in tabular form the milk production of the herds from twelve stations for the year 1933.

MILK PRODUCTION IN NORTHERN ONTARIO AND NORTHERN QUEBEC RECORD OF COWS

Station	Number of cows 1933	Breed	Average number of days in lactation period 1933	Average milk production per cow 1933	Average per cent of butterfat 1933	Highest cow's production 1933	Lowest cow's production 1933	Average over a number of years		
								Number of years	Number of days	Milk production
			days	lb.	%	lb.	lb.			lb.
Barraute, Que.	4	Grade..	229	3,594	4·15	5,216	2,410	2	222	3,957
Belcourt, Que.	6	Grade..	262	5,354	4·02	6,016	4,339	3	224	4,323
Cochrane, Ont.	4	Grade..	263	5,949	3·96	7,155	4,630	3	268	6,976
Earlton, Ont.	11	Grade..	274	5,927	4·40	6,716	4,749	2	254	5,546
Mattice, Ont.	4	Grade..	304	5,716	4·55	6,639	4,654	3	260	4,905
Mindemoya, Ont.	6	Grade..	288	5,341	3·85	6,478	3,815	3	267	5,451
Moonbeam, Ont.	6	Grade..	255	4,881	3·33	6,708	3,990	3	232	4,551
Notre Dame du Nord, Que.	12	Grade..	251	4,840	4·16	5,919	3,463	1	251	4,840
St. Isidore de Laverlochere, Que.	12	Grade..	244	4,260	3·86	5,606	2,952	1	244	4,236
Ste. Rose de Poularies, Que.	8	Grade..	272	6,304	3·91	7,946	4,673	3	259	5,462
Thessalon, Ont.	5	Grade..	275	4,110	3·24	4,875	3,617	2	273	4,308
Val Gagne, Ont.	8	Grade..	243	4,340	3·61	4,722	3,837	3	250	5,075
Average	7·17	.....	261	5,058	3·97	.....	.....	2·42	250	5,031

The records show that all herds are fairly low and that there are many low producers. Two factors prevented higher yields in 1933, dry pastures in July and August and low prices for dairy products, which reduced the feeding of concentrates to a minimum.

O.P.V. is gradually becoming a popular substitute for dry pastures and has been used on all stations, for two or more years, with satisfactory results.

FIELD DAYS

By a field day is meant the gathering of the neighbours at their nearest station on an appointed day. The object is to give all present an opportunity to see at first hand the various demonstrations being carried on.

Between July 4 and July 23, fourteen field days were held and it was the first year that the district was completely covered. The average attendance was 77 or a total of 1,072; 150 attended the field day at Earlton, 150 at Val Gagne, 100 at Belcourt and 85 at Verner.

At each field day, a systematic survey of all the station fields is first made and the following discussed and explained—Rotations, ploughing, drainage, thinning turnips, curing O.P.V. hay, etc. This is usually followed by a live stock demonstration and special lectures and demonstrations by provincial and federal officers.

Assisting the Supervisor were the local Agronome in the Abitibi district, the District Representative in the Cochrane district, the Field Extension Representative for Northern Ontario at Thessalon and Mindemoya and Representatives of the Seed Branch at several places.

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