CANADA
DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS SERVICE

DOMINION EXPERIMENTAL FARM

NAPPAN

N.S.

W. W. BAIRD, B.S.A., SUPERINTENDENT

PROGRESS REPORT
1937-1947

SHROPSHIRE AND LEICESTER × SHROPSHIRE EWES, THE COLLIE HAS ONE EWE SINGLED OUT

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DOMINION EXPERIMENTAL FARM
Nappan, N.S.

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CONTENTS

CONTENTS—*Continued*

INTRODUCTION

The Dominion Experimental Farm, Nappan, N.S., established in 1887, was originally intended to serve the three Maritime Provinces. At first its scope was general, but since the establishment of other experimental stations in this area, it is now becoming increasingly specialized in field crops, soil culture, animal husbandry and dykeland reclamation.

The last general report was published in a five-year summary for the years 1932-1936. The investigations undertaken during the period 1937 to 1947 are briefly summarized in the present progress report. Additional details concerning these experiments may be obtained by writing to the Superintendent, Dominion Experimental Farm, Nappan, Nova Scotia.

The Superintendent wishes to acknowledge particularly the services of C. D. T. Cameron and J. D. E. Sterling in the preparation of material for this report and in writing the different sections.

ANIMAL HUSBANDRY

The experimental projects in this division are concerned principally with the breeding and feeding of dairy cattle, sheep and swine. In addition, detailed data are recorded on the feed consumption of the different classes of livestock. These data are used in calculating production costs.

Dairy Cattle

A Jersey herd of approximately 30 head is maintained and used in experimental feeding trials, pasture grazing tests and studies in cost of production. All the cows are entered in R.O.P. The present Jersey milking herd is composed mainly of grand-daughters and great grand-daughters of the two cows; Lord's Model—59441—and Palatine Manor Starlight—45660—which were imported from the Isle of

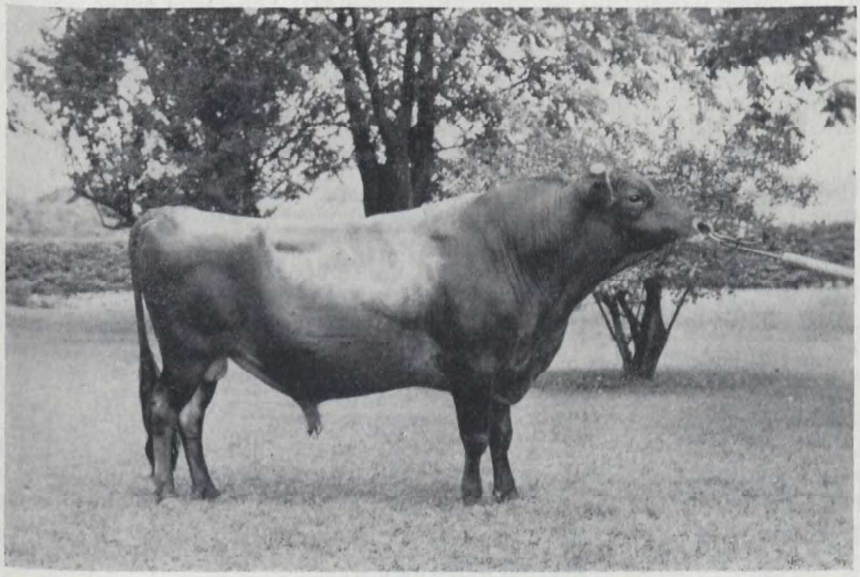

Fig. 1.—Maxwelton Design Hercules—106439—Jersey Herd Sire.

Jersey. These two cows had lifetime records of about 70,000 pounds of milk and over 4,000 pounds of butterfat. Most of the present milking herd was sired by Harrow Design's Lord—79572—a silver medal bull.

The Guernsey herd which was established on this farm in 1920 was exchanged in 1945 for the Shorthorn herd which had been maintained at the Dominion Experimental Station, Kentville, N.S. The latter herd, consisting of sixty head, will be used to study problems in beef production.

Clover Silage vs. Clover Hay in the Dairy Cattle Ration

The economy of replacing field-cured clover hay in the dairy cattle ration with clover silage was investigated in two feeding trials, involving eleven Jersey and Guernsey cows on each ration in both feeding tests. The hay and silage were harvested from the same field. One group of milking cows in each experiment was fed clover hay and corn silage at the rate of one pound of hay and four pounds of corn silage for each 100 pounds live weight, and a meal mixture based on one pound of meal to each 3½ pounds of milk produced. Clover silage at the rate of 3 pounds for each 100 pounds live weight was used to replace clover hay in the ration fed the

cows in the second group. These rations were fed for an average period of 168 days. The use of clover silage to replace hay was satisfactory under the conditions of this experiment. However, there was no apparent difference in either the volume of milk or butterfat produced or in gain or loss of body weight between the two groups. When allowance was made for the amount of shrinkage which occurs during storage, the calculated difference in the feed cost of milk production was considerably in favour of the hay-fed group under the conditions of these trials.

Comparison of Clover Silage and Corn Silage in the Dairy Cattle Ration

This practical feeding trial was designed to compare clover and corn silages in the ration for Guernsey and Jersey milking cows. Silage was fed at the rate of 30 pounds per cow daily with hay and a meal mixture. In this experiment corn silage appeared slightly more palatable than clover silage. The latter feed remained before the cows a longer time before it was consumed. The clover silage was eaten more readily after it was mixed with the meal allowance. On the basis of the average milk and butterfat production, feed consumption and live weight data recorded, the two forms of silage fed in the test appeared equally satisfactory as a part of the dairy ration.

The use of White Fish Meal in the Dairy Cow Ration

The extent to which white fish meal may be used as a protein supplement in the ration of milking cows was investigated in a feeding test involving a total of 18 Guernsey and Jersey cows.

The cows were fed a meal mixture containing 14 per cent white fish meal as the only high protein feed, for a period of 28 days. During the following four-week period, all the cows were fed the same basal and mineral supplement with the addition of linseed oilmeal in amounts sufficient to equal the protein level of the previous meal mixture. The ration containing white fish meal was fed during the final four weeks on test. According to the milk and fat production data and observations recorded in each of the three feeding periods in this trial, the feeding of white fish meal at the rate of 14 per cent of the meal mixture was satisfactory, under the conditions of feeding practised. There was no apparent effect on the quality of the milk produced by the cows when fed a high quality white fish meal in the amounts used in this test.

Record of Performance

JERSEYS—There were 149 lactation periods completed in this herd during the period covered in this report. The best mature 365-day record was 11,081 pounds of milk and 537 pounds of fat. The best two-, three-, and four-year-old 305-day records were, respectively, 7,622 pounds of milk and 377 pounds of fat; 7,353 pounds of milk and 387 pounds of fat; and 8,576 pounds of milk and 435 pounds of fat.

The average records of performance in the different classes are shown in Table 1.

TABLE 1.—RECORD OF PERFORMANCE—JERSEY HERD 1937-1947

Number of Records	Class	Average Production		Average number of days in milk
		Milk (pounds)	Fat (pounds)	
15	Mature	8,428	447	331
7	4-year	7,911	416	327
15	3-year	6,775	355	328
9	2-year	6,140	315	318

GUERNSEYS—There were 151 lactation periods completed in this herd from January, 1937, to October, 1945. The best mature 365-day record during this period was 12,809 pounds of milk and 566 pounds of fat. The highest record in the four-year class was 9,780 pounds of milk and 453 pounds of fat. In the two- and three-year classes the best records were 9,152 pounds of milk and 418 pounds of fat; 9,127 pounds of milk and 398 pounds of fat, respectively.

A summary of the records in the different classes is given in Table 2.

TABLE 2.—RECORD OF PERFORMANCE—GUERNSEY HERD 1937-1945

Number of Records	Class	Average Production		Average number of days in milk
		Milk (pounds)	Fat (pounds)	
15	Mature	8,995	431	332
8	4-year	7,842	394	326
10	3-year	7,638	375	326
31	2-year	6,795	339	338

Feed Cost of Milk and Butterfat Production

The daily milk production and monthly feed consumption records which are recorded for each animal in each herd, provide data which enable a calculation of the average feed cost of milk production. The feed consumption data are based on the average total feed fed to each milking cow in the herd during the lactation and preceding dry period. The feed consumed during the first month prior to freshening in the first lactation is also included. Data on the average annual feed consumption for each milking cow in the two herds are shown in Table 3.

TABLE 3.—AVERAGE ANNUAL FEED CONSUMPTION OF MILKING COWS

	Guernseys	Jerseys
Meal	1,617 pounds	1,550 pounds
Ensilage	3,944 "	3,545 "
Hay	2,830 "	2,732 "
Roots	4,229 "	3,920 "
Greenfeed	533 "	441 "
Pasture	131 days	121 days

The calculated average feed cost per 100 pounds of milk during the period 1937 to 1946 was $1.11. The feed cost per pound of butterfat was 0.22c during the same period. These cost data are approximately 27 per cent below the cost during the year 1946.

The feed prices used in these calculations are based on the cost of production data recorded in the Field Husbandry Division for those feeds grown on this Farm. Market feed prices are used for all purchased feed.

The difference in the feed cost of milk production between seasons is illustrated by the fact that the average cost for each 100 pounds of milk during the months from June to October, inclusive, was $1.05 as compared with $1.91 from November to May in the year 1946. The average dry matter consumed for each 100 pounds of milk produced during the latter seasonal period was 134.3 pounds, whereas, the average for the year, exclusive of pasture, was 91.6 pounds. These data indicate the extent to which pasture is used in dairy production and the importance of this crop in reducing the unit cost of dairy products.

HORSES

The work with horses at this Farm has been devoted toward the development of a stud of high class Clydesdales. Three of the eleven Clydesdale mares in stock at the end of 1947 were sired by the imported stallion, Precedence (21116), three were sired by the imported stallion, Windlaw Dominion (26995), three by the imported stallion, Drumlanrig Inspiration (29297), and one each by the imported stallions, Strathore James (26996), and Ottawa Inspiration (29636).

A total of 31 foals were raised and 44 horses were sold or transferred to other institutions, mainly for breeding purposes during the 11-year period 1937 to 1947.

Data on the feed cost of rearing colts from birth to one year of age and from one to two years of age were recorded during the years 1936 to 1938. The cost of rearing colts to one year of age includes the cost of the feed consumed by the dams from time of foaling until the colt is weaned, in addition to the feed consumed by the colt. The total calculated feed cost from birth to one year of age was $55.89 and from one year to two years of age, $60.95.

The average price of the various feeds and the average feed consumption for the two age groups during this period were as shown in Table 4:—

TABLE 4.—FEED CONSUMPTION AND COST OF REARING COLTS

Feed	Price (per ton)	Feed Consumption (pounds)	
		Birth to 1 year of age	From 1 year to 2 years of age
Oats	$24.67	2,293	2,280
Bran	25.23	640	581
Roots	6.33	99	218
Hay	8.30	3,005	3,560
Pasture (per month)	2.00	3.33 months	5 months

SHEEP

The failure of sheep production to assume the importance it should in the agriculture of the region has been attributed in some measure to the methods of breeding followed. To this may be added flock management difficulties such as parasitic infestation, the ravages of dogs, and inadequate feeding.

Sheep improvement, "through breeding", in Canada has been undertaken mainly by the use of purebred rams on common flocks. The same breed of rams was used continuously in order to impress upon the flock the characteristics of the breed and develop uniformity through a "grading up" plan of breeding as followed with other classes of livestock. The results of this practice were satisfactory in the early stages because of the wide differences between the foundation stock used and the new sires which acted somewhat like an ordinary cross. However, by continuing this method of breeding it was found that the undesirable as well as the desirable characteristics were impressed on the progeny, and while greater uniformity of type was developed together with an improvement in quality, the size and vigour of the lambs were not satisfactory.

To overcome this weakness in breeding practice, the flock at this Farm and a flock owned by a nearby sheep breeder, have been used in a cross breeding program, for the production of crossbred ewes of different types. These ewes are compared on their relative value for producing lambs and wool under Maritime conditions. In addition, various breeds of rams have been tested as to their suitability for topping these crossbred ewes in the production of ideal market lambs.

This experiment was started in the fall of 1938 when a Leicester ram was bred to part of the flock of purebred Shropshire ewes. This particular cross was followed using about 12 to 15 ewes in each of the following seven years. Some of the female progeny of this cross were retained in the flock, and, starting in the fall of 1940, the shearling ewes were bred back to the Shropshire ram. This cross was continued until 1945. The purebred Shropshire flock has also been maintained in order that the results of the various crosses may be compared each year with the data obtained on the purebred stock. A third generation cross was made in 1944 and 1945 in which part of the S × (L × S) ewe flock was bred to a Shropshire ram and part to a Leicester ram.

The following factors were considered in comparing the various crosses:

(1) Fertility and prolificacy.

(2) Birth weight of lambs.

(3) Rate of growth.

(4) Weight and age of the finished lambs.

(5) Quality of carcass.

(6) Fleece weight and returns per ewe.

Results of the First, Second and Third Generation Crossbreds

Fertility and Prolificacy

The first generation ewes were more prolific than Shropshires or second generation ewes. They were better milkers and produced heavier fleeces than other groups.

Birth Weight of Lambs

All ambs were weighed and classified on the basis of the vigour which was shown at birth. Each lamb was classed as good, fair or poor insofar as vigour was concerned. The crossbred lambs were heavier at birth, stronger and more vigorous than Shropshires. The percentage of lambs classified as good in all crossbred groups varied from 80 to 90 per cent as compared with 34 per cent fair and poor in the Shropshire group. Third generation lambs L × (S × (L × S) were superior to Shropshires in weight at birth and vigour, but not equal to second generation lambs on these points.

The Rate of Growth

In addition to the weight at birth, all lambs were weighed five times during the growing period in order to compare the rates of gain at the different stages of growth. These weights were recorded when the lambs were as near as possible to an average of 2, 4 and 8 weeks of age, and again at 3 months of age, and at market weight. These data show a higher rate of gain in the crossbred lambs as compared with Shropshires. This increased rate of growth over the Shropshires occurred in each of the three generations of crossbred lambs.

Weight and Age of Finished Lambs

The first-cross lambs (Leicester ram on Shropshire ewes) reached market weight about one week earlier on the average than Shropshires or second or third generation crossbreds. However, the lambs of this group were more rangy in conformation and required somewhat more weight to be properly finished than the second generation crossbred lambs or Shropshires. The second generation crossbred lambs were practically equal to Shropshires in type and finish but the production of lambs per ewe was much less for the Shropshire ewes.

Quality of Carcass

Altogether 245 lamb carcasses in this experiment were graded by officials of the Production Service, Dominion Department of Agriculture, extending over the period 1939 to 1945. These include 104 carcasses of L × S (Leicester ram by Shropshire ewes) lambs; 74 — S × (L × S); 19 — L × (S × (L × S) and 48 purebred Shropshire lambs.

These data indicate a lower percentage of grade A lambs in the first generation cross than either Shropshires or second and third generation crossbreds. The quality of the carcass from the second generation, S × (L × S), was equal to the Shropshires.

Fleece Weight and Returns

The average fleece weight for the Shropshire aged ewes during the years 1940 to 1945, based on 74 fleeces, was 8.12 pounds, as compared with 9.82 pounds for the Leicester × Shropshire aged ewes during the same period, based on 42 fleeces. The fleece weight for the second generation aged ewes was 8.58 pounds.

The average yearly value of wool per ewe was $2.39 for the Shropshire and the L × S ewes, and $2.87 for the second generation crossbred ewes.

A summary of the data recorded in this experiment from 1939 to 1945 inclusive, is shown in Table 5:—

TABLE 5.—SUMMARY OF DATA IN SHEEP CROSS-BREEDING EXPERIMENT

	Breeding Groups			
	Shropshires	Leicester ram × Shropshire ewes	Shropshire ram × (Leicester × Shropshire) ewes	Leicester ram × S × (L × S) ewes
Prolificacy and Vigour at Birth:				
Number of ewes bred	94	103	68	15
Number of ewes lambed	91	101	67	14
Number of lambs born per ewe bred	1.56	1.50	1.79	1.64
Number of lambs raised per ewe bred	1.32	1.40	1.56	1.50
Grading on Vigour at Birth:				
Good %	66.0	80.0	90.2	82.6
Fair %	23.1	14.2	7.4	4.4
Poor %	10.9	5.8	2.4	13.0
Growth rate and Grading				
Average birth weight of lambs—(lb.)	7.63	8.22	8.33	7.94
Average daily gains-birth to market weight (lb.)	0.37	0.46	0.43	0.42
Pounds lamb (live weight) per ewe	104.1	114.6	127.5	122.7
Grading:				
A%	76.6	66.7	75.5	71.4
B%	21.0	26.4	24.5	28.6
C%	2.4	6.9	.....	.....

Southdown and Cheviot Rams

A breeding experiment was started in the fall of 1945 to study the suitability of Southdown and Cheviot rams in the production of market lambs when bred to the Leicester-Shropshire crossbred ewes. As the number of animals involved in this test is very limited, and since the two groups were not reared on the same farm, a direct comparison of the data recorded in each group in the experiment cannot be made.

The Cheviot × Leicester-Shropshire lambs made very rapid growth. The average age to market weight of the 21 lambs marketed in this group was 114 days. The average daily rate of gain was 0.61 pounds. These lambs were classed by the Dominion Department of Agriculture graders and officials of the Swift Canadian Company Limited as the best group of lambs ever rail graded at the Moncton, N.B. plant. The number of lambs raised per ewe was only 1.11 as compared with 1.73 for the lambs sired by the Southdown ram. The lambs in the latter group made good average gains (0.46 pounds daily) and were of high quality. The high lambing percentage in this group resulted in a very high return per ewe.

Fig. 2.—Leicester × Shropshire ewes with their lambs sired by Cheviot ram.

Swine

The swine herd is used in breeding and feeding experiments, and in studies on the cost of raising market hogs and maintaining breeding stock. The herd is also a source of breeding stock from animals qualified in the Advanced Registry test for purebred swine.

Breeding Experiments

These experiments have been undertaken in co-operation with the Advanced Registry Board in order to develop an improved strain of Yorkshire hogs relatively free from hereditary disqualifications. The breeding practice followed is to select outstanding lines of breeding stock based on the performance of their progeny in the Advanced Registry test. These pigs are inbred with the object of fixing the

desirable hereditary factors in the herd as far as possible. The best progeny from these matings are retained for breeding purposes if they are of good type and quality and are free from disqualifications.

A swine breeding experiment on the inheritance of the economic characteristics of the bacon hog has been undertaken recently in co-operation with the Production Service of the Dominion Department of Agriculture. In this experiment the Advanced Registry records of progeny from sows selected from litters with high Advanced Registry records are compared with the records of progeny from sows selected from litters with low Advanced Registry records when both high and low test sows are mated to a boar from a low record sow and to a boar from a high record sow. In this way it is hoped to accumulate records at several stations which may be combined for a comparison of the performance of parental stock, and for use in the study of the inheritance of such factors as productiveness, maturing tendencies and carcass quality.

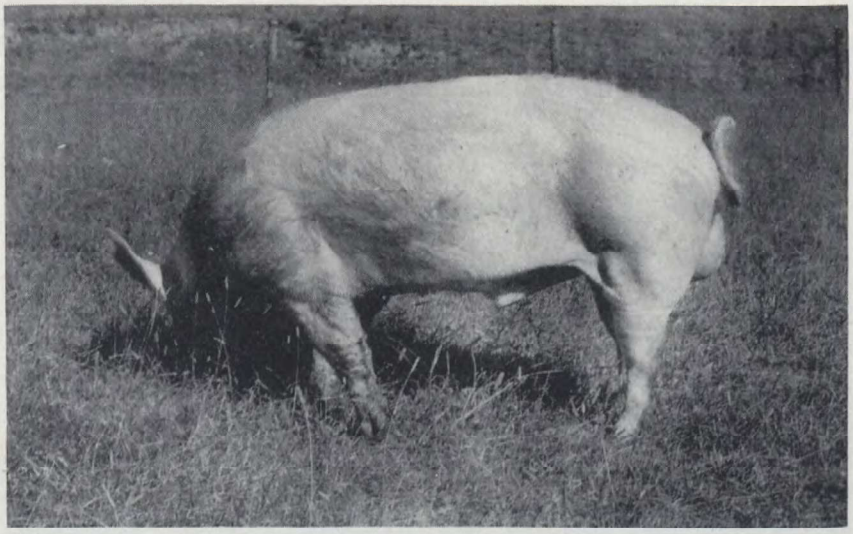

FIG. 3.—Nappan Rock 17Z—292533—Herd Sire.

COMPARISON OF TANKAGE AND VARIOUS GRADES OF FISHMEAL IN THE BACON HOG RATION

Three grades of fishmeal, including one oily fishmeal product, were compared with tankage, when used as a protein supplement in the growing and fattening rations. The basal ration fed consisted of barley, oats, shorts, and a mineral supplement. One of each of the above protein supplements was added to the same basal ration in amounts which provided the same level of protein in each experimental ration.

A total of 18 Yorkshire pigs was used in each of the four experimental groups. In order to secure data on the effect of feeding a basal ration without the addition of a protein supplement, during the latter part of the growth period, the hogs in each group were divided into two lots of nine hogs each. One lot was fed the basal ration only, after the hogs reached an average live weight of 160 pounds; the other group was fed the basal ration with the protein supplement until the hogs reached market weight.

There was no apparent difference in this experiment in the value of the three grades of fishmeal for bacon hog feeding, as measured by the average weight gain, feed efficiency and quality of carcass. The tankage fed hogs showed a lower average efficiency in the utilization of feed than the hogs fed fishmeal as a protein supplement in the same basal ration.

The quality of the carcasses, as indicated by the Advanced Registry slaughter test score and rail grading, showed little difference among the four protein supplements, in the production of high quality bacon. The firmest fat was produced by the hogs fed tankage up to finish weight.

No consistent advantage in feed efficiency was evident from the inclusion of tankage or fishmeal as protein supplements in the ration fed to hogs during the last month prior to slaughter. The addition of these supplements to the basal mixture during this period resulted in a slightly higher cost per unit of gain in live weight.

Barley vs. Oats vs. Corn as the Basal Feed in the Bacon Hog Ration

This experiment is one of four replicate tests undertaken at four eastern Canadian Stations in co-operation with the National Barley Committee. The object of the test was to obtain information on the relative feeding value for bacon hogs of the three top grades of Canadian Western feed barley as compared with oats and corn and combinations of barley and oats, and corn and oats when constituting the entire basal feed for bacon hogs. The same protein-mineral-vitamin supplement was used with each of the basal feeds.

From the results of this feeding trial it would appear that grades 1 and 2, C.W. feed barley are superior to corn or oats as a bacon hog feed. The substitution of oats for barley did not improve the quality of carcass or rate of live weight gain. The hogs fed corn made good gains but produced a poorer quality of carcass than the hogs fed barley, oats, or a mixture of barley and oats.

It would appear from this experiment that barley may constitute the entire basal part of the growing and fattening ration for pigs, provided a satisfactory protein-mineral-vitamin supplement is included in sufficient quantity to balance the ration. The use of corn in a large proportion of the basal ration may produce a poorer quality of carcass. Pigs fed oats as the only basal feed showed much slower gains than the hogs fed barley or corn, and required a larger feed consumption for each unit of gain in weight.

Comparison of Various Levels of Feed Wheat in the Bacon Hog Ration

The object of this feeding trial was to compare the effect on rate and economy of gain and quality of carcass from the feeding of different proportions of feed wheat in the ration of bacon hogs.

Twenty-five Yorkshire hogs were started on test at about 70 days of age and fed to market weight in each of the following four experimental feeding groups:

(1) Wheat constituted the entire basal ration.

(2) 20 and 30 per cent of wheat in the basal ration.

(3) 40 and 50 per cent of wheat in the basal ration.

(4) 65 and 70 per cent of wheat in the basal ration.

The lower percentage of wheat given above was fed in each group until the pigs reached an average live weight of 100 pounds and the higher rate from this weight until the hogs reached an average market weight of approximately 200 pounds.

The results of this test indicate that the most serious disadvantage from the use of the higher proportions of wheat in the ration, is the effect on the quality of the carcasses produced. Only one-third of the hogs fed the two higher rates of feed wheat in this experiment qualified for A quality carcasses as compared with 90 per cent grade A carcasses in group 2. However, the most rapid average gains in live weight were made by the hogs fed the higher levels of wheat and the average feed consumption per 100 pounds of carcass gain was also lower for these two groups.

Effect of Feeding Practice on Growth Rate and Carcass Quality

Three methods of feeding market hogs during the fattening period were compared in this experiment under group and individual feeding conditions. All the pigs used in this test were full hand fed a standard growing ration three times daily until they reached an average live weight of 100 pounds. The hogs were divided into three groups of four hogs using one group and an equal number of pigs in individual pens in a comparison of each of the following three feeding methods:

(1) Full hand feeding twice daily.

(2) Full hand feeding three times daily.

(3) Limited feeding twice daily.

The hogs were considered full fed when they were provided with all the feed which could be consumed within a period of 15 to 20 minutes. The limited feed allowance for group 3 was based on three-quarters of the feed consumed by the hogs in group 1.

The average daily growth rate of the hogs fed a restricted feed allowance during the fattening period was approximately one-half pound less than the gain recorded for the full fed hogs. This reduction in the rate of live weight increase appeared to effect considerable improvement in carcass quality. 76 per cent of the carcasses from hogs fed a limited ration graded A as compared with 44 per cent grade A carcasses from the hogs under full feeding. Although equal numbers of each sex were included in each experimental group, only 30 per cent of the grade A carcasses were from male hogs.

There was no apparent difference in the average growth rate or in carcass quality between the hogs fed twice daily as compared with those fed three times per day during the fattening period.

Growth of Bacon-Type Hogs

There are very limited data available on the average growth rates of Canadian bacon-type hogs. The practical feeder may frequently wish to compare the progress of his market pigs, at some time during the growing or fattening periods, with the performance of pigs fed elsewhere, in order to gauge the results of his management and feeding practice.

The procedure followed in the experimental feeding trials with hogs at this Farm has been to weigh the pigs bi-weekly. These data provided satisfactory material for the construction of the normal growth curve shown in Figure 4.

The 183 hogs used in this study were all of Yorkshire breeding. Their dams were bred at the Nappan Experimental Farm and were almost all daughters, grand-daughters, or great grand-daughters of the sire Valter of Svalof—179616—. Litters were farrowed in both early spring and fall and creep-fed from two weeks of age. The males were castrated when one month old, and all pigs were weaned at approximately 8 weeks.

The hogs were fed in pens of 4 or 5 hogs each and started on the experimental rations at 65 to 75 days of age. All groups were full hand fed the meal allowance, with water, thrice daily, from weaning to an average weight of 100—125 pounds, and thereafter twice daily.

The basal rations for most of the pigs consisted of feed barley, oats, and wheat or shorts. Barley generally constituted about 50 per cent of the rations.

White fish meal constituted the entire protein supplement for the greater number of the hogs. The protein-mineral supplement fed 72 of the pigs was made up as follows: tankage 50 per cent; white fish meal 15 per cent; linseed oilmeal 20 per cent; bonemeal 5 per cent; ground limestone 5 per cent; and salt 5 per cent. A mineral mixture made up of bonemeal 40 per cent, ground limestone 40 per cent and salt 20 per cent, was fed at 1 to 2 per cent of the basal feed allowance to all hogs fed white fish meal as the only protein supplement.

The rations during the growing period, for all groups fed the mixed protein mineral supplement, consisted of 85 parts basal feeds and 15 parts supplement, while the proportion of supplement was reduced to about 10 per cent when the hogs reached 100 pounds live weight. The various protein supplements used did not result in any appreciable difference in the estimated digestible protein content of the rations fed. The final feed mixtures were supplemented with one teaspoonful of cod liver oil daily for each animal in all groups under 100 pounds average weight.

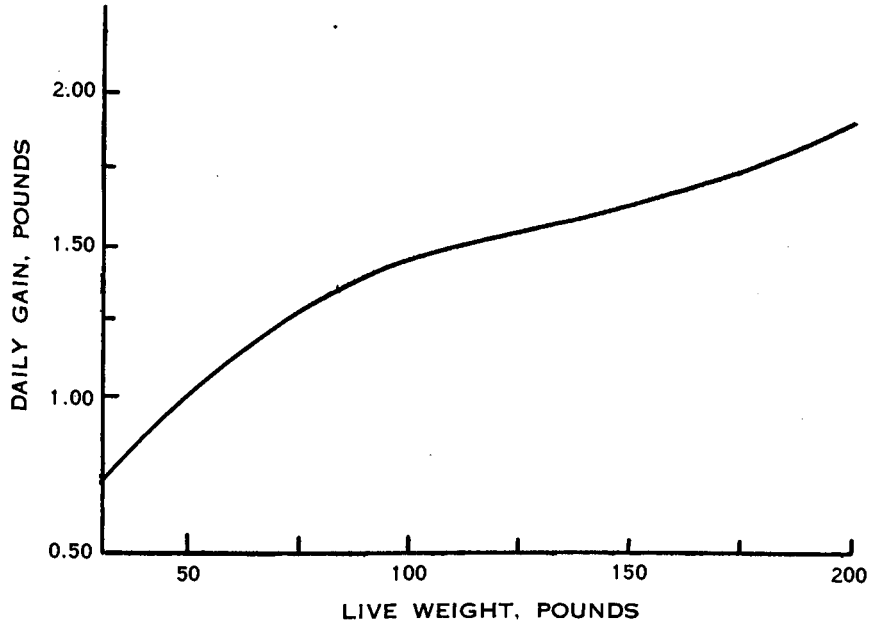

FIG. 4.—Average daily gain of pigs fed at Nappan.

PRODUCTION RECORDS

During the period from 1937 to 1947 inclusive, an average of 15 sows were kept in the herd each year. A total of 204 litters was farrowed in the 11-year period, with an average of 8.67 pigs per litter. There were 261 of these pigs sold as breeders, and 662 were sold on the rail grade basis, 372 of which graded A, and 270 B1.

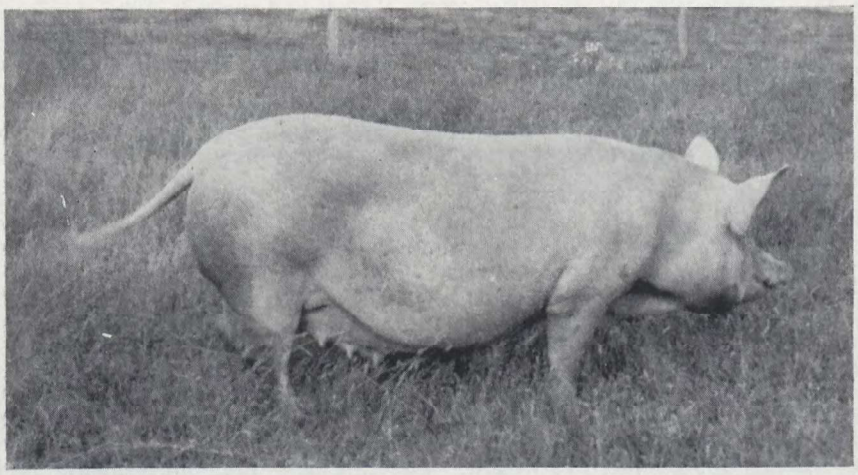

FIG. 5.—Nappan Lass 21W—239592—A. R. No. 2665. This sow had farrowed a total of 92 pigs at age of 5 years and 8 months. Advanced Registry score: Production 70; Maturity 100; Carcass 85.

Data on the feed cost of pork production and of raising and maintaining breeding stock have been recorded each year. The costs of feed for each animal, based on the average yearly cost of stock kept at this Farm, and using market feed prices, are summarized in Table 6:—

TABLE 6.—AVERAGE FEED COST DATA (per animal)

Rearing pigs to weaning age	$ 3.36	Average 1937-1946 Inclusive
Rearing pigs to three months of age	4.46	" 1939-1946 "
Maintaining brood sows (per year)	45.22	" 1937-1946 "
Maintaining herd sire (per year)	31.97	" 1939-1946 "
Cost of pork production (per 100 pounds)	7.20	" 1937-1946 "

CEREAL CROPS

Approximately one-fifth of the cultivated land in Nova Scotia is utilized for cereal grain production. A better crop balance would exist if this acreage were increased. The quality and yield of grain compare favourably with that produced in other provinces.

The cereal testing program of this Farm has been greatly increased during the past ten years in order that suitable varietal recommendations might be made for the various climatic regions and soil types of Nova Scotia.

In addition to tests conducted at Nappan, those varieties of oats, barley, spring and winter wheat which show the greatest promise are tested in the more important cropping regions of the province. The varieties and strains tested are, for the most part, the more promising Canadian and United States productions. Those discussed in this report are the ones most worthy of immediate consideration.

Climatic conditions during the years covered by this report were, on the average, quite favourable for most cereal crops. In summarizing the 11 years under review, four years could be classed as good, four fair, and three rather poor. The year 1942 was an excellent year in all respects, while 1938 and 1943, being very wet years, were poor from the standpoints of yield and disease attack.

WHEAT

SPRING WHEAT

Approximately 1,400 acres of spring wheat are grown in Nova Scotia each year. The largest portion is used as poultry or other stock feed.

As a result of tests conducted by this Farm during recent years, two new varieties have been recommended for the province. In 1942, Coronation II, a bearded, white-chaffed variety, began replacing Huron and other varieties susceptible to stem rust in areas where this disease was prevalent. Cascade, a beardless, semi-hard, white-grained variety, has a high degree of resistance to stem rust and mildew. This variety was released to the farmers of Nova Scotia for the 1948 crop. C.D. 3285, a bearded strain, which has not yet been named or distributed, has given good performance since 1941.

In general C.D. 3285 and Cascade mature three or four days earlier than Huron or Coronation II, that is, in approximately 97 days. All varieties have good height and strength of straw.

Comparable yield data of these varieties are given in Table 7.

TABLE 7.—AVERAGE YIELD OF SEVEN SPRING WHEAT TRIALS (1945-47) in bushels per acre

Variety	Bushels
Cascade	25.1
Huron	24.3
C. D. 3285	21.9
Coronation II	18.8

WINTER WHEAT

Approximately 150 acres of this crop are annually produced in Nova Scotia, the bulk being in Pictou and Kings counties.

Winter wheat varieties and strains were tested from 1932 to 1942. Average yields of the two leading varieties for the eleven-year period 1932-1942 inclusive, were Minturki, 32.6 bushels per acre and Kharkov 22 M.C., 30.7 bushels per acre.

In 1944 it was decided to test fifteen newly developed varieties and strains in hopes of finding more adaptive material for this area. These tests were located at Nappan (Cumberland county), and in Pictou county and Kings county.

The average yield of the five best performers at each location is compared with Kharkov 22 M.C. in Table 8.

TABLE 8.—AVERAGE WINTER WHEAT YIELDS IN BUSHELS PER ACRE FOR THREE LOCATIONS (1945-47)

Nappan*		Pictou Co.*		Kings Co.†	
Variety	Bushels	Variety	Bushels	Variety	Bushels
Yorkwin	41.8	1073-30.32	45.0	Rideau	36.6
2623 A	41.0	1073-30.34	39.0	1083-29.146	34.5
Rideau	40.0	1087-32.105	38.4	Cornell 595	34.2
1073-30.34	39.0	Kawvale	35.7	Kawvale	34.0
1083-29.146	38.0	Rideau	35.5	Fairfield	33.3
Kharkov	31.9	Kharkov	33.1	Kharkov	22.4

*Nappan and Pictou county yield data are three-year averages.
†Kings county data are the average for 1945 and 1947 trials.

The variety Rideau has given the best general performance. The 1073 strains are selections from a cross between Kharkov 22 M.C. and Dawson's Golden Chaff. When exposed to severe winter conditions, as were the Pictou county trials, these strains excelled.

Several dates of seeding winter wheat were compared from 1945 to 1947. These tests show that the optimum period for seeding this crop in this area lies between August 15 and early September. After September 15, very rapid reductions in yield were obtained.

When a winter-hardy variety, such as Rideau, is sown at the proper time, on well drained land, good results may be expected.

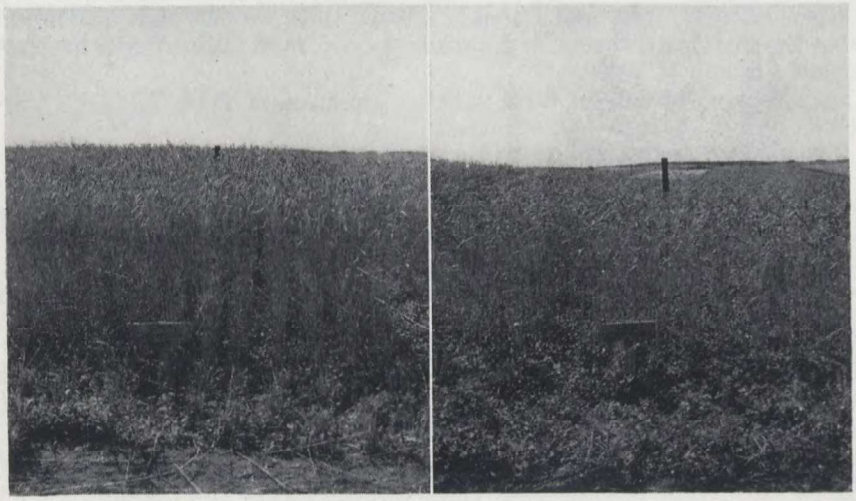

Fig. 6.—Rideau Winter Wheat, Nappan, N.S.
Left—Crop seeded August 15.
Right—Crop seeded September 15.

OATS

More than four-fifths of the total cereal acreage of this province is devoted to oat production. The development of Erban oats was an important event in the history of the crop. The high yield and high degree of crown-rust resistance displayed by this variety were responsible for its widespread popularity in Nova Scotia. Beaver, a cross between Vanguard and Erban, was released in 1946. This variety is slightly inferior to Erban in yield, but has a more desirable kernel and carries the crown-rust resistance of the Erban parent and the stem-rust resistance of Vanguard. Erban and Beaver are of medium maturity.

Abegweit, a sister selection of Beaver, is being distributed for the 1948 crop. It has given slightly higher yields than Beaver and has similar disease resistance. It is three or four days later maturing than Erban or Beaver.

Comparable yield data collected during the past ten years at Nappan for Erban and three older varieties are presented in Table 9.

TABLE 9.—TEN-YEAR YIELD SUMMARY OF OAT VARIETIES AT NAPPAN IN BUSHELS PER ACRE

Variety	Bushels
Erban	72.5
Victory	69.9
Banner	68.9
Alaska	63.4

A comparison of average yields taken from thirty-one trials located throughout the province from 1944 to 1947 is given in Table 10:

TABLE 10.—SUMMARY OF THIRTY-ONE NOVA SCOTIA OAT TRIALS
Yield in bushels per acre, average of 4 years, 1944-1947

Variety	Bushels
Erban	62.8
Abegweit	59.4
Beaver	57.7
Banner	54.7
Alaska	48.4

The varieties Exeter and Roxton show promise in the Annapolis and Wentworth Valleys. Exeter is susceptible to crown rust and is not recommended in areas where this disease is prevalent. Both of these varieties mature late.

The Ajax variety of oats has not been outstanding in Nova Scotia.

HULLESS OATS

Poultry and hog producers have shown an interest in this crop as a low fibre feed. Although the amount of testing was limited, the varieties Brighton and Laurel proved suitable for the province.

BARLEY

There has been a slight reduction in the barley acreage of this province during the period under review. The area planted annually of this crop, at time of writing, is approximately 7,500 acres.

Of the many varieties and strains tested during the period covered by this report, none has proved superior to Charlottetown No. 80 in general performance. Where a six-rowed type is preferred, the smooth-awned variety Montcalm is recommended. Montcalm matures several days earlier than Charlottetown No. 80. Olli and Byng yield well, but objections to them are their short and weak straw respectively. Byng is smooth-awned. Galore, another smooth-awned variety, and Peatland, a rough-awned variety, have proved satisfactory.

The average yield of five varieties compared in forty-four tests located throughout the province from 1944 to 1947 inclusive are given in Table 11:

TABLE 11.—SUMMARY OF YIELDS OBTAINED IN FORTY-FOUR NOVA SCOTIA BARLEY TRIALS IN BUSHELS PER ACRE 1944-1947

Variety	Bushels
Charlottetown No. 80	41.1
Olli	38.9
Montcalm	38.8
Peatland	37.8
Galore	36.9

WINTER RYE

Although winter rye is not grown to any extent in Nova Scotia, it is well adapted to normal conditions. Yields of forty-five bushels per acre are not uncommon.

Variety and strain trials of this crop were conducted from 1936 to 1942 but were discontinued when sufficient data on common varieties had been obtained.

The varieties Crown and Imperial are the better grain yielders. Horton yields well but is chiefly recommended for early spring pasture. Dakold is slow in spring growth and in only a fair yielder. It is recommended in areas where winter- killing is very severe.

FIELD PEAS

In tests conducted from 1938 to 1944 the varieties given in Table 12 were outstanding:

TABLE 12—YIELDS OF FIELD PEA VARIETIES—7-YEAR AVERAGE 1938-1944

Variety	Bushels per Acre
Early Blue	68.3
Chancellor	56.9
Arthur	52.5

Early Blue lacks favour because of its short vine. Chancellor produces a small pea and on very rich soil the long vine which it produces is sometimes a disadvantage. Arthur is one of the best varieties when all factors are considered.

FIELD BEANS

Frost damage frequently occurs when late maturing varieties of this crop are grown. In general, early maturing varieties are not sufficiently high yielding to encourage field bean production in the province.

Tests show that the variety Norwegian has the most satisfactory maturity and gives a fair yield.

Mohawk is a few days later maturing than Norwegian and has a slightly inferior yield.

Navy, a medium maturing, large white bean variety gives high yield.

Flax

Although flax is not an important crop in Nova Scotia, good seed and fibre yields can be obtained. Of the linseed varieties, tests indicate that the variety Redwing produces the most satisfactory seed and fibre yield. This variety matures earlier than Bison or Royal.

Of the fibre varieties, Liral Prince and Stormont Cirrus gave the highest fibre yields. Liral Dominion excelled in seed yield.

Fig. 7.—Harvesting fibre flax plots, Nappan, N.S.

Cereal Plant Breeding

During recent years, breeding by selection of spring and winter wheats, oats and barley, has been carried on to a limited extent. Early generation material is tested for rust resistance at the Central Experimental Farm, Ottawa, and from the more resistant lines, further selections are made under Nova Scotia conditions on the basis of type, adaptability and yield.

The most gratifying results have been obtained with barley. Several strong-strawed, smooth-awned strains have been developed.

Co-operative Grain Cleaning

The grain cleaning establishment on this farm serves most of Cumberland county and some other nearby districts.

Since 1937 there has been a growing interest in sowing pure, clean, disease-free seed. A total of 45,819 bushels of grain has been cleaned since that time; 8,600 bushels, the largest amount during any one year, were cleaned for the 1948 crop. Of the cleaned product, approximately 85 per cent was treated with New Improved Ceresan to combat seed-borne diseases.

Seed Production

In order to maintain a pure source of seed grain for the farmers of the province, this Farm produces elite, registered, certified and commercial seed of the most popular recommended variety of oats, barley and spring and winter wheats.

Oats

Although the variety Beaver is slightly inferior to Erban in yield, it has a more desirable kernel and possesses considerable stem-rust resistance, as well as the crown rust resistance of its Erban parent. For these reasons, Beaver oats have been propagated by this farm since 1946.

Barley

Up to the time of writing, the Charlottetown No. 80 barley variety has given the greatest satisfaction. Sufficient seed to supply the demand is annually produced.

Wheat

The new semi-hard, white spring variety Cascade was produced in 1947 in order to satisfy the many requests for seed.

Although there is usually little demand for winter wheat seed, sufficient quantities of Rideau are produced to supply those interested.

FIELD HUSBANDRY

Studies of practical field husbandry problems include investigations in the use of commercial fertilizer and manure in crop production, cultural methods, marsh land and pasture improvement, and studies on the cost of crop production.

Most of the upland experiments have been located on the fields owned by the Dominion Experimental Farm, which are in the Nappan "Soil Association". In recent years experiments have been conducted on five privately-owned farms located on the more important agricultural soil types in Cumberland county.

COMMERCIAL FERTILIZER AND MANURE IN CROP PRODUCTION

In relation to the use of commercial fertilizer and manure, it is important to know the amounts and combinations of these materials which may be expected to show the most satisfactory return, as measured by actual crop yields involving several complete rotations.

During each of the past ten years of the period under review, crop yield data have been recorded on one thousand plots, on which various combinations and amounts of commercial fertilizer and manure have been applied. Three, three-year rotations are included in this experiment. These differ only in the first-year crops; swedes, mangels and potatoes. Oats and clover are grown in the second and third years, respectively, in each rotation. All fertilizer treatments are applied, broadcast, every third year before the root crops. The results in this experiment may be summarized as follows:

NITROGEN

Nitrogen (N) was applied in the form of ammonium sulphate. The yields of swedes showed a trend to increase as the amount of ammonium sulphate in a mixed fertilizer was increased up to 45 pounds of nitrogen per acre. The mixed fertilizer was applied at the rate of 750 pounds an acre. In the potato rotation, the yields of this crop were increased as the level of nitrogen was increased up to 80 pounds in a mixed fertilizer applied at the rate of 2000 pounds per acre. Oat and clover yields remained fairly constant and were apparently unrelated to the level of nitrogen in the fertilizer. Increased rates of nitrogen had no apparent effect on the average yields of mangels.

The response to nitrogen in the potato rotation and the calculated return from the use of a number of the fertilizer mixtures tested are presented in Table 13. The return from the use of fertilizers, is based on the market value of the average increase in crop production above the production on the check (untreated) plots. The cost of the fertilizers was subtracted. Manure was valued at $1.50 a ton and commercial fertilizers were charged at actual cost price.

TABLE 13.—CROP RESPONSE TO NITROGEN

Fertilizer Formulae	Rate per acre	Average Annual Crop Yields (per acre)			Average value of crop increase over cost of fertilizer
		Potatoes 1936-1945	Oats 1937-1945	Clover hay 1938-1945	
N-P-K	lb.	bushels	bushels	tons	$
2-8-10	2,000	258.4	52.1	2.29	67.00
4-8-10	2,000	271.5	51.6	2.17	69.57
6-8-10	2,000	266.5	58.5	2.17	66.48
Check (untreated)	.....	129.6	46.3	1.90	.....

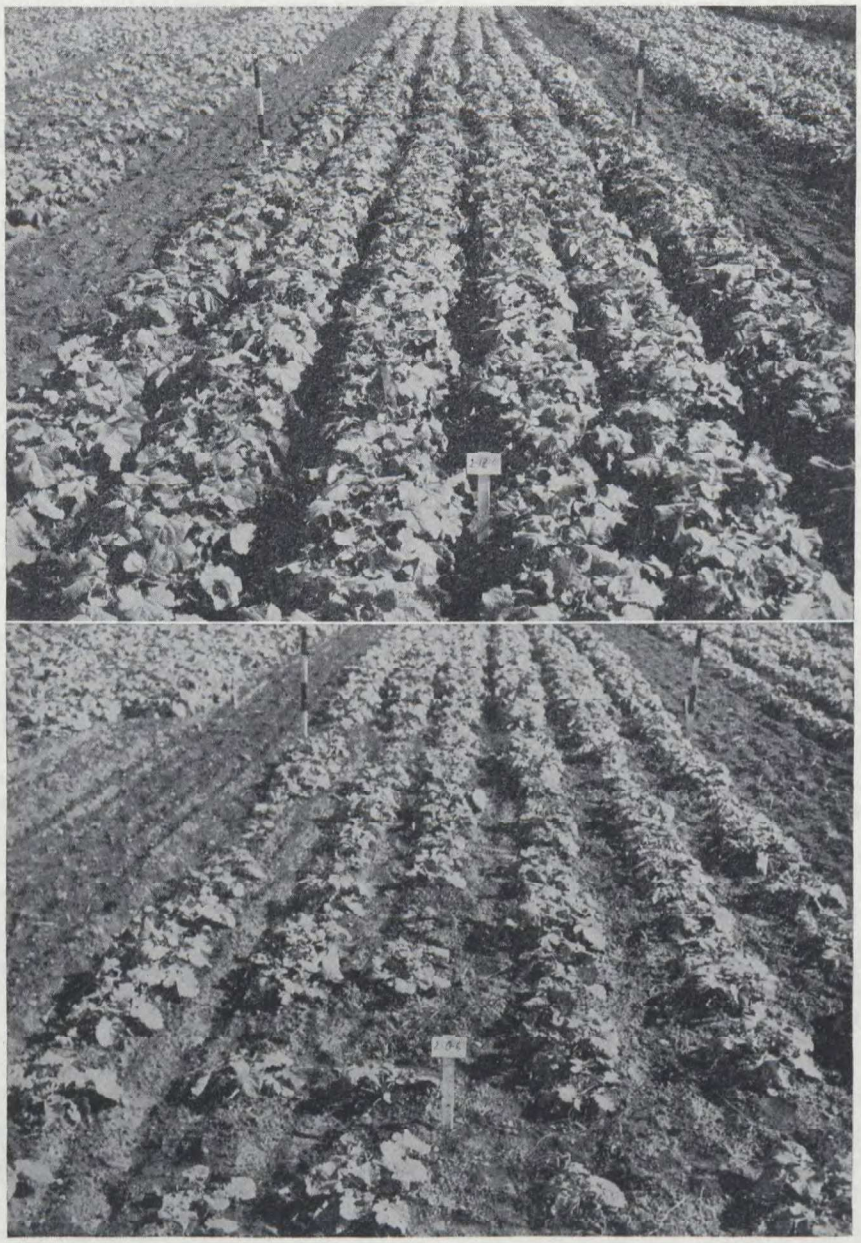

FIG. 8.—(*Upper*) Swede Crop—Superphosphate applied.
(90 pounds P_2O_5 per acre)

FIG. 9.—(*Lower*) Swede Crop—No superphosphate applied.

Phosphorus

Phosphorus (P) stimulates root development in the early stages of growth and promotes seed formation in the latter stages. Its importance in the growth of potatoes and swedes is reflected in the relative yields of these crops on plots which received different amounts of superphosphate in a mixed fertilizer. In the rotation which includes potatoes, the yields of this crop showed a trend to increase as the rates of super-phosphate were increased up to 120 pounds of P_2O_5 per acre. The mixed fertilizer was applied before the root crop at the rate of 1000 pounds per acre. The average yield of swedes and mangels showed a similar trend up to 60 and 90 pounds of P_2O_5 per acre, respectively.

The response to phosphorus in the potato rotation and the average value of the increase in crop yield above the cost of the fertilizer applied are shown in Table 14:

TABLE 14.—CROP RESPONSE TO PHOSPHORUS

Fertilizer Formulae	Rate per acre	Average Annual Crop Yields (per acre)			Average value of crop increase over cost of fertilizer
		Potatoes 1936-1945	Oats 1937-1945	Clover hay 1938-1945	
N-P-K	lb.	bushels	bushels	tons	$
4-0-10	1,000	191.4	49.8	2.13	37.10
4-4-10	1,000	212.5	47.3	1.97	41.77
4-8-10	1,000	222.6	52.0	2.15	50.69
4-12-10	1,000	234.7	51.3	2.22	55.68
Check (untreated)	.....	129.6	46.3	1.90	.....

Potassium

The greater part of the potassium (K) content of the soil is in the insoluble state and is not available to the plant. In the rotation involving potatoes a good response in the average yields of this crop has been shown from the application of muriate of potash in amounts up to 200 pounds of K_2O in a mixed fertilizer applied at the rate of 2000 pounds per acre. The yields of swedes and mangels showed a trend to increase as the rate of potash was increased up to approximately 67 pounds of K_2O per acre. This increase in yield occurred on plots which received a mixed fertilizer applied at the rate of 750 pounds per acre.

The yields of swedes and mangels on the plots receiving no superphosphate were considerably below those receiving no potash.

The yields and returns from the crops in the potato rotation, on plots which received various amounts of potash, are shown in Table 15:

TABLE 15.—CROP RESPONSE TO POTASH

Fertilizer Formulae	Rate per acre	Average Annual Crop Yields (per acre)			Average value of crop increase over cost of fertilizer
		Potatoes 1936-1945	Oats 1937-1945	Clover hay 1938-1945	
N-P-K	lb.	bushels	bushels	tons	$
4-8-0	1,000	151.2	50.5	1.89	5.64
4-8-4	2,000	238.8	51.7	2.06	50.18
4-8-7	2,000	246.8	54.1	2.10	51.91
4-8-10	2,000	271.5	51.6	2.17	69.57
4-8-13	2,000	264.0	52.7	2.17	62.99
Check (untreated)	.....	129.6	46.3	1.90	.....

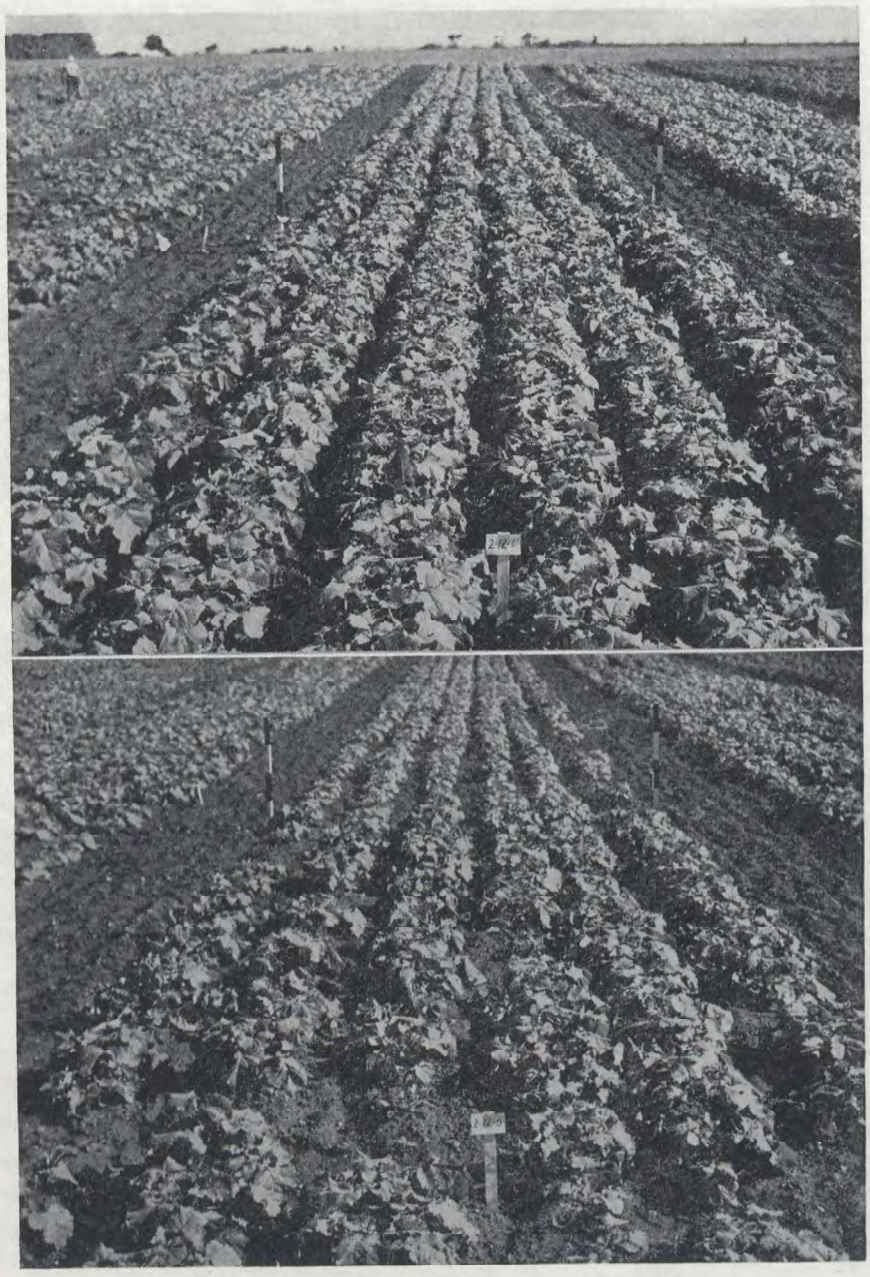

FIG. 10.—(*Upper*) Swede Crop—Muriate of potash applied.
(45 pounds K_2O per acre)

FIG. 11.—(*Lower*) Swede Crop—No potash applied.

RATE OF FERTILIZER APPLICATION

Several rates of application of a complete fertilizer were tested in each rotation, in order to obtain data on the rate of application which might be expected to show the most economical returns above the cost of the fertilizer materials applied. Twenty commercial fertilizer mixtures, and fertilizer and manure combinations, were compared in each of the two rotations involving swedes and mangels, and forty-four in the potato rotation. The treatments compared showed an increase in the value of the crop produced, above the cost of the materials, in practically every case. The highest average net value of the crops was shown when manure or manure and fertilizer combinations were used. When fertilizer alone was applied, the highest returns were obtained from the 2-12-6 fertilizer at the rate of 1000 pounds per acre in the swede rotation, and from the 2000-pound rate of the 4-8-10 fertilizer in the potato rotation.

The crop yields recorded for the plots which received an application of different rates of the same fertilizer and the increased value of the crops produced above the check or untreated plots, after deducting the cost of fertilizer, are shown in Table 16:

TABLE 16.—CROP RESPONSE FROM DIFFERENT RATES OF FERTILIZER

Fertilizer Formulae	Rate per acre	Average Annual Crop Yields (per acre)				Average value of crop increase over cost of fertilizer used per acre
		Swedes 1936-1945	Potatoes 1936-1945	Oats 1937-1945	Clover hay 1938-1945	
N-P-K	lb.	tons	bushels	bushels	tons	$
2-12-6	500	16.34	.....	41.9	1.74	5.56
2-12-6	1,000	19.66	.....	43.0	1.95	10.06
2-12-6	1,500	19.75	.....	45.1	2.02	7.10
Check (untreated)	.....	11.83	.....	39.4	1.72	.....
4-8-10	500	.....	185.0	50.8	1.95	29.67
4-8-10	1,000	.....	222.6	52.0	2.15	50.69
4-8-10	1,500	.....	251.7	53.0	2.21	65.44
4-8-10	2,000	.....	271.5	51.6	2.17	69.57
4-8-10	3,000	.....	269.4	58.9	2.19	61.16
Check (untreated)	.....	.....	129.6	46.3	1.90	.....

The yield of mangels has been low, particularly on the plots which have not received an application of manure. Even with manure applied the yields of this crop have not been as high as those recorded for swedes on the same field. However, the value of the crop produced was increased above the untreated plots after deducting the cost of the materials applied, in practically all the plots which received an application of a complete fertilizer.

MANURE

The average yields of clover and mangels were relatively higher on the plots which received an application of manure. In the swede and mangel rotations the average net value of the crops produced on the plots which received manure at the rate of 10 to 20 tons per acre was higher than that recorded for plots on which manure was not applied. The same trend is shown in the potato rotation when the manure was applied at the rate of 20 or 30 tons per acre.

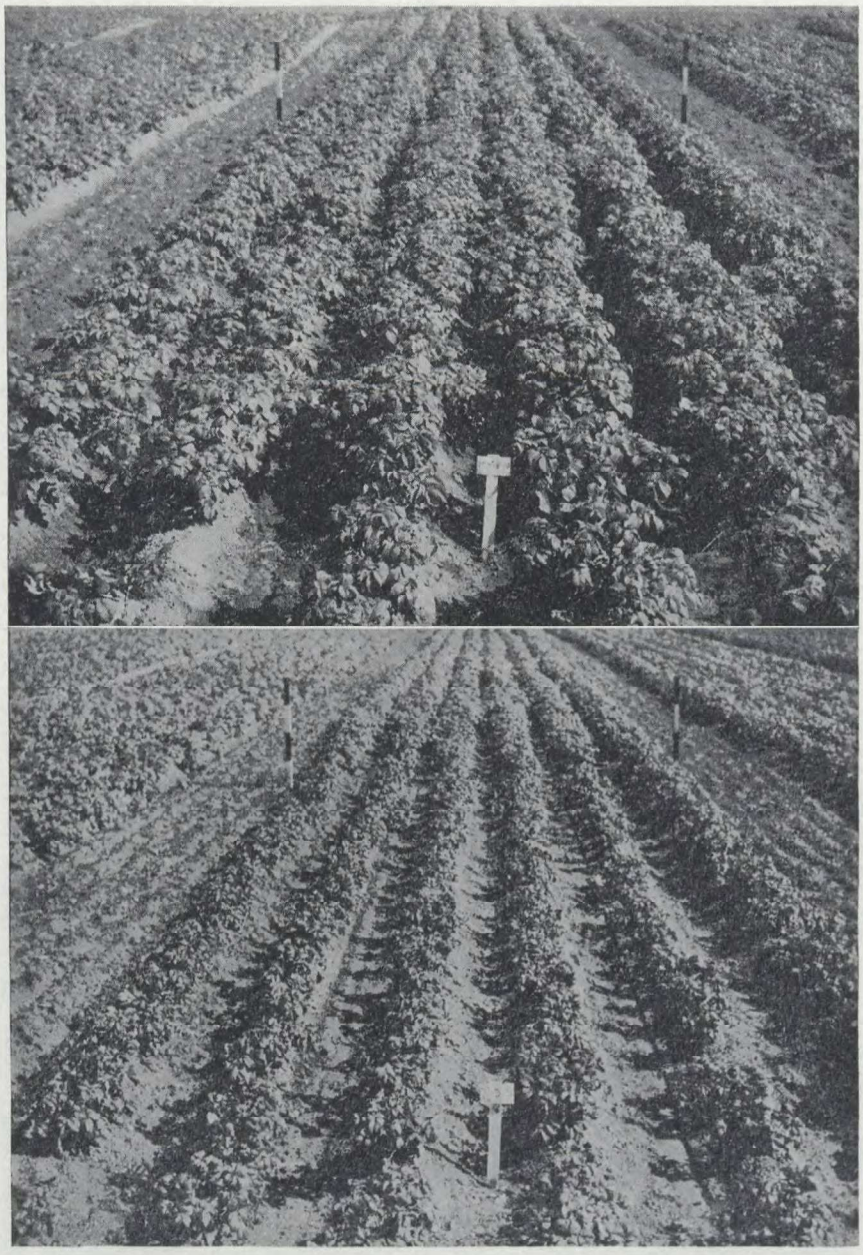

FIG. 12.—(*Upper*) Potato Crop—Manure and fertilizer applied.
(10 tons manure, ½ ton 4-8-10 per acre)

FIG. 13.—(*Lower*) Potato crop—No manure or fertilizer applied.

The yields and returns from the crops in the swede and potato rotations, on plots which received various amounts of manure and manure plus commercial fertilizer, are given in Table 17:

TABLE 17.—CROP RESPONSE TO MANURE ALONE AND WITH FERTILIZER

Material Applied	Rate per acre	Average Annual Crop Yields (per acre)				Average value of crop increase over cost of manure and fertilizer per acre $
		Swedes 1936-1945 tons	Potatoes 1936-1945 bushels	Oats 1937-1945 bushels	Clover hay 1938-1945 tons	
Manure	10 tons	16.40	.....	43.3	1.96	14.76
Manure	20 "	18.01	.....	49.0	2.20	24.88
Manure 2-12-6	10 " 500 lb.	18.80	.....	46.1	2.12	17.88
Check (No treatment)	.....	11.83	.....	39.4	1.72	.....
Manure	10 tons	.....	194.8	52.9	2.05	45.12
Manure	20 "	.....	240.4	53.9	2.34	77.20
Manure	30 "	.....	267.9	55.9	2.47	96.50
Manure 4-8-10	10 " 1,000 lb.	.....	262.1	55.1	2.26	78.41
Check (No treatment)	.....	.....	129.6	46.3	1.90	.....

Boron

Boron is concerned in the prevention of certain physiological disorders in plants, such as brown-heart in swedes, which can usually be materially lessened by the application of borax to the soil. In conjunction with the fertilizer experiments, borax, which contains 10 per cent of boron, was applied every third year, before the swede crop, on a group of randomized plots, at the rate of 10 pounds to the acre, until the year 1945. In the following year, this rate was increased to 20 pounds, as the previous rate of application failed to give the complete control which is now obtained at the higher rate of application. With the exception of the manured plots, the number of roots showing brown-heart, and the severity of the disorder in affected roots, appeared to increase with increase in yield on plots which did not receive an application of borax.

About 30 per cent of the roots in the check or untreated plots were affected with brown-heart as compared with 53 to 84 per cent on the fertilized plots without borax. The percentage of affected roots on the manured plots was only slightly above that recorded for the untreated plots.

Magnesium

Magnesium is a necessary constituent of plants but is usually available in sufficient quantities in most soils. However, some crops in certain districts benefit from the application of compounds containing magnesium. The effect of this element on the growth of potatoes, applied in the form of epsom salts, (magnesium sulphate), at the rate of 120 pounds per acre, was studied in this experiment. There has been no increase in the average yield of potatoes attributable to the application of magnesium, but considerable improvement in the cooking quality, and particularly in flavour, was observed in cooking tests.

Fertilizer on Soil Types

Differences in soil requirements among various soil types is now well recognized. A survey of the soil in Cumberland county, Nova Scotia, was recently completed

by the Nova Scotia Department of Agriculture, in co-operation with the Dominion Soil Survey, in which the soils were classified and mapped on the basis of certain characteristics expressed in the soil profile.

A study of five of the more important agricultural soil types classified in the survey was started in 1944. These experiments were designed to investigate possible differences in their response to mixed fertilizers and lime. The field tests are located on one or more farms on each of the following five soil types: Nappan, Pugwash, Tormentine, Acadia and Queens. Soils collected from the same areas on which the field tests are located were also used in greenhouse tests to compare the two methods as a means of determining soil needs.

FIG. 14.—Greenhouse pot tests in soil type fertility experiments.

In view of the importance of this problem, a summary of the results obtained thus far will be of interest even though the experiments have been in progress for a relatively short time.

Nitrogen at the rate of 20 pounds per acre showed a highly significant increase in the yield of oats on the five soil types in the greenhouse tests and on the Acadia and Queens soils in the field tests. There was a slight response to nitrogen by the oat crop on the Nappan, Pugwash and Tormentine soils, under field conditions. However, there was no response to nitrogen indicated in the yields of hay, following oats, on these three soil types.

Phosphorus applied in the form of superphosphate, at the rate of 60 pounds of P_2O_5 per acre, showed a significant increase in the yield of oats in the greenhouse tests on the Nappan, Tormentine, Acadia and Queens soils. The yield of oats was also higher, in the pots receiving phosphorus, in the Pugwash soil, but this increase was not as great as that recorded on the other four soil types. In the field experiments, oats showed a highly significant response to phosphorus on the Queens and Acadia soils, and a similar trend was indicated on the other three soil types. There were no apparent benefits from phosphorus indicated in the yields of hay in the Nappan, Pugwash and Tormentine soils.

Potassium—there was no definite response to muriate of potash when applied at a rate equivalent to 30 pounds of K_2O per acre on the crops or soils under test, except for a highly significant response on the yields of alfalfa in greenhouse experiments on the Pugwash soil.

Lime was applied as dolomitic ground limestone, at the rate of two tons per acre, before oats. There was a significant response to lime in the yield of oats in the field test, and of oats and alfalfa in the greenhouse tests on the Acadia soil, and in the yield of hay in field tests on the Pugwash soil. The hay yields were decreased significantly on the plots which received lime on the Tormentine soil.

A comparison of the response patterns of the soils studied in this experiment indicates that the effects of treatments vary considerably with the different soil types.

In general, the response to the various fertilizer materials, as measured in the greenhouse tests, was closely correlated to the response on the same treatments in the field tests on each soil type.

Rate and Place in Rotation to Apply Manure

Considerable interest is shown in the question of the rate and place in the rotation to apply manure in order to derive the greatest benefit from the available supply of this material.

A test was started in 1922, to compare three rates and three places of applying manure, in a four-year rotation of swedes, oats, clover and timothy. When manure was applied at the rate of 12, 16 and 20 tons per acre, before the swede crop, the average return value per acre per ton of manure applied was $2.87, $3.13 and $3.34 respectively. These values are based on the 23-year average increase, in the value of crops produced, above that produced on adjacent plot areas which did not receive an application of manure.

The yields of crops on plots which received an application of 16 tons of manure per acre on clover sod were compared with the yields of crops from plots receiving the same quantity of manure applied on timothy sod. A third series of plots in the same rotation received an application of 8 tons of manure on timothy sod and the same quantity on oat stubble. The latter group of plots showed a more even distribution of crop yields and a somewhat higher return value for the manure applied. The crops immediately following the application of manure responded more than subsequent crops.

Sydney Slag

Several by-products in the manufacture of steel at the Dominion Steel & Coal Corporation plant, Sydney, N.S., have been investigated as possible sources of phosphorus and lime in crop production. The response in crop yields from the application of steam granulated tapping slag, one of the by-products used in this experiment, compared favourably with equivalent quantities of lime and phosphoric acid applied in the form of ground limestone and superphosphate. Another by-product of the Sydney plant known as "blast lime" is still under investigation as a possible substitute for ground limestone in the correction of soil acidity.

Cultural Methods

There is still considerable difference of opinion among growers on certain practices such as the most satisfactory depth of ploughing, rates of seeding grain, and the most desirable sequence of crops in a rotation.

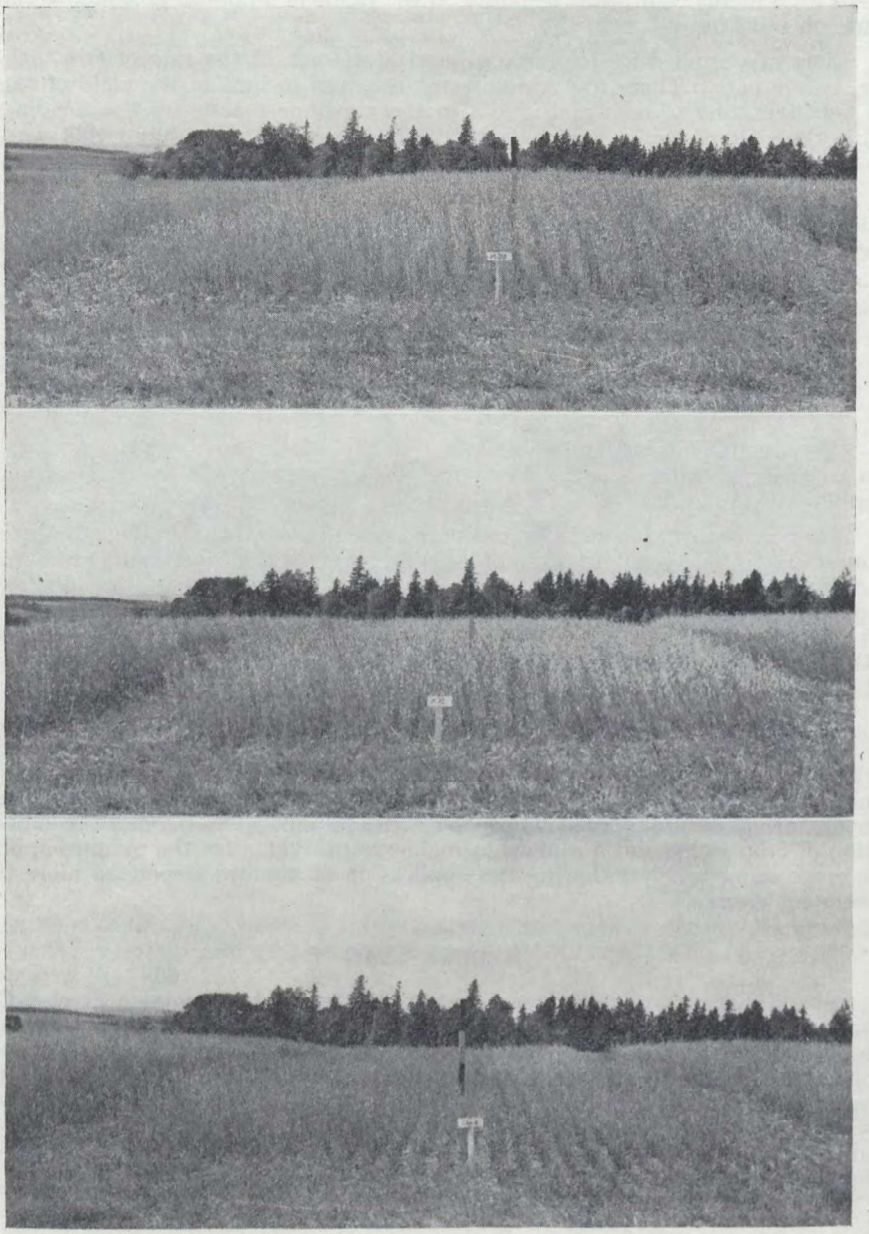

FIG. 15.—(*Top*) Oat crop 1946—20 tons manure applied per acre.
FIG. 16.—(*Middle*) Oat crop 1946—12 tons manure applied per acre.
FIG. 17.—(*Bottom*) Oat crop 1946—No manure or fertilizer applied.

Depth of Ploughing

A comparison of 3 to 5, 6 to 7, and 9 inch depths of ploughing timothy sod and oat stubble, before swedes, has been made during a period of twelve years. Each depth was compared on a clay loam soil, when fall ploughed and when ploughed in the spring, using a rotation of swedes, oats, clover, timothy and oats.

The average yields of swedes were slightly higher on plots which were ploughed to a depth of 3 to 5 inches; however, weed growth on these plots was much greater than on the plots which were ploughed to a greater depth. It was also observed that more time was required in shallow ploughing, a much narrower furrow being necessary in order to turn the sod properly. The average yields of grain were higher on the plots which were ploughed in the fall than those which were ploughed in spring regardless of the depth of ploughing.

Rates of Seeding Barley

A comparison of three rates of seeding barley as a companion crop in a four-year rotation was started in 1938. Barley was seeded at the rate of 1½, 2¼ and 3 bushels per acre. According to the average yields of barley, clover and timothy recorded over a period of eight years, there was no advantage in seeding barley on a clay loam soil at a rate above the lowest rate of seeding used in this experiment.

Marshland Improvement

Considerable study has been given to practical methods which may be used in increasing the yield and improving the quality of crops grown on a typical marshland area.

Between the years 1922 and 1931 several marshland flats, of approximately one acre each, were laid out as experiments to measure the response of swedes, grain and hay crops to various commercial fertilizers, manure and lime. These tests were conducted in three, four and eight year rotations and on permanent hay areas. The response to the materials used in these experiments is indicated by the crop yield data shown in Table 18, which were recorded in an experiment on a three-year rotation of oats, and two years of hay. These flats were first ploughed and seeded to oats and hay seed mixture 24 years ago. The fertilizer materials were first applied at this time and several applications were made in subsequent years at the time of seeding. The entire area is well drained.

TABLE 18.—CROP YIELDS ON MARSHLAND

Material Applied	Rate of application	Number of applications	Oats		Hay	
			Number of crop years	Yield	Number of crop years	Yield
	lb.			bushels		tons
Wood ashes	1,400	3	6	39	18	2.5
Basic slag	1,000	5	6	45	18	2.8
Limestone	5,000	5	6	45	18	2.8
Limestone	3,000	5	6	46	18	2.7
Check	.....	.....	6	30	18	1.9

The crop yields in these experiments have shown that drainage, ground limestone, commercial fertilizers, manure and frequent ploughing and seeding have substantially increased the average yields of the crops grown on these areas, and very materially improved the quality of the hay crop above that produced on adjacent unimproved areas.

The soil types found on these dykelands are classed among the most fertile soils in Canada. These dykelands were gradually formed as sediment from the water of receding tides of the Bay of Fundy. They have given good yields of hay for over one hundred years, without an application of manure or fertilizer, on areas properly dyked and drained.

The 60 to 70 thousand acres of dykelands represent an investment of many millions of dollars, much of which has been in the form of heavy labour. The spading of dykeland mud requires skilled labour to do the work efficiently.

Forty years ago these lands sold at $150.00 to $200.00 per acre. However, in their present poor condition, much of the land of these areas is now worth very little, because of the bad condition of dykes and aboiteaux.

There are many reasons for this; these structures date back many years. The causes and effects of the bad condition are well known to the landowners. Therefore, no useful purpose can be served in reviewing them in detail here. It is enough to state that the loss of these lands to the agricultural industry of the Maritimes is significantly great. The major factor that has hampered the proper maintenance of these dykelands has been labour. The loss of skilled dykemen by removal to other occupations, has been continual for over a quarter of a century. Furthermore, during World War I and World War II, landowners found it impossible to obtain any kind of labour, to work on dykelands, skilled or unskilled. Consequently, the necessary reinforcing and repair work was left undone. The results have been that the sods, earth, brush and breakwaters have become rotten, weak and worn out—an easy prey to high tides, especially when they are accompanied by storms and heavy seas.

FIG. 18.—The spading of dykeland mud requires skilled labour.

FIG. 19.—Tide has broken through dyke. Note the deep gully cut by receding tides. These gullies may run from 10 to 15 feet in depth.

During the past ten or fifteen years the loss caused by the breaking of dykes and aboiteaux has been extremely heavy. It has not been confined to just the cost of rebuilding the dykes and aboiteaux. The loss in crops, bridges, highways and buildings would run into thousands of dollars. These losses have placed a tremendous burden on the landowners; in fact, more than the average landowner could bear. Following a careful study of prevailing conditions, it was recommended that the Dominion Government should co-operate with the Provincial Governments to assist the landowners in protecting these areas from further loss of crops and land.

An agreement was reached late in 1943 whereby the Dominion and the Provincial Governments and the landowner would each assume one-third of the cost of all emergency repair work. The main objective was to conserve feed for livestock and, in addition, to record data on the use and cost of the different types and makes of machines for the construction of dykes and aboiteaux.

Late in the fall of 1943, a survey of some 5,500 acres of dykeland, in the Amherst and Aulac districts, was made. Contouring was done to 1-foot intervals and plans drawn 1-inch to 400 feet. This survey did not show property lines. For a complete survey, property lines should be shown. The cost of control ranged from $0.18 to $0.20 per acre; plane tabling cost $0.15 to $0.18 and office work $0.05 per acre, or an average total of $0.45 per acre. A survey was made of all work projects carried out from 1943 to 1947.

The cubic yards of earth and brush were recorded for each work project and the cost per cubic yard in place was calculated and these data are on file in the office of the Dominion Experimental Farm, Nappan, N.S.

During 1946, a reconnaisance survey was made of some 26 miles of dykes and aboiteaux in Nova Scotia and 21 miles in New Brunswick, the object being to

determine the average repairs necessary per mile of dyke. The cost of the survey, (with inexperienced help), was $40 per mile, or an average of $0.28 per acre of land protected.

This survey revealed that 75 per cent of the average dyke would pass as reasonably safe, 18 per cent required heavy reinforcing and 7 per cent required a new dyke immediately. These results are based on previous standards. Under present-day standards, not more than 25 per cent of the dyke could be considered safe, 50 per cent should be heavily reinforced and 25 per cent requires a new dyke. The previous standard for handbuilt dykes was a 12 to 15 foot base, 5 to 10 feet high and a 2 foot top. The standard recommended for machine-constructed dykes is a 30 to 40 foot base, 6 to 10 feet high and a 4 foot top. The sea side slope should be 2/1, with borrow pit not less than 150 feet from the base of the dyke.

In 1944, when the repair work began, very few machines were available. In fact, one ¾ cubic yard dragline and two D-4 bulldozers were the only machines obtainable.

There were 80 work projects carried out in Nova Scotia from 1944 to 1947. Of these, Canning aboiteau was treated as a special case. The balance was on the ⅓ payment basis. The 79 projects covered a distance of 81,700 feet of dyke and aboiteaux, and required a fill of 225,100 cubic yards of earth and brush in place. (This includes reinforcing work as well as new dyke construction). The gross cost was $220,633.71, or an average of $0.87 per cubic yard, or $7.05 per acre, of land protected.

The Canning aboiteau is one of the largest ever built in Eastern Canada and one of the first to have the sluice built on piling. The sluice is 120 feet long, with three waterways, 3 feet by 5 feet each, inside measurements, and it required approximately 50 thousand feet of hardwood timber to construct the sluice. The

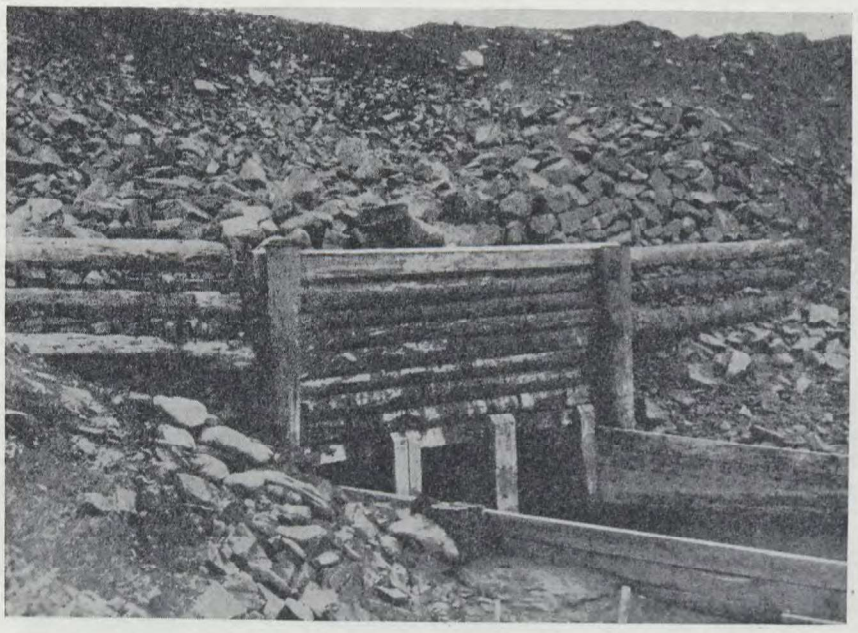

FIG. 20.—A well-built sluiceway. It has 3 spillways 3 by 5 feet inside measurements, with brass gates.

FIG. 21.—Protecting the dyke with brush mats staked down. Brush mats prevent cutting away of banks.

fill required 72,400 cubic feet of rock, earth and brush. The total cost of construction was $234,631.93 or $3.24 per cubic yard of fill, including sluice.

There were 50 work projects carried out in New Brunswick during the same period. These covered a distance of 62,700 feet of dykes and aboiteaux. The quantity of fill required was 134,500 cubic yards of earth and brush. The total cost was $137,206.01, or an average cost of $0.95 per cubic yard of fill in place, or $5.52 per acre of land protected.

The total of the dykes, aboiteaux and drainage canals constructed in the two provinces was 145,800 lineal feet, (27.6 miles), of dykes, aboiteaux and drainage canals. This included a drainage canal 11,643 feet in length. The volume of excavation (canal) was 32,135 cubic yards at an average cost of $0.30 per cubic yard.

The construction of two aboiteaux was not completed within this period, namely, the Hogan aboiteau at Belleisle, Nova Scotia and Harvey Bank, Harvey, Albert county, New Brunswick.

The traditional method of building dykes and aboiteaux was by hand with the aid of ox and horse team labour. The dykes built with a sod face had a high degree of resistance to waves and erosion, but once the sods were broken, the waves quickly wore a hole through the earth fill.

Prior to 1944, no data were available on the cost of machine-built dykes, with the exception of one pioneer undertaking carried out by the Grand Pré Body, N.S. This Body built about 1,600 feet of good dyke with a ¾ cubic yard dragline. Since 1944, the dragline and bulldozer have been used on all major construction work on dykes and aboiteaux. The bulldozer did excellent work on firm soil, but was not efficient on very soft ground. The average unit cost per cubic yard of earth moved by bulldozer was $0.28, (range $0.15 to $0.80); for dragline $0.50 per cubic yard, (with a range of $0.17 to $1.09), on dyke work. The bulldozer has an advantage over the dragline on firm soil, but this is not so on soft ground. By using mats,

the dragline can be used on very soft land. The main objection to dragline work is that it leaves the borrow pit too close to the base of the dyke. When bulldozers are used the borrow pit need not be nearer than 150 feet to the base of the dyke. The data collected indicated that it is not economical to move earth by bulldozer more than 200 to 250 feet. Both the bulldozer and the dragline have a place in dyke construction and may be used economically. The real efficiency of either of these machines depends largely on the ability of the operator. Under a good operator, it is possible to double the cubic yards handled per operating hour. Like skilled dykemen, skilled operators are difficult to locate. This shortage of skilled operators made it more difficult to obtain fair comparisons between types of machines working under similar conditions. Nevertheless, valuable data have been compiled that should serve as a very useful guide in any future work to be undertaken.

The unit cost was high, in most of the emergency work carried out, mainly for the following reasons:

(1) Shortage of good machines, (bulldozers or draglines).

(2) Shortage of experienced operators.

(3) Rental charges were at their peak.

(4) Frequent long moves of heavy machines were necessary.

(5) Loss of time caused by high tides and storms.

(6) Low weight capacity of highway bridges, necessitating long, roundabout transportation moves by train.

(7) Lateness of season in which the major part of the emergency work had to be undertaken.

(8) About 50 per cent of the work had to be done on badly flooded areas.

(9) The scarcity of skilled foremen for aboiteau construction. Very few skilled men under sixty-five years of age were available.

For small jobs, on firm ground, a bulldozer of about the size of a D-4 can do an excellent job economically. For medium-size construction projects, on very soft ground, a ⅜ or ½ yard dragline is preferable. On dykeland that has been out to tide, yet reasonably firm, a ¾ or ⅞ cubic yard dragline is suitable. For large work projects, with reasonably fair ground conditions, a 1 to 1¼ cubic yard machine will probably put the earth in at a lower cost. To date, no satisfactory methods have been found to place the mud on the brush filler in medium to large size aboiteaux.

Further studies on machinery are needed before definite recommendations can be made. These studies are being continued at the Dominion Experimental Farm, Nappan, N.S.

Pasture Investigations

Pasture herbage is an ideal food for livestock and is usually the cheapest feed which can be raised on the farm. The economic possibilities in pasture improvement in Nova Scotia are indicated in the total estimated pasture acreage in the province, which, according to the 1941 census of Canada, exceeds 900,000 acres. Much of this large area is now unproductive.

In order to study the possibility of improving permanent pasture without ploughing, several fertilizer materials, including superphosphate, with and without potash, were applied in one and two acre pasture fields, which were in sod for a long time prior to the start of this experiment in 1937. The fertilizers were applied broadcast, by hand, or by a fertilizer spreader. The response to the various fertilizers was measured by the live weight gains of dairy heifers and in the yields of herbage

FIG. 22—(*Upper Left*) The construction of dykes by hand is slow, laborious work, requiring stamina and skill. When properly built they will withstand heavy seas.
FIG. 23.—(*Upper Right*) A bulldozer at work building dykes. On firm soil they are efficient and economical, leaving no undesirable borrow pit near base of dyke.
FIG. 24.—(*Lower Left*) Back hoe reinforcing dykes. Note borrow pit too close to base of dyke.
FIG. 25.—(*Lower Right*) Dragline in action at dyke construction. Borrow pit not as close to base of dyke as back hoe, yet too close for good construction.

produced on protected areas in each field. These data were compared with similar data recorded on an adjacent area which was untreated in respect to fertilizer. These data are summarized in Table 19:

TABLE 19.—RESPONSE TO FERTILIZERS ON PERMANENT PASTURE

Treatment—per acre applied every third year	Average live weight gain of Dairy Heifers grazing 130 days (lb. per acre)	Average yield of herbage—dry matter (lb. per acre)
Superphosphate 480 lb..... Potash—83 lb.....	447	4,591
Superphosphate 480 lb.....	338	3,589
Check (no fertilizer).....	227	2,691

The field which received an application of superphosphate and potash showed an average increase, above the check field, of 220 pounds per acre in the live weight gain of dairy heifers, each season. The same trend is apparent in the yield of herbage. However, in this latter record no account is taken of the very considerable improvement in the quality of the pasturage which was evident on the treated areas.

Cost of Producing Farm Crops

Data on the cost of producing farm crops are useful in a study of the ways of reducing the cost of production and in determining the most profitable crops. Most of the data recorded in this study were obtained on a forty-acre area of upland clay loam soil in a five-year rotation. The average cost per acre of producing grain, root and hay crops on this area, during the 25-year period 1922-1946 inclusive, is shown in Table 20:

TABLE 20.—COST OF PRODUCING FARM CROPS PER ACRE
(Average 1922 to 1946 inclusive)

——	Oats	Barley	Mixed grain	Corn silage	Swedes	Clover hay	Timothy hay
Number of years grown.....	25	25	24	24	25	25	23
Rent and taxes.....$	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Manure, fertilizer and lime...$	7.86	9.67	6.49	13.77	14.53	8.88	4.94
Seed.....$	3.01	2.97	3.72	1.90	1.83	1.83	1.80
Use of machinery.....$	2.85	2.85	2.85	5.10	2.85	2.85	2.85
Twine.....$	0.37	0.30	0.37	0.32	.....	.....	.....
Manual labour.....$	5.25	4.42	4.79	26.70	43.66	5.40	4.82
Horse labour.....$	1.25	1.05	1.14	3.96	4.67	0.83	0.75
Tractor labour.....$	1.73	1.17	1.99	5.01	3.63	0.11	0.23
Threshing.....$	2.10	1.44	2.19	.....	.....	.....	.....
Total cost per acre.....$	28.42	27.87	27.54	60.76	75.17	23.90	19.39
Yield per acre bushels or tons.	52.5	30.4	44.7	12.55	16.43	2.32	2.51
Yield per acre—straw tons....	0.98	0.77	0.98	.....	.....	.....	.....
Value per acre.....$	32.15	26.25	35.40	40.60	31.59	23.95	25.87
Value per acre—straw.....$	3.62	2.80	3.51	.....	.....	.....	.....
Total value per acre.....$	35.77	29.05	38.91	40.60	31.59	23.95	25.87
Profit or loss per acre.....$	7.35	1.18	11.37	-20.16	-43.58	0.05	6.48
Cost per ton or bushel (considering value of straw)....$	0.49	0.83	0.56	4.84	4.58	10.30	7.73
Average return value per ton or bushel.....$	0.61	0.86	0.78	3.24	1.92	10.32	10.31

Examination of the data in the above table shows the relatively high cost of producing swedes and corn silage. These cost data are based on the quantity of crop harvested and do not take into consideration the losses which occur in these crops during storage.

Weeds and 2, 4-D

Weeds are one of the principal obstacles to profitable crop production. In recent years, experimental data have been accumulated on the use of the chemical 2, 4-D in the destruction of the more common weeds in the area. Each of the three main groups of 2, 4-D compounds: (1) sodium salts of 2, 4-D; (2) amine salts of 2, 4-D, and (3) ester of 2, 4-D were compared when sprayed at various rates on hay, lawn and pasture areas which were heavily infested with one or several weeds.

The 2, 4-D brands which are available contain various percentages of the effective 2, 4-D compound. In these experiments the materials were applied in one application during the last week in June at rates of 1, 1.9, 2.1 and 2.9 pounds of 2, 4-D acid equivalent per acre. There is considerable difference in potency among the three main groups of the 2, 4-D compounds. The esters are the most powerful and these compounds act very quickly, whereas the sodium salts are the least powerful and act quite slowly. In the control of weeds in a crop it is important to avoid the use of too large quantities of the potent brands of 2, 4-D because of the danger of possible injury to the crop.

In this study a satisfactory control of buttercup, dandelion, plantain, burdock, ox-eye daisy, Canada thistle and yellow goat's beard was obtained on pasture sprayed with 1.9 pounds of acid equivalent per acre. The one-pound rate of application was considerably less effective than the higher rates of application.

Fig. 26.—2,4-D Applied on lawn weeds.
Left—treated.
Right—not treated.

A fair control of king devil was obtained in pastures using 1.9 pounds of acid per acre, but a more effective destruction of this weed was obtained when the pure acid was applied at the rate of 2.9 pounds per acre.

Willow, wire birch, lambskill, rhodora and blueberry were killed in pasture areas sprayed with ester of 2, 4-D at the rate of 2.1 and 2.9 pounds of acid per acre. There was no damage observed on the ferns present in these areas. The amine salts of 2, 4-D applied at the rate of 2.9 pounds of pure acid per acre showed a good kill of king devil, yarrow, vetch and sowthistle.

On the control of susceptible annual weeds in grain crops it is recommended this compound be applied at approximately one-quarter pound of 2, 4-D acid per acre when the grain is from 6 to 8 inches in height. Young clover may be damaged by the use of these compounds when they are applied in excess of the minimum necessary to kill the most susceptible annual weeds. This compound is therefore not generally recommended for the spraying of grain fields seeded down to grass and clover until more information is available on its use under such conditions.

FORAGE CROPS

Forage crops, insofar as this report is concerned, includes all of those crops which are grown primarily as food for livestock and of which the animals consume all or most of the herbage or roots, or both.

ENSILAGE CROPS

The development of early maturing types of hybrid corn and the desire for more satisfactory methods of handling grass and clover during poor hay-curing years have aroused considerable interest in ensiled products.

CORN FOR ENSILAGE

Corn is profitably grown for ensilage purposes where yields of ten tons per acre or more can be secured. The most satisfactory corn ensilage, from the standpoint of nutritional value, keeping quality and palatability, is obtained by ensiling the crop when the kernels are in the "early" or "medium dough" stage. While the earlier maturing varieties and hybrids are usually lower in yield than those of later maturity, it is better to sacrifice some bulk in order to obtain proper maturity.

There are hundreds of different corn hybrids available. These range in maturity from 85-day types to 200-day types. It is very important that the grower obtain the most suitable hybrid for his locality. There are many more hybrids available which are unsatisfactory for conditions in Nova Scotia than there are satisfactory ones. For example, there is considerable difference between Canada 355 and Pioneer 355.

HYBRIDS

Before purchasing hybrid corn seed, growers would be well advised to contact their Experimental Farm or Agricultural College relative to the most promising hybrid for their area.

Average yield data of Nappan and Windsor, N.S., tests collected from 1945 to 1947 inclusive, are presented in Table 21:

TABLE 21.—AVERAGE YIELD OF CORN HYBRIDS FOR ENSILAGE AT TWO LOCATIONS (1945-1947)

Hybrid	Average Yield per acre (tons)				Maturity preference
	Nappan		Windsor		
	Green Wt.	Dry Matter	Green Wt.	Dry Matter	
Pioneer 355	18.65	2.93	12.52	2.30	5th
De Kalb 65	18.45	2.80	14.20	2.45	4th
Funks G 184	17.62	2.78	13.06	2.29	2nd
Algonquin	17.51	2.77	9.99	1.78	3rd
Canada 240	13.81	2.43	8.44	1.79	1st

COMMERCIAL VARIETIES

Longfellow has been the most consistent good yielding open-pollinated variety.

SUNFLOWERS FOR ENSILAGE

No ensilage experiments have been conducted with this crop during the period covered by this report.

While sunflowers are not so palatable nor so nutritious as properly matured corn, and while they lodge and break badly in wind storms, a good yielding, properly matured crop can usually be obtained where this is not possible with corn.

Mammoth Russian is recommended as the most suitable sunflower variety for ensilage purposes.

Grass and Clover Silage

The frequency of poor hay-curing years has been largely responsible for a revived interest in ensiling grass and clover. Best results have been obtained when the material is put in the silo at approximately 63 to 68 per cent moisture. Experience has shown that this condition is reached when the cut clover has wilted but no actual drying has occurred.

While no experiments with grass and clover silage have been conducted at this Farm, the above are well established facts and they are included in this report to inform those who may be interested.

Early Maturing Corn for Grain

No varieties or hybrids have been found which are considered suitable for grain production in this province. Ensilage tests at Windsor, N.S., show that, in that district, Canada 240 will reach grain maturity in some years.

Root Crops

Even though climatic conditions in Nova Scotia are well suited to root crop production, there is a definite decrease in the acreage devoted to this purpose.

Approximately 11,000 acres are grown annually. The reason for the decrease in acreage grown is the high cost of hand labour and the damage caused by clubroot. Should corn silage and grass-clover silage become more widely used, further decreases in the acreage devoted to root crops will probably occur.

Experiments at this Farm have shown that it costs approximately two and one half times as much to produce a ton of digestible nutrients from a root crop as from a hay crop.

In spite of the above facts, roots are valuable, not only as a stock and table food, but, also, their cultivation assists in keeping land in good condition and aids in weed eradication.

Swedes

By far the greatest root acreage in the province is devoted to the swede crop. Globe, flat, ovoid (oval) and tankard types are available. These are subdivided as to skin colour: purple, bronze and green. Gradations between these colours frequently occur.

Points which a grower should consider before choosing a variety are: yield of dry matter per acre, keeping quality, whether the crop is to be used for table purposes or as a stock feed, or both, and whether or not a clubroot-resistant variety is required.

Varieties

Hall's Westbury, Acadia and Ditmars Bronze Top, are usually very satisfactory from a yield standpoint *when clubroot is not a factor.* The first two are purple top varieties and are recommended for stock feed. Ditmars Bronze Top produces a fair quantity of roots suitable for table stock. Laurentian, another purple top variety which is susceptible to clubroot, is recommended particularly for table purposes.

Clubroot Resistant Swedes

Of the factors causing reduced swede acreage in the province, the clubroot organism is second only to the expense and shortage of hand labour.

Clubroot is a soil-borne organism which is capable of surviving for many years in infested fields. When the disease is well established and conditions are suitable for its survival, a field may be useless for swede production for more than seven years. Therefore, a short crop rotation is not an effective method of control.

The organism may be spread from field to field or from farm to farm in many ways. Diseased roots should be boiled before they are fed to stock in order to prevent contamination of manure. Contaminated soil on harrows or other farm implements carries the disease. Stecklings (seed-roots) should be carefully inspected for the typical clubroot clubs or nodules, prior to storage. In many cases, soft rot produces a secondary infection in the clubrooted areas. Roots showing these symptoms should be treated with similar caution.

Acid soils favour the development of clubroot and in many cases liming has considerably reduced the amount of disease.

Growing resistant varieties is the most satisfactory method of control. It should be noted, however, that resistance and not immunity is claimed for any variety recommended. Some roots are likely to be infected and, for this reason, the above precautionary cultural methods should also be practised.

While varieties may differ in their degree of resistance at different locations, the variety Wilhelmsburger is best suited to most clubroot areas. This globe-shaped, green-topped variety has somewhat better yielding ability than the various strains of clubroot-resistant Bangholm which were prevalent on the market several years ago.

In order that a uniform seed supply may be available to the producers, the Experimental Farm and a selected group of growers in the vicinity of Nappan are producing a highly resistant strain of Wilhelmsburger in commercial quantities. Through a new selection program, it is hoped to further improve the quality, yield and clubroot-resistance of this variety.

Comparable average yield data of six annual tests are presented in Table 22:

TABLE 22.—AVERAGE YIELD OF FIVE SWEDE VARIETIES (1938-1943*)
Six years

Variety	Average Yield per Acre (tons)	
	Green	Dry Matter
Hall's Westbury	30.55	3.14
Acadia	28.39	2.93
Ditmars Bronze Top	28.87	2.86
Laurentian	28.76	2.67
Wilhelmsburger	28.61	2.87

* 1943 crop omitted.

Clubroot-Resistance Swede Breeding Program

The selection of resistant roots from existing commercial varieties of swedes was a successful start in attempting to solve the clubroot problem. However, this method has not produced strains which yield as well as the better susceptible varieties, when the latter are grown on disease-free soil. Also, a higher degree of resistance than that available in Wilhelmsburger or Bangholm would be of great economic value.

For these reasons, an extensive plant breeding program was initiated in 1944. Progress has been excellent and several promising lines are now on hand.

Brown-Heart of Swedes

Roots with brown-heart are rejected as table stock and their livestock feeding value is lower than that of healthy roots.

Broadcasting 15 to 20 pounds of borax per acre on soil which is not high in lime content will usually effect satisfactory control of this deficiency disease. When applied directly to the row 10 pounds of borax applied per acre has been effective.

On soils which are high in lime content, spraying the plants with a special boron salt mixture is most satisfactory. Where this treatment is necessary, growers are advised to contact their experimental farm or agricultural college for instructions.

Swede Seed Production

A test was conducted in 1946 to study the most satisfactory method of producing swede seed.

Small, medium and large stecklings were spaced at 1, 2 and 3 feet within the rows. Rows were three feet apart. The small roots were obtained from an unthinned crop.

Results were very definitely in favour of the larger roots, spaced one foot apart within the rows. Not only in this case were yields higher but also weed growth was much less. Since the closely-spaced roots supported each other, the crop was harvested with more ease.

The data for this test are presented in Table 23:

TABLE 23.—SIZE AND SPACING OF SWEDE ROOTS IN RELATION TO SEED PRODUCTION (1946)

Root Size	Root spacing within row	Seed yield
	feet	lb. per acre
Large	1	506
"	2	379
"	3	274
Medium	1	421
"	2	314
"	3	193
Small	1	207
"	2	184
"	3	83

Mangels

There are six types of mangels: long, half-long, intermediate, tankard, ovoid (oval) and globe. These are subdivided according to skin colour, such as: red, white, green, and various shades of yellow and rose. The rose types are rather variable and usually grow deep in the ground and are difficult to pull.

Half-long and intermediate types have shown general superiority from the standpoints of uniformity and yield. Since they are more easily pulled than the long type, less breakage occurs and better storage results.

The shallow-rooted types, represented by the globes and tankards, may be more satisfactory on shallow soils. Of the two, tankards have given the best results under these conditions.

Varietal trials were concluded in 1943 because sufficient information had been collected on the existing varieties.

Frontenac, a yellow intermediate type, has proved to be the outstanding variety. It has a high degree of uniformity and a high dry-matter content.

Tip-Top, also a yellow intermediate type, is high yielding. In recent years it has shown a lack of uniformity.

Prince, an intermediate-to-long type with green skin and white flesh, produces a large quantity of green material but is low in dry matter and lacks uniformity.

Yellow Intermediate has reddish yellow skin and white to cream flesh. It is fair in yielding ability and has good uniformity.

FLESHY ANNUALS

Four varieties of kale and one variety of rape were tested for five years. These crops are used chiefly for fall finishing of lambs and for hog pasture.

Dwarf Essex rape was the highest in green and dry matter yield. Green and Purple Marrow Stem kales were more productive than Thousand Headed and Sheep kale.

The average data for these tests are presented in Table 24.

TABLE 24.—AVERAGE YIELD OF FIVE FLESHY ANNUALS (1934-38) FIVE YEARS

Variety	Average Yield per Acre (tons)	
	Green	Dry Matter
Dwarf Essex Rape	17.42	2.39
Green Marrow Stem Kale	15.31	2.11
Purple Marrow Stem Kale	14.50	2.04
Thousand Headed Kale	10.55	1.66
Sheep Kale	8.92	1.20

ANNUAL CROPS FOR HAY

Annual crops were tested from 1927 to 1941 to determine their suitability for hay production. Such crops are seeded and harvested in one season and, in addition to being used for hay, they may be used as soiling crops (green feed) or as annual pastures.

No crop proved as satisfactory as oats sown alone or in combination with peas and common vetch. All of these yielded more than three tons of hay per acre. Oats seeded alone slightly outyielded the combinations.

The rates used were as follows:

Banner oats (3 bushels)
Banner oats (2 bushels); Chancellor peas (1 bushel).
Banner oats (2 bushels); Chancellor peas (¾ bushel).
Common Vetch (¼ bushel).

While other varieties were not tested, satisfactory substitutions may be made. For hay, the combination should involve varieties which can be harvested when the oat kernels are in the dough stage and the pea pods are about half developed.

Millets, Sudan grass, Early Amber cane sorghum and soybeans, did not compete successfully with weeds. Japanese and Siberian millets, at 25 pounds per acre, followed the oats and oats, peas and vetch mixtures in productivity. Japanese Millet produces a coarse, poor quality hay.

HAY AND PASTURE.

The cultivated hay acreage of Nova Scotia occupies approximately seventy-five per cent of the area devoted to field crops. Further, hay will produce a ton of digestible nutrients for less than one-half the cost required to produce the same quantity of these nutrients from oats, barley or swedes. These facts are sufficient to emphasize the importance of hay to the growers of this province.

Two important points are frequently overlooked in hay production. These are the seed mixture used and the time of harvest.

Dairy and beef cattle are the chief consumers of hay. They require large amounts of protein for growth and milk production. Experiments at many institutions have proved that the protein content of grasses is highest just prior to flowering. Clovers and alfalfa are recommended for harvest when approximately ten per cent of the flowers are in bloom. Harvesting at this early stage naturally means that the total yield will not be as great as if the crop were harvested later. However, this loss in bulk is not indicative of a loss in total food value. It is now known that as plant maturity progresses a greater amount of the woody substance, called lignin, may encase valuable digestible nutrients, thus rendering them unavailable to animals.

In general, mixtures of grass and clover or alfalfa should be harvested just prior to the flowering of the grasses. Over-mature grasses will result in greater losses than under-mature legumes.

A common practice is to harvest hay from the grass-clover mixture for one or two years and to pasture the crop for the following one or two years. While no one mixture is suited to all conditions, the following basic mixtures are recommended when this system is used, or where the crop is to be used solely for hay:—

1. Where alfalfa is adopted, 8 pounds of timothy seed per acre, 6 pounds of red clover, 4 pounds of alfalfa, and 2 pounds of alsike are recommended.

2. Where alfalfa is not adapted, 8 pounds of timothy seed per acre, 8 pounds of red clover, and 3 pounds of alsike are recommended.

On damp soils 2 pounds of red top are frequently substituted for two pounds of timothy.

If the mixtures are to be pastured for several years after hay cropping, an early stand of the volunteer "bottom" species will often be advantageous. This can be done by adding the following to the above mixtures:—

Kentucky blue grass—3 pounds per acre.

White Dutch or wild white clover—1 pound per acre.

Variety and strain tests of the more valuable grasses and legumes have been conducted at various intervals. A considerable amount of information has been gathered regarding the general adaptability of various crops and varieties.

TIMOTHY

Timothy is the most valuable grass component of seed mixtures for this province and with very few exceptions it should be included in every hay and pasture mixture.

Several varieties have proved superior to common timothy in leafiness and disease resistance; their yields have been at least as good. Medon, Milton, Boon, Drummond, Huron, Swallow and Svalof M.C. have all performed well.

Marshland hay, which is generally harvested after the upland crop, is usually past the proper stage of maturity when cut. At time of writing, a breeding program

is in progress with the object of developing late maturing strains which would overcome this difficulty and also be of use to those growing large upland acreages.

Brome

Brome, a grass used extensively for hay and pasture in Western Canada, has recently become of considerable interest in the eastern provinces. It is hardy, drought resistant, highly nutritious and is relished by all types of livestock.

Excellent stands of a brome-alfalfa mixture have been obtained at this Farm by rolling the ground before seeding, mixing the brome grass seed with grain in the grain box and setting the seed drill so that the brome was not covered by more than one inch of soil.

Tests indicate a slight superiority of the Parkland strain over the common brome.

Alfalfa

Alfalfa is not a successful crop on damp or acid soils and its use is, therefore, limited in the province. A plant selection program has recently been started with the object of obtaining lines which are adapted to Nova Scotia conditions.

The varieties, Grimm, Ladak and Ontario Variegated have given the best results in tests conducted during the past years. Cossack, one of the more hardy varieties, was tested for three years only, but performed well.

Red Clover

Experiments at this farm with red clover showed that seed imported from southern sources was not sufficiently hardy for Nova Scotia winter conditions. Canadian grown seed should be purchased.

Single-cut types are more generally suited to this province. Of these, Mammoth Late red clover and Altaswede have given the best results.

Ottawa red clover, a double-cut strain, has not outyielded the common commercial crop, another double-cut type; however, it does produce a higher quality hay.

White Clover

Although white clover usually seeds itself naturally on closely grazed pastures of this province, it is often wise to add at least one pound of the seed to mixtures, particularly when the crop is to be pastured for more than one or two years.

Morso, a Danish strain, was the most hardy and productive in tests conducted in this area.

Ladino, a mammoth type of white clover, is not so hardy as common white Dutch, but with careful management, and where rainfall is plentiful, it yields very well. Ladino is very responsive to lime applications and should not be too closely grazed in the fall.

Soybeans for Seed

Of the numerous varieties and strains tested, Manitoba Brown has the most satisfactory maturity and is a good yielder. Most of the higher yielding varieties, such as Mandarin and Kabott, are in danger of being frozen while immature in most years.

Sugar Beet Seed Production

Tests were conducted in 1941, 1942 and 1943, to determine the feasibility of producing sugar beet seed in Nova Scotia.

The average yield of the three trials was 2,537 pounds of seed per acre. This compares very favourably with yields obtained in the more important seed production areas.

POULTRY

The poultry industry has made steady progress in Nova Scotia in the past twenty years. According to the eighth Census of Canada the total poultry population for the province was 1,196,434 in the year 1921 as compared with 1,320,308 in 1941. During these years there has been a steady improvement in the quality of the laying strain and in the finish of market birds.

A flock of approximately three hundred and fifty Barred Plymouth Rock laying hens is maintained annually at the Dominion Experimental Farm, Nappan, N.S. This flock is used largely for demonstration and investigational work in the breeding and feeding of poultry for economic production.

PEDIGREE BREEDING

The object of this project was to assist in the selection of "superior" male birds based upon the egg production records of their progeny. To qualify as a superior male, the average egg production of the progeny of a sire must exceed, by a significant amount, the average production of the progeny of all other sires tested.

During the period from 1936 to 1945, seventy-two Barred Plymouth Rock males were tested, including ten males bred at the Central Experimental Farm, Ottawa. The Ottawa bred sires were sons of "superior" line bred males. A total of 2149 daughters from 387 dams were trap-nested. The data recorded in this project are presented in Table 25:

TABLE 25.—PEDIGREE BREEDING FOR EGG PRODUCTION

Year	Number Tested		Number of daughters trap-nested	Average egg production of daughters
	Sires	Dams		
1936	10	65	299	207
1937	3	19	109	209
1938	6	37	178	204
1939	7	20	143	205
1940	6	29	199	200
1941	8	51	325	204
1942	8	48	314	195
1943	8	33	178	210
1944	7	37	203	209
1945	9	48	201	214

Five of the males were significantly better than the remainder of the sires tested at this farm, and one of these was superior based on the egg production of all sires tested under this plan at the various Dominion Experimental Farms.

KEEL CYSTS

Breast blisters or keel cysts located between the keel bone and the skin of the breast frequently occur in poultry. These formations appear at the earliest, about the age of twelve weeks, and occur mainly in males other than Leghorns. The latter breed is not susceptible. The presence of cysts detracts considerably from the appearance of dressed poultry and reduces its market value.

The possible influence of roosts and roosting conditions on the incidence of keel cysts was investigated during the years 1937 and 1938. A total of 112 Barred Rock cockerels was allotted to each of three 10′ x 12′ colony houses. One house

was equipped with 4'' x 1'' roosts, and 2'' x 2'' roosts were installed in another house. One house was without roosts. The birds were examined for the incidence and severity of keel cysts upon reaching a market weight of about seven pounds. These data are presented in Table 26:

TABLE 26.—INCIDENCE AND SEVERITY OF KEEL CYSTS

	Year	Number of Birds Affected			Total number of birds affected	Percentage of birds affected
		Large Cysts	Medium Cysts	Small Cysts		
Roost Size						
4'' x 1''	1937	4	6	9	19	33.9
	1938	8	5	3	16	40.0
2'' x 2''	1937	2	4	6	12	22.2
	1938	6	5	12	23	50.0
No Roosts	1937	5	8	4	17	29.3
	1938	3	4	14	21	43.7

It will be seen from these data that very little difference in the incidence of cysts occurred among the three groups. However, considerably more birds were affected in 1938 than in 1937.

In order to study the influence of conformation on the development of cysts, body measurements of each dressed bird were made in co-operation with the Poultry Division, Central Experimental Farm, Ottawa. A report recently published by Bird and Hollingsworth of the Poultry Division shows that the incidence and severity of keel bursae in poultry are largely dependent on the magnitude of the depth of the individual fowl through the breast region, relative to body weight. According to this report, the differences between years in the number of birds affected may be caused by differences in body weight, which may vary materially between years depending on rearing conditions.

Various Levels of White Fish Meal and Meatmeal in the Mesh for Laying Hens

White fish meal and meatmeal were compared when fed as the only single high protein feed in a mash mixture for laying hens. In the first year of the experiment, each protein supplement was compared when added to the ration in amounts sufficient to form mash mixtures containing 15, 17 and 19 percent protein. Mash and grain mixtures were fed in equal amounts to each group.

As the performance of the birds in both groups fed the lowest level of protein was unsatisfactory during the first year of the experiment, it was decided to confine the test to a comparison of the two higher protein levels during the balance of the test. A total of 1,800 Barred Plymouth Rock pullets was started on this test during the following five-year period.

According to the data recorded for the various groups, there would appear to be little difference between the two protein supplements or between the two higher levels of protein feeding, these conclusions being based on egg production and size, feed efficiency and mortality.

Barley vs. Corn for Egg Production

The effect of substituting barley for corn in the grain and mash mixtures for laying hens was investigated in feeding tests during the period 1936 to 1939.

A total of 300 Barred Plymouth Rock pullets was used in this test. The birds were divided into two groups of 150 birds each. Group 1 was fed a grain mixture consisting of 400 pounds each of wheat and corn and 200 pounds of oats. The mash mixture was made up of 200 pounds of corn meal, 100 pounds each of ground oats, middlings and bran; 25 pounds each of alfalfa leafmeal, meatmeal, white fish meal, buttermilk and charcoal, 5 pounds of salt and 10 pounds of cod liver oil. Group 2 was fed the above grain and mash mixture replacing corn with an equal quantity of barley.

The results of these tests indicate that barley may be substituted for corn in the grain and mash mixtures for laying hens provided the birds are fed a properly balanced ration.

PRODUCTION AND COST

A detailed record of the performance of the laying flock was maintained each year. A summary of the annual egg production and the feed cost of production is given in Table 27:

TABLE 27.—COST OF EGG PRODUCTION

Year	No. of birds	Total eggs laid	Market value of eggs	Feed cost	Return over feed cost	Average per cent of production
		No.	$	$	$	
1936-37	397	82,432	1724.58	988.89	735.69	57
1937-38	408	81,155	1733.98	1011.07	722.91	54
1938-39	402	77,030	1503.98	798.48	705.50	52
1939-40	307	50,922	1052.75	616.55	436.20	45
1940-41	343	62,362	1407.35	790.22	617.13	50
1941-42	321	58,355	1646.57	674.05	972.52	50
1942-43	319	55,888	1819.08	807.70	1011.38	47
1943-44	244	47,149	1465.87	674.88	790.99	53
1944-45	334	62,764	1884.41	896.95	987.46	51
1945-46	369	69,252	2232.51	850.37	1382.14	56

The average annual egg production per bird during the ten-year period 1937 to 1946 was 188. The calculated average cost of the feed consumed during this period was $0.15 per dozen eggs or $2.36 per bird annually and the return above the cost of feed was $0.155 per dozen or an annual return of $2.43 per bird over the cost of feed.

ILLUSTRATION STATIONS

There are six Illustration Stations in operation in eastern Nova Scotia. These stations are operating on privately-owned farms in co-operation with the Dominion Experimental Farms Service.

The farm owner and the area served by the various stations are as follows:
Moreshead Brothers, Sydney River, Cape Breton Co.
T. E. Ross and Son, North East Margaree, Inverness Co.
R. B. Lipsett, Middle Manchester, Guysborough Co.
D. M. McDonald, Knoydart, Antigonish Co.
Fred Setchell, Salt Springs, Pictou Co.
Allan Beaton and Son, Glenora Falls, Inverness Co.

The farm owned by Allan Beaton and Son has been operating as an Illustration Station since the fall of 1946.

Field husbandry problems are under study at all stations. These include practical studies on crop rotations and the use of commercial fertilizers and ground limestone. The improvement of livestock is under way at the stations through a planned breeding and feeding program and by systematic elimination of low producing individuals.

CROP ROTATIONS

A crop rotation plan is followed on each Illustration Station. A five-year rotation consisting of roots, grain, clover, timothy and timothy has been found the most satisfactory in meeting the feed requirements of most of the farms and is the basis for soil and crop improvement work on five of the stations. The station located at Sydney River is following a five-year rotation in which two consecutive root crops are grown before seeding to grain and a hay seed mixture. Approximately 15 tons of manure are added, in two applications, during the rotation. The heavier application of manure is made before the root crop and the second application is applied on the oat stubble following the third year in the rotation. A section of the root crop area is used in a commercial fertilizer test each year.

The root crops grown are mainly swedes and potatoes. Oats is the principal cereal grain grown. Erban oats is the most popular variety in recent years because of its early maturity and high yield. The advantage of feeding roughages containing a high percentage of legumes has been emphasized at all the Illustration Stations.

Crop yield data are recorded annually at all stations for each of the crops grown in the five-year rotation. The average crop yields for the years indicated are presented in Table 28:

TABLE 28.—CROP YIELDS PER ACRE—FIVE-YEAR ROTATION

Station	Potatoes		Swedes		Grain		Clover		Timothy	
	No. of yrs. grown	Yield	No. of yrs. grown	Yield	No. of yrs. grown	Yield	No. of yrs. grown	Yield	No. of yrs. grown	Yield
		bu.		tons		bu.		tons		tons
Salt Springs	2	288.1	17	26.1	10	39.0	15	2.61	14	2.47
Knoydart	2	230.3	17	25.7	17	26.3*	16	2.30	17	2.12
Middle Manchester	2	303.6	7	20.2	8	59.6	7	2.07	6	1.70
Sydney River	.....	.....	12	26.1	25	44.5	24	2.56	25	2.30
N.E. Margaree	2	239.9	25	26.2	10	41.7	25	2.99	24	2.69

*Spring Wheat

The Effect of Nitrogenous Fertilizers on Hay Lands

The effect of applications of nitrogenous fertilizers on the yields of timothy hay has been investigated at each of the Illustration Stations in eastern Nova Scotia. Various forms of nitrogenous fertilizers were applied on timothy sod in the spring, in amounts equivalent to twenty-three pounds of nitrogen per acre. The yields of timothy hay were recorded for each treatment at the time of harvest.

Tests have been carried on for twenty years at Sydney River and North East Margaree, fourteen years at Knoydart and Salt Springs, and six years at Middle Manchester.

The check or untreated plot showed an average annual yield of 1.88 tons of timothy per acre. The areas which received an application of either ammonium nitrate, nitrate of soda or sulphate of ammonia showed an average annual increase of .22, .66 and .77 tons of timothy hay per acre, respectively, above the yield recorded for the untreated areas during the same period.

Crop Response to Ground Limestone

The effect of applications of ground limestone on crop yields was investigated at four Illustration Stations.

Ground limestone applications of one, two and three ton rates per acre were tested when applied before the root crop in a four-year rotation of swedes, oats clover and timothy, in order to obtain data on the rate of application which might be expected to give the most satisfactory crop yields.

The following data in Table 29 show the average increase in crop yields above the untreated plots for the four stations:

TABLE 29.—AVERAGE INCREASE IN CROP YIELDS ABOVE UNTREATED PLOTS AT FOUR ILLUSTRATION STATIONS

Limestone Treatment	Average Increase Swedes	Average Increase Oats	Average Increase Clover Hay	Average Increase Timothy Hay
tons/acre	tons/acre	bushels/acre	tons/acre	tons/acre
1	0.70	0.9	0.48	0.28
2	0.60	2.2	0.74	0.90
3	0.80	2.5	0.96	1.30

The average yields of swedes and grain on the plots which received an application of ground limestone were slightly higher than those recorded for the unlimed plots. The average yields of clover and timothy hay showed an appreciable and gradual increase as the rate of ground limestone application was increased, the highest and most economical yields of these crops being recorded for the areas receiving the heaviest application of limestone.

Pasture Improvement by the Use of Commercial Fertilizers

Tests on the improvement of pastures through the application of commercial fertilizers were started on the Illustration Stations in eastern Nova Scotia in 1939. The fields selected for these experiments are representative of a large acreage of pasture land commonly found in this area.

In order to obtain comparative data, the same fertilizer treatments are applied at all stations. There are seven plots in each test, two of which are untreated with respect to fertilizer. Square yard areas on each plot are protected by wire cages. The yields of grass on these protected areas are recorded monthly throughout the grazing season as a measure of the relative yields of the various plots.

The fertilizer treatments tested and the average yield of grass recorded at each station are given in Table 30.

TABLE 30.—EFFECT OF FERTILIZER ON YIELD OF HERBAGE
(Tons per acre—green weight)

Treatments per acre	Salt Springs	Knoydart	St. Andrews	Middle Manchester	Sydney River	North East Margaree	Average
100 lb. ammonium sulphate annually. 600 lb. superphosphate 20%..... 120 lb. muriate of potash..... Once every three years.	7.33	12.01	1.82	1.92	10.11	10.74	7.32
600 lb. superphosphate 20%..... 120 lb. muriate of potash..... Once every three years.	5.93	11.88	1.89	1.40	10.45	10.52	7.01
600 lb. superphosphate 20% Once every three years.	4.95	13.17	1.79	2.73	8.53	10.30	6.91
100 lb. ammonium sulphate..... 200 lb. superphosphate 20%..... 40 lb. muriate of potash..... Annually.	8.58	9.09	4.04	5.17	11.14	9.02	7.84
100 lb. ammonium sulphate..... 600 lb. superphosphate 20%..... 120 lb. muriate of potash..... Annually.	7.49	8.94	5.05	2.74	7.99	3.67	6.00
Check (untreated).....	5.48	7.87	0.25	1.13	8.61	6.03	4.90

The test at St. Andrews was started in the spring of 1945.
The tests at the other stations were started in 1939.

The lighter annual fertilizer application of 100 pounds of ammonium sulphate, 200 pounds of superphosphate (20%) and 40 pounds of muriate of potash gave the highest yields of green herbage. The application of 100 pounds ammonium sulphate annually with 600 pounds superphosphate (20%) and 120 pounds of muriate of potash every three years gave a yield slightly lower than the annual application mentioned above. The only difference in these two treatments is in the time of application.

Plant Food Deficiency Studies

An experiment designed to study the effect of manure, commercial fertilizes and lime applications on crop yields, was laid down at several Illustration Stationr in the province in 1939.

The various fertilizer materials were compared when applied alone, and in combination, before the root crop in a five-year rotation of swedes, oats, clover, timothy and timothy. One rotation has been completed at each station and a second application of the treatments was made on the same area at Knoydart station. The various treatments and the yield data recorded for the second cycle of the rotation at the latter station are presented in Table 31 on following page.

On the series of plots which did not receive an application of manure, the greatest increase in crop yields above the untreated plots was recorded for the areas receiving an application of superphosphate. The plots receiving an application of 10 tons of manure per acre showed an increase in crop yield above the untreated plots in each year of the rotation. There was an appreciable response, particularly in the yeild of hay from the heavier applications of a complete fertilizer when applied with ten tons of manure per acre.

TABLE 31.—CROP RESPONSE TO MANURE, COMMERCIAL FERTILIZER AND LIME
(Yields per Acre)

Treatment per Acre	Swedes 1943 tons	Oats 1944 bushels	Clover Hay 1945 tons	Timothy Hay 1946 tons	Timothy Hay 1947 tons
Check	17.60	60.0	1.90	0.76	1.30
500 lb. superphosphate 20%	22.10	71.1	3.40	1.09	2.92
100 lb. muriate of potash	16.90	69.9	1.80	0.95	2.52
1000 lb. 0-10-5	22.90	81.5	3.10	1.35	2.92
250 lb. sulphate of ammonia	21.40	60.3	1.60	0.82	1.98
1000 lb. 5-10-0	35.50	76.8	2.30	0.83	2.43
1000 lb. 5-0-5	21.40	64.9	2.10	1.23	3.08
1000 lb. 5-10-5	32.50	76.7	2.80	1.25	2.92
10 tons manure (check)	28.40	78.0	2.40	1.12	2.55
10 tons manure 480 lb. superphosphate 20%	28.60	86.3	3.20	1.52	3.39
1 ton lime 10 tons manure	24.70	83.9	2.60	1.16	2.08
3 tons lime 10 tons manure	26.60	81.6	2.30	1.42	3.22
400 lb. 2-12-6 10 tons manure	26.40	98.1	2.90	1.20	2.70
800 lb. 2-12-6 10 tons manure	28.20	88.6	4.00	1.75	3.11
800 lb. 2-12-6 plus 20 lb. borax 10 tons manure	29.60	82.2	3.50	1.82	3.73
1600 lb. 2-12-6 10 tons manure	30.60	85.1	3.90	2.01	2.78

Testing Cereal Varieties

A systematic cereal variety testing program on the Illustration Stations in eastern Nova Scotia was started in 1946 in co-operation with the Dominion Experimental Farm, Nappan, N.S. The varieties and strains which appeared most promising in tests conducted at the Experimental Farm were subjected to comparative tests on the Illustration Stations. The data recorded in these tests are incorporated in Tables 6, 9 and 10 in the Cereal Crops section of this report.

Farm Business Studies

Inventory, expenditure and revenue records are maintained on all farms operated as Illustration Stations in eastern Nova Scotia. These data show an average total capital investment of $12,824.98 per farm, ranging from a low of $6,296.60 to a high of $20,522.00. The average investment in land and buildings is 60.3 per cent of the total farm capital, 14.6 per cent is invested in livestock, 12.7 per cent in machinery and equipment and 12.4 per cent in feeds and supplies.

The average gross revenue for the five stations was $3,467.98 during the year 1946 and the average net revenue per station in the same year amounted to $1,877.50.

The chief sources of revenue were from the sales of cattle and dairy produce. These sales contributed 51.7 per cent and field crops 26.8 per cent of the average total farm revenue as compared with only 13.5 per cent from the combined sales of swine, poultry, meat and eggs, sheep and garden produce.

WEATHER

The meteorological data which are presented in Tables 32 to 37 inclusive were taken at the Dominion Experimental Farm, Nappan, N.S., in co-operation with the Meteorological Division of the Department of Transport.

TABLE 32.—METEOROLOGICAL RECORDS

DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

1909-1947 (39 years)

Month	Temperature			Precipitation			Total Bright Sun	Daily Evaporation
	Highest	Lowest	Mean	Rain	Snow	Total		
				(in.)	(in.)	(in.)	(hrs.)	(in)
January	56	−34	17·38	1·53	16·88	3·22	94·38	.....
February	59	−35	16·89	1·08	17·90	2·87	104·90	.....
March	66	−21	27·34	1·63	12·09	2·84	129·01	.....
April	79	−19	37·85	2·09	6·44	2·73	149·00	.....
May	85	21	48·96	2·53	·17	2·55	193·57	3.15 (11 yrs.)
June	89	26	57·88	2·87	.....	2·87	208·95	3.39 (12 yrs.)
July	92	33	64·46	2·85	.....	2·85	234·46	3.52 (12 yrs)
August	94	32	63·34	3·08	.....	3·08	228·37	3.55 (12 yrs.)
September	90	25	56·29	3·57	.....	3·57	166·79	2.71 (11 yrs.)
October	80	18	46·73	3·88	·25	3·91	129·08	2.54 (7 yrs.)
November	68	− 2	35·65	3·19	5·25	3·72	84·69	.....
December	63	−24	22·47	2·04	16·53	3·69	75·61	.....
Annual	94	−35	41·27	30·34	75·51	37·90	1,798·81	.....

The columns for highest and lowest temperatures, shown in Table 32, are for the absolute highest and lowest temperatures in any day, which have ever occurred in the various months. The mean temperature refers to the average of the daily temperatures for the entire month over the 39-year period, 1909 to 1947.

The columns for precipitation show the average total monthly rainfall and snowfall in inches and the average total monthly precipitation for the period 1909 to 1947.

Sunshine is recorded as the average total hours of sunshine for each month over the thirty-nine year period.

The average daily evaporation, in inches, is given for each of the six warmest months of the year for the number of years indicated. These data were first recorded at this Farm in 1936.

The highest temperature recorded at this Farm was 94°F. on August 18, 1935. The lowest temperature was -35°F. on February 18, 1922.

The total precipitation for each month and the total annual precipitation for each year in the period 1909 to 1947 are presented in Table 33.

TABLE 33.—ANNUAL PRECIPITATION—(Inches)

DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

1909-1947 (39 Years)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1909	3·51	3·85	4·09	3·57	3·06	1·08	2·68	3·66	4·07	4·16	3·34	4·63	41·70
1910	4·76	3·73	2·37	2·92	2·90	3·72	3·13	1·55	3·14	4·14	4·18	2·85	39·39
1911	2·83	1·58	2·27	1·61	0·69	3·17	2·30	2·17	4·74	1·35	3·84	1·62	28·17
1912	1·95	1·76	2·41	2·04	2·74	2·32	6·62	4·82	2·86	1·67	3·75	5·82	38·76
1913	2·92	2·15	6·16	3·46	2·38	1·97	4·98	3·76	2·70	7·83	2·03	4·25	44·59
1914	3·00	2·60	2·13	3·69	0·75	4·23	3·61	2·95	3·05	2·46	2·97	1·46	32·90
1915	3·09	1·31	1·20	3·29	4·43	3·57	1·95	4·67	1·47	4·11	4·63	4·76	38·48
1916	1·30	2·96	3·80	2·13	2·42	4·74	2·60	1·70	1·64	5·55	2·32	3·91	35·07
1917	3·38	2·84	2·10	3·43	3·55	2·21	1·38	5·15	0·90	8·05	3·71	4·40	41·10
1918	2·31	3·02	2·55	1·07	1·40	3·14	3·43	1·33	5·25	5·21	3·86	2·62	35·19
1919	1·56	1·98	2·24	3·26	2·27	2·73	3·88	1·28	3·97	2·50	5·69	2·05	33·41
1920	1·41	4·99	3·58	3·74	1·72	2·68	2·63	5·70	2·21	0·50	2·18	3·48	34·82
1921	1·84	2·57	3·58	3·26	1·09	1·23	0·96	2·17	2·99	2·07	4·73	2·54	29·03
1922	1·70	2·75	1·66	2·02	1·73	3·01	4·23	6·62	2·67	3·50	3·33	4·52	37·74
1923	5·02	1·05	3·14	4·10	1·77	4·12	2·31	2·97	3·21	3·33	4·16	4·45	39·63
1924	3·95	2·20	1·58	1·62	0·88	3·70	0·50	5·19	1·40	2·10	2·29	2·13	27·54
1925	3·48	2·78	3·01	1·55	2·09	5·59	3·24	1·54	5·00	5·75	2·99	1·51	38·53
1926	5·05	5·41	3·01	3·08	3·18	1·58	2·28	2·09	1·15	4·85	2·11	3·39	37·18
1927	4·16	2·50	3·20	2·75	3·71	1·96	4·65	7·16	3·32	4·21	3·88	5·83	47·33
1928	3·58	1·77	2·22	2·82	2·38	2·08	2·78	1·92	5·59	2·82	2·76	5·35	36·07
1929	4·22	2·29	2·71	1·95	4·29	1·00	2·59	1·12	3·90	2·61	2·95	5·10	34·73
1930	3·54	3·20	2·80	0·97	1·86	1·76	3·44	2·26	2·35	4·47	1·92	4·30	32·87
1931	3·26	3·77	3·86	2·94	1·45	3·58	3·25	3·15	3·77	2·39	1·28	4·70	37·40
1932	3·34	1·41	3·61	3·22	1·34	2·12	4·54	2·14	2·84	2·69	2·25	2·33	31·83
1933	3·88	3·15	4·46	2·79	1·39	4·63	0·29	3·08	4·61	10.74	5·17	3·86	48·05
1934	2·75	4·57	3·72	1·90	2·21	2·51	1·96	2·06	2·23	2·03	8·10	4·19	38·23
1935	8·02	2·98	1·69	2·54	1·25	3·50	2·96	3·10	4·72	2·32	6·22	4·79	44·09
1936	5·30	1·57	3·68	3·95	4·42	2·70	1·96	2·98	5·24	4·70	4·57	4·77	45·84
1937	2·43	3·01	1·54	0·75	3·66	4·26	1·20	1·75	3·58	4·42	4·39	4·14	35·13
1938	2·71	4·48	1·26	3·07	2·31	3·32	5·67	6·15	4·01	3·02	2·99	3·29	42·28
1939	2·34	3·65	3·53	2·99	3·62	2·30	1·27	1·67	2·61	6·66	1·23	3·08	34·95
1940	0·94	2·05	3·19	3·24	2·81	2·10	3·38	1·18	9·67	2·41	4·83	4·13	39·93
1941	4·23	1·08	2·74	2·10	4·42	1·38	3·56	4·62	1·86	4·59	3·41	3·41	37·40
1942	4·60	2·64	3·74	1·96	1·95	0·87	3·25	1·69	10·73	5·56	4·69	3·18	44·86
1943	1·84	3·01	3·17	2·64	4·76	4·95	4·70	3·33	3·58	3·61	6·39	1·98	43·96
1944	1·37	3·69	2·91	2·51	0·76	3·68	1·19	3·61	3·63	4·59	6·71	4·07	38·72
1945	4·83	3·09	2·22	3·77	5·41	3·90	1·73	1·48	2·46	5·56	4·09	3·30	41·84
1946	1·56	4·33	1·27	4·94	2·61	1·22	1·45	3·99	1·95	2·58	2·21	4·45	32·56
1947	3·27	4·06	2·00	3·15	3·48	3·21	2·48	2·36	4·36	1·14	2·99	4·07	36·57
Average	3·22	2·87	2·83	2·74	2·54	2·87	2·85	3·08	3·57	3·91	3·72	3·71	37·89

Average annual precipitation — 37.89 inches.
Highest rainfall in a 12-hr. period 4·26 inches — Sept. 22, 1942
Highest rainfall in a 24-hr. period 6·05 inches — Sept. 22, 1942
Highest monthly rainfall..... 10·74 inches — Oct. 1933
Highest seasonal snowfall.....123.0 inches 1931
Lowest seasonal snowfall..... 40.0 inches 1915
Average annual snowfall (1909-1947) 75.51 inches.
The latest snowfall recorded in this period was 5" on May 20, 1929
The earliest snowfall was 1¼" which occurred on October 17, 1939.

The earliest and latest dates of various farm operations at the Dominion Experimental Farm, Nappan, N.S. are given in Table 34.

TABLE 34.—DATES OF FARM OPERATIONS

	Period Covered	Earliest	Latest	Average
Seeding oats	1915–1946	Apr. 29/37	June 9/45	May 17
Seeding wheat	1915–1943	Apr. 29/37	June 3/35	May 17
Seeding corn	1928–1946	May 23/42	July 5/45	June 2
Seeding potatoes	1936–1946	May 22/42	June 17/39	June 7
Cutting clover hay	1917–1946	June 26/42	Aug. 1/17	July 14
Cutting timothy hay	1928–1945	July 11/39	Aug. 10/43	July 21
Cutting oats	1915–1946	Aug. 6/42	Sept. 30/41	Aug. 29
Cutting wheat	1915–1943	Aug. 18/21	Sept. 20/15	Sept. 2
Cutting corn	1928–1946	Sept. 12/42	Oct. 4/45	Sept. 25
Harvesting potatoes	1936–1946	Sept. 17/37	Oct. 14/43	Sept. 30
Livestock put on pasture	1930–1946	May 22/46	May 28/41	May 25
Livestock taken off pasture	1930–1946	Sept. 9/39	Oct. 21/46	Oct. 5
Date of freeze-up	1914–1946	Nov. 5/33	Dec. 18 1920 & 1944	Dec. 2

The dates of farm operations shown in Table 34 refer to the earliest and latest dates on which these operations have ever occurred on the larger upland fields at the Dominion Experimental Farm, Nappan, N.S. over the period indicated.

The greatest difference between the earliest and latest dates of seeding oats during the period 1915 to 1946 was 41 days. The greatest difference between dates of cutting this crop was 55 days.

The earliest "freeze-up" during the 33-year period 1914 to 1946 occurred on November 5, while the average date of freeze-up during this period was approximately one month later.

The dates of the last frost which occurred in the spring and the first frost which occurred in the following fall during the period 1914 to 1947, together with the actual temperatures which occurred on these dates at the Dominion Experimental Farm, Nappan, N.S. are shown in Table 35.

TABLE 35.—THE OCCURRENCE OF FROST AND FROST-FREE PERIODS

DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

1914–1947 (34 years)

(Freezing Temperature 32 degrees F., or lower)
(Temperatures recorded shown in brackets)

Year	Spring frosts	Fall frosts	Frost-free period
	Date of last frost in spring	Date of first frost in fall	(Number of days)
1914	June 4 (26)	Oct. 1 (28)	119
1915	June 3 (30)	Sept. 26 (32)	115
1916	June 10 (32)	Sept. 11 (31)	93
1917	June 1 (32)	Sept. 12 (32)	103
1918	June 21 (30)	Sept. 12 (30)	83
1919	June 1 (31)	Sept. 17 (32)	108
1920	June 18 (30)	Sept. 21 (31)	95
1921	June 6 (30)	Sept. 21 (30)	107
1922	May 28 (31)	Sept. 19 (32)	114
1923	May 29 (31)	Sept. 27 (31)	121
1924	May 21 (29)	Sept. 27 (32)	129
1925	May 19 (27)	Sept. 20 (31)	124
1926	May 14 (32)	Sept. 5 (31)	114
1927	June 3 (30)	Sept. 28 (32)	117
1928	May 17 (30)	Sept. 26 (31)	132
1929	May 20 (31)	Sept. 21 (32)	124
1930	May 24 (32)	Oct. 3 (30)	132
1931	May 13 (29)	Sept. 17 (32)	127
1932	May 30 (29)	Oct. 16 (24)	139
1933	May 27 (30)	Sept. 15 (31)	111
1934	June 2 (31)	Oct. 2 (24)	122
1935	May 24 (32)	Sept. 18 (30)	117
1936	May 27 (32)	Sept. 6 (32)	102
1937	May 8 (29)	Oct. 4 (27)	149
1938	May 30 (31)	Sept. 10 (32)	103
1939	May 27 (31)	Sept. 19 (30)	115
1940	May 12 (32)	Aug. 27 (32)	107
1941	June 4 (30)	Sept. 14 (30)	102
1942	June 2 (29)	Sept. 9 (30)	99
1943	June 15 (31)	Sept. 19 (31)	96
1944	May 20 (32)	Sept. 25 (29)	128
1945	June 8 (32)	Sept. 18 (27)	102
1946	May 9 (32)	Sept. 13 (30)	127
1947	June 8 (32)	Sept. 21 (31)	105
Average	May 28	Sept. 20	115

The column headed, "Frost-Free Period", refers to the number of days between the date of the last spring frost and the date of the first frost the following fall. The longest frost-free period was 149 days and the shortest frost-free period was 83 days. The latest spring frost on record occurred on June 21, 1918, and the earliest fall frost was recorded on August 27, 1940.

The maximum and minimum total hours of sunshine which have ever occurred in the various months at the Dominion Experimental Farm, Nappan, N.S. during the thirty-four year period, 1914 to 1947, are shown in Table 36:

TABLE 36.—HOURS OF SUNSHINE

DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

1914–1947 (34 years)

Months	Maximum hours	Year	Minimum hours	Year
January	123.7	1922	73.7	1926
February	154.3	1923	70.0	1920
March	180.4	1946	66.8	1931
April	200.0	1944	94.3	1919
May	269.6	1944	136.2	1915
June	264.9	1939	122.4	1945
July	289.6	1924	160.7	1938
August	290.0	1940	175.1	1922
September	207.7	1947	122.2	1940
October	182.6	1947	76.6	1927
November	129.7	1939	47.9	1915
December	110.2	1914	45.7	1935

The maximum and minimum number of hours of sunshine in any one month was 290.0 and 45.7 respectively. The maximum number of hours sunshine in any one year was 1,992, recorded in 1930. The minimum number of hours sunshine in any one year was 1,512, recorded in 1915.

A general summary of the weather conditions and crop yields at the Dominion Experimental Farm, Nappan, N.S. during the period 1909 to 1947 is given in Table 37.

It may be observed from these data that relatively low yields for most of the seven crops listed were recorded in only two years, 1921 and 1938, during the 39-year period. These two years represent extremes in moisture conditions. The year 1921 had an early spring, but was extremely dry during the growing season, while 1938 had a late spring and very wet growing season.

Oat yields of 30 bushels or less per acre were obtained in only three years, barley yields of 17.5 bushels or less per acre were recorded in six years, while wheat yields of 15.5 bushels or less were obtained in ten years during the 39-year period.

Corn ensilage yields of 10 tons or more per acre were obtained for 31 of the 37 corn crops grown during the period 1909 to 1947.

According to the data shown in Table 37 there is no apparent relation between crop yields in any season and the snowfall recorded during the previous winter.

TABLE 37.—SNOWFALL AND CROP YIELDS — EXPERIMENTAL FARM, NAPPAN, N.S.
1909 - 1947

Crop Year	Snowfall Previous Winter (inches)	Date Fields Bare of Snow	YIELDS PER ACRE							WEATHER CONDITIONS DURING GROWING SEASON
			Oats (bu.)	Barley (bu.)	Wheat (bu.)	Clover (tons)	Timothy (tons)	Swedes (tons)	Corn (tons)	
1909	112	Mar. 1	30	35	.....	.....	.....	25	16	Very favourable growing season.
1910	58	Late Feb.	65	25	.....	.....	.....	22	12.5	Excellent until July 15; then very dry until October.
1911	48	Mar. 15	50	36	.....	.....	.....	25	11	Spring very dry. Excellent Summer and Fall.
1912	56	.....	55	34	20	.....	.....	12	.....	Unfavourable. Spring cool and damp. July dry to 22nd; then rains through August and Fall.
1913	67	Mar. 15	59	34	29.5	.....	2.40	23	12.5	Cold Spring. July good. August rainy and cool.
1914	82	Mar. 15	62.5	54.5	31.5	.....	.....	18	11	Cool May and June. Excellent Summer and Fall.
1915	40	.....	38	30	17	.....	3.11	9.5	10.5	Fair season. June cool and damp. August rainy. September cool. Grain did not fill. Roots poor.
1916	88	Apr. 15	45.5	8	27	.....	2.66	17.5	15.5	Early Spring. Excellent growing season. Barley damaged by excessive moisture in June.
1917	68	Apr. 1	35.5	16	19.5	.....	1.78	22	17.5	Fair Spring. Fine July. August unsettled. September excellent.
1918	94	Late Mar.	47	39	24.5	.....	2.05	22	.....	Cool to middle of July. August excellent. September cool. October wet.
1919	44	.....	39	23	15.0	.....	2.76	12.5	12.5	Excellent Spring and Summer. Fair to good Fall.
1920	68	.....	35.5	22	23.5	2.02	2.70	18	16	Spring dry. Good growing weather in July and August. September dull first part.
1921	56	.....	36.5	17	20	.....	2.09	10.5	4	Early Spring. Dry Summer; grain ripened prematurely. Poor growth of forage crops.
1922	70	Mar. 3	55.5	41.5	20	.....	2.11	17.5	19	Excellent growing season.
1923	120	Apr. 1	63	38.5	21.5	2.65	.....	22.5	12	Late Spring. Dry June. Wet Summer. Fine and dry October.
1924	78	.....	56.5	31.5	21	2.32	1.75	18	14	Dry to end of July. Excellent growth in August and September.
1925	49	Feb. 15	64.5	32	25	2.78	2.70	19.5	11	Wet Spring. Fair July. Wet August, September and October. All crops good except corn.
1926	115	Apr. 1	41.5	33	12.5	1.83	2.16	17	13	Late seeding. Very dry June and Summer months. October wet.
1927	77	Apr. 15	36	23	15.5	2.45	1.31	17.5	14	Late seeding. Excellent weather to July 8th, then unsettled to November. Poor crop season.
1928	58	.....	47.5	25.5	18	2.69	2.32	21.5	13	Excellent Spring and Summer to August then very dry to September 11th.
1929	64	.....	41.5	26	15	2.20	2.43	11.5	13.5	Late Spring. Dry June, July and August. Fair Fall.
1930	78	Mar. 1	57.5	39	24.5	1.43	2.08	21.5	16	Excellent growing season.
1931	123	Apr. 3	48	28	31.5	2.36	1.69	20	16.5	Early Spring. Excellent growth in July and August. Wet September.
1932	65	Mar. 30	64.5	38	23.5	3.11	2.85	19	12	Good Spring. Excellent growing weather in July and August. Dry August and September.

TABLE 37.—SNOWFALL AND CROP YIELDS — EXPERIMENTAL FARM, NAPPAN, N.S.
1909 - 1947

Crop Year	Snowfall Previous Winter (inches)	Date Fields Bare of Snow	YIELDS PER ACRE							WEATHER CONDITIONS DURING GROWING SEASON
			Oats (bu.)	Barley (bu.)	Wheat (bu.)	Clover (tons)	Timothy (tons)	Swedes (tons)	Corn (tons)	
1933	69	Mar. 31	72.5	47	28	2.29	3.13	21	17.5	Average Spring. Wet June. Dry July and August. Very wet October.
1934	120	Mar. 15	57.5	25.5	32	2.01	1.72	21.5	18	Average Spring. Cool dull June. Dry July and August. Fine warm September October unsettled.
1935	109	Apr. 10	59	34	8.5	1.87	1.94	19	13	Late cool Spring. Wet June. Fine warm July, August very dry and hot until 21st, then rain. September wet. October fine.
1936	112	Mar. 12	64	41	15.5	2.97	2.67	13.5	7.5	Late Spring. June warm and wet. July cool and fine. August fine and warm. September cool and wet. October fine.
1937	62	Mar. 14	58	32	23	2.49	3.33	6.5	6.2	Early seeding. May wet after 14th. June rainy and warm. July and August fine and warm. Early grain excellent.
1938	63	Mar. 24	26.5	24.5	8	2.45	2.45	5.5	11	Late Spring. June rainy and warm. July wet. August cool and wet. September wet.
1939	64	Mar. 30	64	17.5	13	1.62	2.65	9	8.5	Late Spring. Cool June. July warm and showery. August and September dry. October wet and cool.
1940	66	Mar. 30	33.5	27	21	2.18	3.24	17.5	13	Late Spring. Very dry August. Very wet September.
1941	102	Apr. 10	50.5	33.0	11.5	1.79	2.25	12.5	10	Late Spring. June cool and dry. July average. August wet and cool. September cool and showery. October wet.
1942	73	Apr. 23	46.9	25.4	12.5	2.67	2.89	18.6	14.1	Very hot dry summer.
1943	76	LateApril	40.7	17.3	.....	2.25	3.14	11.1	7.2	A wet summer. Many heavy fogs and dull days.
1944	89	Mar. 24	67.1	33.0	.....	2.80	2.36	22.6	14.6	Excellent crop season. One of the best on record at this farm.
1945	77	Mar. 14	26.0	15.7	.....	3.00	4.21	12.4	9.4	Very poor crop year. Very unfavourable distrbution of rain and sunshine.
1946	75	Apr. 23	70.0	30.4	.....	1.69	2.22	21.7	11.1	June was very dry. Otherwise summer was average.
1947	58	Mar. 13	44.0	23.7	.....	2.46	2.87	12.8	11.8	Very good crop year.

ACTIVE PROJECTS

DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

DECEMBER 31, 1947

ANIMAL HUSBANDRY

CEREALS

FIELD HUSBANDRY

Forage Plants

Poultry

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