CANADA
DEPARTMENT OF AGRICULTURE
EXPERIMENTAL FARMS SERVICE

DOMINION EXPERIMENTAL FARM
NAPPAN, N.S.

S. B. WILLIAMS, Superintendent

PROGRESS REPORT—1948-1952

A group of Shorthorns used in pasture tests at the Experimental Farm, Nappan, N.S.

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DOMINION EXPERIMENTAL FARM
NAPPAN, N.S.

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[1] Appointed July 1952 on the retirement of W. W. Baird.
[2] Resigned December 1, 1951.
[3] Transferred June 13, 1949.
[4] Transferred to M.M.R.A. October 12, 1949.
[5] Appointed July 11, 1950; resigned September 30, 1951.
[6] Appointed May 6, 1949.
[7] Appointed June 6, 1949

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INTRODUCTION

The Experimental Farm at Nappan, N.S., was established in 1887. The last published report of this Farm covered the period 1937 to 1947, inclusive. The present report is for the years 1948 to 1952, inclusive.

Until recently the area served by this Farm was principally northern Nova Scotia, but, with increasing emphasis on specialization, attention is given to all Maritime problems falling within the scope of the work of the Farm, special attention being given to problems of livestock, poultry, and forage production. To perform these functions six Divisions are represented on the Farm—Animal Husbandry, Field Husbandry, Forage Crops, Poultry, Cereal Crops, and Illustration Stations.

In the period 1948 to 1952 there have been numerous changes in staff. E. T. Goring was transferred to this Farm from the Experimental Station, Kapuskasing, and J. E. Langille, J. G. Crowe, and T. M. MacIntyre were added to the staff. J. W. Byers transferred to the staff of the Maritime Marshland Rehabilitation Administration, and H. D. Blenkhorn and J. G. Crowe left the Farm. In July, 1952, W. W. Baird, who had been Superintendent of this Farm for the past 39 years, retired and S. B. Williams was appointed Superintendent.

With the shift in emphasis of the work, increasing attention is paid to problems of forage production on both marshland and upland soils. Concurrently nutritional trials are being conducted on different phases of roughage utilization. Reports of these and other trials will be found under the work of the various Divisions. Further details can be obtained by writing to the Superintendent of the Experimental Farm, Nappan, N.S.

METEOROLOGY

Complete temperature, precipitation, and sunshine records have been maintained for the past 39 years. The following tables present data for the years covered by this report, along with the long-time average.

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TABLE 1.—MEAN TEMPERATURE RECORDS AT THE DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

1948–1952 and 39-year average 1914–1952, inclusive

Monthly and annual mean temperatures (°F.)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1948	15·92	11·91	22·74	36·93	48·89	56·42	64·55	64·50	56·58	47·03	40·27	28·06	41·15
1949	22·41	20·87	29·37	40·89	49·05	60·25	66·37	65·07	57·16	48·18	35·45	28·52	43·63
1950	22·49	14·82	25·75	38·91	49·75	58·40	63·95	62·51	53·28	45·95	42·47	32·07	42·53
1951	24·43	25·91	31·85	42·85	49·50	57·41	65·18	64·37	58·23	48·00	37·45	24·15	44·11
1952	21·34	24·21	29·41	41·38	47·43	59·28	68·64	65·06	57·00	46·82	36·37	27·52	43·71
39-year average	17·71	17·29	27·19	38·00	48·87	58·04	64·71	63·60	56·50	46·63	35·85	23·05	41·45

Monthly and annual extremes of temperature (°F.)

——	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Mean
Extreme low	−34	−35	−21	−6	20	26	33	32	25	10	−2	−24	39·35
Year	1925	1922	1923	1923	1925	1914	1919	1940	1947	1925	1921	1943	1917
Extreme high	57	59	66	79	84	89	90	94	90	80	70	63	44·11
Year	1935	1943	1936	1921	1932	1948	1952	1935	1942	1930	1950	1950	1951

TABLE 2.—PRECIPITATION RECORDS, DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

Monthly and annual precipitation records (inches) 1948–52, inclusive, with 39-year averages and monthly extremes for the same period

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total annual snowfall	Total annual rainfall	Total annual precipitation
1948	4·94	2·36	3·06	2·91	4·35	2·82	2·72	3·64	2·38	3·42	4·14	3·16	74·55	32·45	39·91
1949	2·91	3·22	4·47	3·22	2·54	3·14	1·42	3·36	5·72	1·70	4·44	3·10	55·70	33·67	39·24
1950	2·29	2·97	2·53	3·20	0·99	2·06	3·40	6·66	0·69	1·86	6·12	4·67	94·20	28·03	37·45
1951	4·59	3·99	1·85	2·67	5·41	2·25	3·38	7·43	4·53	1·37	6·51	4·54	78·10	40·71	48·52
1952	6·73	5·92	1·42	1·76	2·91	1·64	1·19	4·45	1·96	1·82	2·78	2·13	110·50	23·66	34·71
39-year average	3·38	3·01	2·73	2·74	2·63	2·86	2·65	3·33	3·52	3·67	3·90	3·67	79·19	30·19	38·11
Extreme low for 39-year period	0·94	1·05	1·20	0·75	0·75	0·87	0·29	1·12	0·69	0·50	1·23	1·46	32·70	20·34	27·54
Year	1940	1923	1915	1937	1914	1942	1933	1929	1950	1920	1939	1914	1919	1924	1924
Extreme high for 39-year period	8·02	5·92	4·47	4·94	5·41	5·59	5·67	7·16	10·73	10·74	8·10	5·83	133·00	40·71	48·52
Year	1935	1952	1949	1946	1945	1925	1938	1927	1942	1933	1934	1927	1926	1951	1951

Snow is converted to rain by the formula 10 inches of snow equals one inch of rain.

Highest 24-hour rainfall	September 22, 1942	6·05 inches
Highest seasonal snowfall	1951–52	134·00 "
Lowest seasonal snowfall	1952–53	33·00 "
Latest snow in spring	May 20, 1929	5·0 "
Earliest snow in fall	Oct. 17, 1939	1·3 "

TABLE 3.—SUNSHINE RECORDS, DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

Monthly and annual hours bright sunshine, 1948–52, inclusive, with 39-year averages and extremes for same period

Year	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
1948	59·9	146·8	137·7	133·0	152·7	201·1	245·7	197·6	170·9	123·6	76·5	66·3	1,711·8
1949	76·7	113·2	100·1	120·0	203·9	237·2	271·9	233·1	147·2	182·7	65·2	74·8	1,826·0
1950	75·7	117·8	165·2	110·2	262·1	203·5	223·3	196·3	139·2	133·0	88·1	54·3	1,768·7
1951	101·0	72·9	92·8	180·3	180·4	209·1	252·9	152·0	191·1	120·5	73·0	92·2	1,718·2
1952	78·8	62·0	77·7	143·2	148·5	173·2	288·1	229·2	197·6	159·8	69·2	75·2	1,702·5
39-year average	91·2	102·5	124·2	145·3	188·9	200·3	234·4	217·6	160·9	129·8	81·2	75·0	1,751·3
Extreme low for 39-year period	59·9	62·0	66·8	94·3	97·3	120·7	160·7	152·0	122·2	76·6	47·9	45·7	1,512·1
Year	1948	1952	1931	1919	1917	1917	1938	1951	1939	1927	1915	1935	1915
Extreme high for 39-year period	123·7	154·3	180·4	200·0	269·6	264·9	289·6	290·0	207·7	182·7	129·7	110·1	1,992·4
Year	1922	1923	1946	1944	1944	1939	1924	1940	1947	1949	1939	1914 1934	1930

TABLE 4.—FROST RECORDS, DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

	Frost—32° or lower					Killing Frost—28° or lower				
	Last frost in spring		First frost in fall		No. of frost-free days	Last killing frost in spring		First killing frost in fall		No. of killing frost free days (above 28°)
	Date	Temp.	Date	Temp.		Date	Temp.	Date	Temp.	
		°		°			°		°	
1948	May 20	30	Sept. 17	32	120	May 5	26	Oct. 21	26	169
1949	" 21	29	" 12	31	114	May 16	26	" 25	28	162
1950	" 22	26	" 22	27	123	May 22	26	Sept. 22	27	123
1951	" 18	25	Oct. 2	32	137	May 18	25	Oct. 14	20	149
1952	" 6	31	Sept. 15	29	132	April 19	28	Oct. 11	24	175
39-year average	" 26	30	Sept. 20	30	117	May 9	26	Oct. 9	26	153
Shortest season 1918	June 21	30	Sept. 12	30	83	1914 June 4	26	Oct. 1	28	119
Longest season 1937	May 8	29	Oct. 4	27	149	1917 May 6	28	Nov. 1	26	179

Earliest and latest frost dates (32° or lower) 1914–1952:			Earliest and latest killing frost dates (28° or lower) 1914–1952:		
Latest spring frost	June 21, 1918	30°	Latest spring killing frost	June 4, 1914	26°
Earliest last spring frost	May 6, 1952	31°	Earliest last killing frost of spring	April 19, 1952	28°
Earliest fall frost	Aug. 27, 1940	32°	Earliest fall killing frost	Sept. 18, 1945	27°
Latest first fall frost	Oct. 16, 1932	24°	Latest first killing frost of fall	Nov. 9, 1927	19°

Annual frost records prior to 1948 may be obtained from previous Progress Reports.

TABLE 5.—DATES OF FARM OPERATIONS, DOMINION EXPERIMENTAL FARM, NAPPAN, N.S.

—	1948	1949	1950	1951	1952	Earliest	Latest	Average	Period
First seeding oats	May 29	May 10	May 10	May 7	May 20	April 29/37	June 9/45	May 17	1915–52
First cutting grass silage	July 9	June 24	June 27	June 27	July 2	June 24/49	July 9/48	June 30	1948–52
First cutting hay	July 16	July 7	July 15	July 16	July 8	June 26/42	Aug. 1/17	July 14	1917–52
First cutting oats	Sept. 3	Aug. 16	Aug. 23	Aug. 24	Aug. 18	Aug. 6/42	Sept. 30/41	Aug. 28	1915–52
Dairy herd put on pasture	June 1	May 28	June 1	May 30	May 28	May 22/46	June 1/50	May 26	1930–52
Dairy herd taken off pasture	Oct. 15	Oct. 1	Oct. 20	Oct. 21	Oct. 12	Sept. 9/39	Oct. 21/51	Oct. 7	1930–52
Date of freeze-up	Dec. 1	Dec. 1	Dec. 1	Nov. 25	Nov. 30	Nov. 5/33	Dec. 18/44	Dec. 2	1914–52

ANIMAL HUSBANDRY

C. D. T. CAMERON

Experimental projects in this Division during the period under review were concerned principally with the breeding and feeding of beef cattle, sheep, and swine. In addition, a nucleus of purebred Clydesdales and a small herd of Jersey cattle were maintained.

The size of the Shorthorn herd and Shropshire flock has increased considerable since the time of the last progress report. An adjoining farm consisting of 40 acres of upland and marshland was leased in 1949. This farm is used for grazing trials. The construction of a pole barn to be used in connection with beef cattle projects under loose housing conditions was started late in 1952.

Beef Cattle

A purebred herd of Shorthorn cattle of dual-purpose breeding was transferred to this Farm from the Dominion Experimental Station, Kentville, N.S., in 1945. Since this time the herd has been gradually changed to a beef-type herd through breeding and selection. In 1949, 14 Shorthorn breeding females and young stock bred at the Dominion Experimental Farm, Indian Head, Sask., were added to the herd. During the period covered by this report, the beef cattle were used mainly for pasture experimental projects. These experiments are outlined in the pasture section of this report. A preliminary beef cattle performance testing project was started in 1951.

Rate and Efficiency of Growth of Beef Cattle

Recent research has indicated that the heritability of growth rate and feed efficiency in beef cattle is high. Experimental results have also shown that the selection of sires on the basis of their rate of growth and efficiency in the utilization of feed can lead to an improvement in feeder stock. An investigation of this problem was started in 1951. Records were kept of individual gains and feed consumption for a total of 22 animals—heifers, bulls and steers—from a live weight of 500 to 900 pounds. The animals tested were the entire 1951 progeny of two Shorthorn bulls and were maintained under uniform feeding and management. The data for the individual animals are shown in Table 6.

TABLE 6.—PERFORMANCE OF MOST AND LEAST EFFICIENT ANIMALS—500 TO 900 LB. LIVE WEIGHT—1951

—	Number of days on test	Average daily gain	Feed consumed per 100 lb. gain	
			Meal	Hay
		lb.	lb.	lb.
Most efficient heifer	198	2·02	499	269
Least efficient heifer	326	1·21	830	432
Most efficient bull	187	2·26	450	280
Least efficient bull	236	1·69	610	334
Most efficient steer	235	1·77	604	303
Least efficient steer	259	1·47	724	370
Average (all animals tested)	251	1·59	641	351

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A maximum difference of 40 per cent in rate and efficiency of gain occurred between the females. Smaller but substantial differences occurred between the bulls and also between the steers. The heifer that showed the best performance and the heifer that made the smallest gains were sired by the same animal. The bull that made the best record and the bull that made the poorest record were also sired by the same animal.

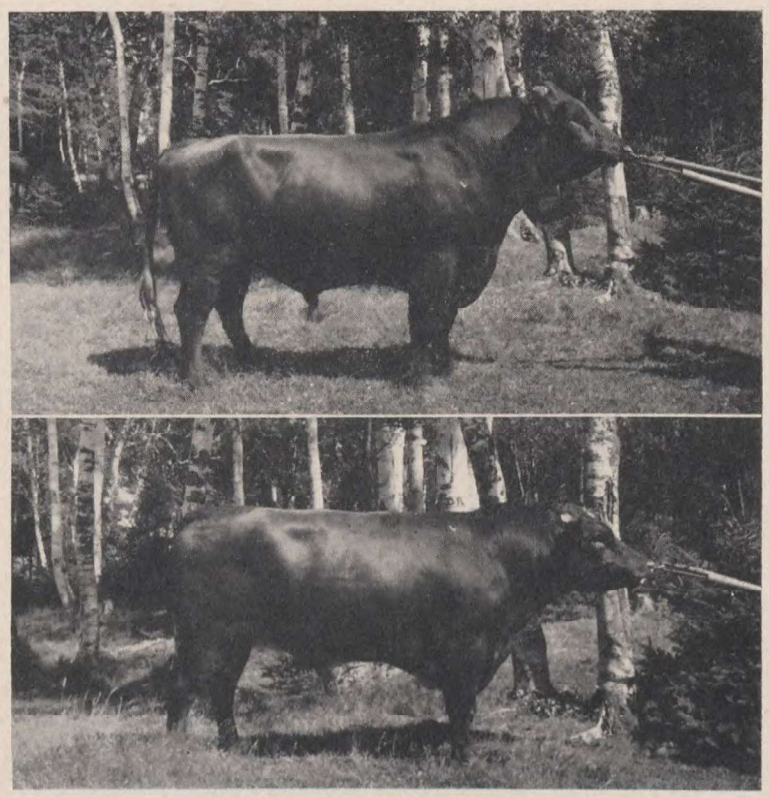

FIGURE 1. Shorthorn bulls showed wide differences in rate and economy of gain from 500 to 900 pounds body weight. Upper: this animal gained 2·26 pounds daily and required 450 pounds of meal and 280 pounds of hay per 100 pounds gain. Lower: This animal gained 1·79 pounds daily and required 587 pounds of meal and 319 pounds of hay per 100 pounds gain.

It would appear from the limited data recorded in this test that there is a wide variation in the rate and economy of gain in beef cattle. Further beef progeny trials will be undertaken to develop methods of testing and to investigate the possibility of developing more efficient animals through selection and breeding on the basis of performance tests.

Sheep

A flock of approximately 36 Shropshires was overwintered each year during the period covered by this report. The experimental work with sheep was limited to a study of the possibility of developing a more productive type of Shropshire through selection and breeding for less wool cover on the face.

Two types compared.—Each year the ewe flock was divided into two lots with an equal number of ewes in each lot. One lot was bred to a large open-faced

Shropshire ram imported from the British Isles. The other lot was bred to a close-faced Shropshire ram of the standard type. Otherwise flock management and rations were the same for both lots.

FIGURE 2. Open-faced Shropshires showed increased productivity but were excelled by the close-faced type in carcass and wool quality. Left: open-faced type. Right: close-faced type.

The best ewe lambs were retained in the flock as breeders and data were recorded on the relative ability of the two strains to produce market lambs and wool. While the numbers are not large, differences between the two sire groups appear to exist. The data on the lambing percentage, birth weights, early gains, and percentage of lambs weaned are given in Table 7.

TABLE 7.—CLOSE-FACED VERSUS OPEN-FACED SHROPSHIRES—4-YEAR AVERAGE, 1949–52, INCLUSIVE

—		Close-faced Shropshire	Open-faced Shropshire
Ewes—			
Bred	No.	56	61
Lambed	No.	54	58
Lambing percentage*	%	159·3	148·3
Lambs—			
Born	No.	86	86
Average birth weight	lb.	7·3	8·0
Average daily gain to 2 weeks	lb.	0·42	0·48
Average daily gain to 4 weeks	lb.	0·41	0·50

*Based on number of ewes lambed.

Open-faced lambs heavier at birth and made more rapid gains.—The close-faced ewes showed a higher lambing percentage based on the number of lambs born over number of ewes lambed; however, this difference was not large. The open-faced lambs were heavier at birth and made more rapid growth to one month of age. The more rapid rate of gain made by the open-faced lambs may be an indication that the open-faced ewes are heavier milk producers than the close-faced ewes.

Lamb gains and market data.—Lambs were marketed upon reaching a live weight of 80 pounds provided they carried sufficient finish. The gains and marketing results are shown in Table 8.

TABLE 8.—LAMB GAINS AND MARKET DATA—CLOSE-FACED VERSUS OPEN-FACED SHROPSHIRES—4-YEAR AVERAGE, 1949-52, INCLUSIVE

—		Close-faced Shropshire	Open-faced Shropshire
Lamb gains—			
Lambs marketed	No.	42	38
Average market weight	lb.	81	85
Average daily gain	lb.	0·26	0·33
Market data—			
Average dressing percentage	%	45·7	43·5
"A" grade carcasses	%	69	50
"B" grade carcasses	%	26	29

Close-faced lamb carcasses superior.—The progeny of the open-faced sire showed more rapid gains but they were not so well finished nor so desirable in conformation. This is indicated by their lower yield and the smaller percentage of "A" grade carcasses.

Open-faced fleeces were heavier but coarser.—The relative production and quality of wool from the two strains is of interest since wool contributes considerably to the return from the sheep enterprise. Average grease-wool yields per head were 6·8 and 7·5 pounds for the close-faced and open-faced ewes, respectively. The close-faced fleeces were finer, 76 per cent of the fleeces from the one- to three-year-old ewes were graded 56's to 58's, but only 54 per cent of the fleeces from open-faced ewes of the same age were in this grade.

Swine

The swine facilities provide accommodation for the rearing of approximately 16 litters annually. During the past five years the swine work was limited to experimental feeding trials. The herd was also a source of Yorkshire breeding stock from animals qualified in the Advanced Registry test for purebred swine.

Feeding Experiments

The nutritional work with swine was concerned with the effect of the addition of feeding supplements to growing and fattening rations, and with methods of feeding market hogs.

Vitamin B_{12} Aureomycin feeding supplement in the hog ration.—A number of feeding tests have been reported showing a considerable improvement in the performance of hogs when a feeding supplement containing vitamin B_{12} and antibiotic substances or the latter alone was included in the ration. However, there is little information on the value of these materials in the ration for bacon-type hogs fed typical Canadian rations.

Antibiotic supplement increased rate of gain.—The value of a vitamin B_{12} aureomycin feeding supplement was studied in a trial involving 72 pigs in six lots. The pigs were started on test at approximately 30 pounds live weight and fed to a market weight of about 200 pounds. The vitamin B_{12} aureomycin feeding supplement under test was included with each of three main protein feeds in six lots as follows:

Lot 1—Linseed oilmeal.

Lot 2—Linseed oilmeal plus vitamin B_{12} aureomycin supplement.

Lot 3—Soybean oilmeal.

Lot 4—Soybean oilmeal plus vitamin B_{12} aureomycin supplement.

Lot 5—Fishmeal.

Lot 6—Fishmeal plus vitamin B_{12} aureomycin supplement.

Barley constituted the entire basal part of the ration. The vitamin B_{12} aureomycin supplement was included in the growing and fattening rations at the rate of 0·5 per cent.

The results of this trial to date show that:

(*a*) The pigs that received the vitamin B_{12} aureomycin feeding supplepent made six per cent faster gains than the pigs that were fed the same rations without this supplement.

(*b*) The supplement was less effective in the rations containing fishmeal and soybean oilmeal than in the ration containing linseed oilmeal.

(*c*) There was no difference in average daily feed consumption between the pigs receiving the supplement and those receiving the same ration without the supplement.

(*d*) The average feed efficiency of the pigs receiving the supplement was four to seven per cent above that of the pigs on the same rations without the supplement. The greatest effect in this respect was with linseed oilmeal and the least with fishmeal.

(*e*) Carcass quality was not influenced by the supplement with fishmeal or soybean meal but there appeared to be some lowering of carcass quality when the supplement was added to the linseed oilmeal ration although this may not be significant.

Seaweed Meal for Hogs

A survey of the shores of southwest Nova Scotia reveals a large tonnage of several species of seaweeds. It is therefore of importance to study the possibility of utilizing a meal prepared from this material for the feeding of livestock.

In this trial six lots of twelve pigs each were used. They were fed from a live weight of 40 pounds to a market weight of 200 pounds on the rations shown in the following table:

TABLE 9.—COMPOSITION OF RATIONS

Lot	1		2		3		4		5		6	
Period*	A	B	A	B	A	B	A	B	A	B	A	B
Barley	83·0	91·0	81·0	89·0	79·0	87·0	78·0	86·0	90·0	94·0	88·0	92·0
Tankage	16·0	8·0	16·0	8·0	16·0	8·0	16·0	8·0				
Fishmeal	.....	.....	.....	.....	.....	.....	.....	.....	9·0	5·0	9·0	5·0
Seaweed meal	.....	.....	2·0	2·0	4·0	4·0	6·0	6·0	.....	.....	2·0	2·0

* The A ration was fed until the pigs reached an individual live weight of 100 to 110 pounds, after which the B ration was used.

The seaweed meal consisted almost entirely of one species of rockweed.

A mineral supplement made up of one-half pound each of ground limestone and salt was added to each of the above feed mixtures except that of Lot 4.

Gains and carcass quality. — Table 10 gives the data on the daily gains, percentage "A" grade carcasses and the average Advanced Registry carcass score for each lot.

TABLE 10.—EFFECT OF SEAWEED MEAL ON THE GAINS AND CARCASS QUALITY OF BACON HOGS

Protein supplement		Tankage				Fishmeal	
Seaweed meal	%	0	2	4	6	0	2
Average daily gain	lb.	1·48	1·52	1·48	1·48	1·61	1·63
"A" grade carcasses	%	33	75	58	58	42	67
A.R. carcass score		77·5	78·4	78·7	80·3	77·6	83·3

Seaweed meal may form at least six per cent of the ration.—From the results, it would appear that seaweed meal may form up to at least six per cent of the ration, from a live weight of 40 pounds to finish, without any harmful effects or without significant influence on rate of gain. There was some indication of improved carcass quality with the feeding of seaweed meal.

Self Versus Hand Feeding of Hogs

The feed mixtures commonly used for self feeding of hogs are the same as those for hand feeding. There is a possibility that rations that are satisfactory for hand feeding may be less satisfactory for self feeding, particularly from the standpoint of carcass quality.

Four lots compared.—A project to study this problem was undertaken in co-operation with a number of Agricultural Colleges and other Experimental Farms. Two trials of four lots each, (8 pigs per lot), were conducted. Treatments were as outlined in the following plan:

Advanced Registry Feeding Station ration throughout		A.R. Feeding Station ration to average live weight of 125 lb. Bran diluted ration to market weight	
Hand fed	Self fed	Hand fed	Self fed

The rations were made up as shown in the following table:

TABLE 11—COMPOSITION OF RATIONS

—	A.R. Feeding Station ration		Bran diluted ration	
	From start of test to 125 lb. live weight	From 125 lb. live weight to market weight	From start of test to 125 lb. live weight	From 125 lb. live weight to market weight
	lb.	lb.	lb.	lb.
Barley	43	46	43	36
Wheat	17	18	17	14
Oats	25	28	25	22
Wheat bran	..	..	..	20
Protein-mineral supplement	15	8	15	8

Gains, feed efficiency, and carcass quality.—A summary of the results is given in Table 12.

TABLE 12.—GAIN, FEED CONSUMPTION, AND CARCASS QUALITY OF SELF- VERSUS HAND-FED BACON HOGS

Ration		A.R. ration throughout		A.R. ration to 125 lb. A.R. ration plus 20 per cent bran to finish	
Method of feeding		Hand fed	Self fed	Hand fed	Self fed
Average daily gain	lb.	1·46	1·58	1·46	1·50
Meal consumed per 100 lb. gain	lb.	399	407	404	430
"A" grade carcasses	%	75	50	50	25
A.R. carcass score	..	73	71	75	71

Lower carcass quality with self feeding.—The self-fed pigs on the A.R. ration throughout made somewhat better gains but the percentage of "A" grade carcasses was greater for the hand-fed pigs.

There was little difference in rate or economy of gain from hand feeding the bran-diluted Advanced Registry fattening ration. However, the self-fed pigs on this ration produced inferior carcasses.

Pasture Investigations

The greatest returns from labor in the production of meat and milk are made when the animals are on pasture. Tests have shown that these returns may be greatly increased by the use of fertilizers.

Commercial Fertilizer for Permanent Pasture

To study the possibility of improving sod pasture, without plowing, various fertilizers were applied to one-acre permanent pasture fields. The kind and amount of fertilizer applied per acre on each field and the frequency of application are shown in Table 13.

TABLE 13.—FERTILIZER TREATMENTS (PER ACRE)

Field	Fertilizer materials applied	Amount (pounds)	When applied
A	Superphosphate (P) Muriate of potash (K)	480 100	Every third year.
B	Ammonium sulphate (N) Superphosphate (P) Muriate of potash (K)	100 480 100	Every year. Every third year.
C	Ammonium sulphate (N) Superphosphate (P) Muriate of potash (K)	100 480 100	Every year.
D	Superphosphate (P)	480	Every third year.
E	Check (no fertilizer)		

The production of the fields was measured by the gains in live weight made by yearling and two-year-old Jersey and Shorthorn heifers. The gains made by the animals on the different fields over the seven-year period from 1945 to 1951 inclusive, are shown in Fig. 3.

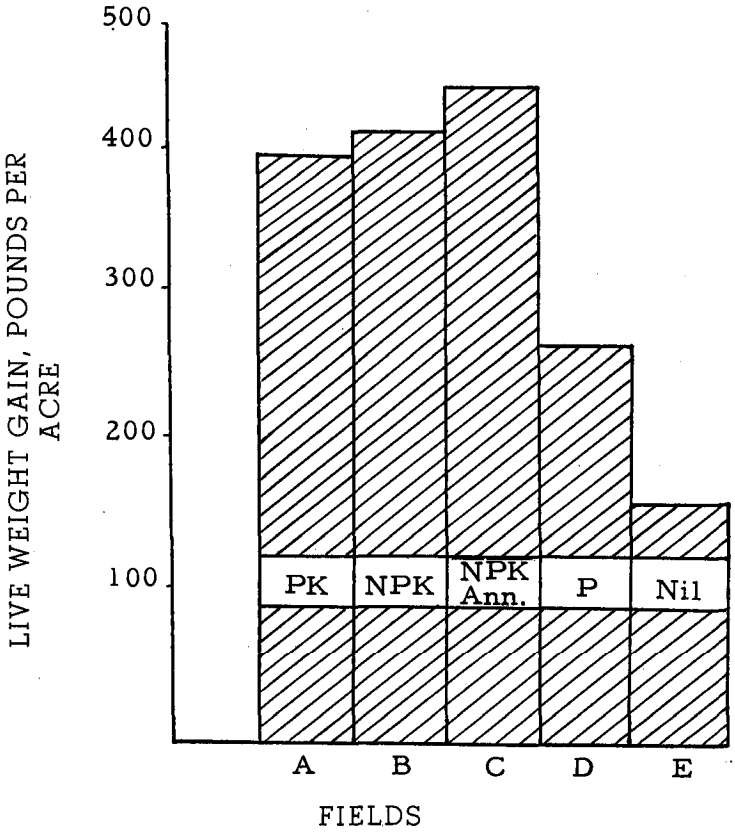

FIGURE 3. Average yearly live weight gain per acre from 1945 to 1951

Fertilizer Increases Pasture Yields

The results may be summarized as follows:

(*a*) Fields receiving superphosphate and muriate of potash produced over 100 per cent more gain in live weight than did the untreated field.

(*b*) Annual applications of superphosphate and muriate of potash produced only slightly more gain than did the application of these fertilizers every third year.

(*c*) There was little difference in the live-weight gain between the field that received superphosphate and potash with and without ammonium sulphate.

CEREAL CROPS

J. D. E. STERLING AND H. A. RIORDON

The acreage of the various cereal crops grown in Nova Scotia has not changed to any extent during the past five years. Seedings of mixed oats and barley have increased slightly. Since an intensifying grassland program involves frequent reseedings, grain production may increase to a certain extent in the near future.

As in the past, varietal recommendations are based on the performance of varieties on test at strategic locations throughout the province. The varieties discussed in this report are those worthy of immediate consideration.

Oats

Oats (with some 60,000 acres), are the major grain crop in Nova Scotia. Thus, most of the cereal work at this Farm concerns this crop. The work is divided into oat breeding projects and variety and strain testing for production performance.

With the exception of losses caused by a disease first reported in Nova Scotia in 1949, there are no new production problems. This disease, *Septoria avenae,* is identified by a characteristic leaf blotch and stem rot. Stem rot appears in the form of blackened areas beginning about six inches above the ground. Straw breakage is particularly severe at these rotted areas during a dry season such as was experienced in 1952. No varieties are known to be resistant to the disease, and plant breeding staffs throughout Eastern Canada are now concentrating on a search for such material.

Oat Breeding

The main objective of the oat breeding program is to develop varieties high in whole-kernel and groat yield and possessing high resistance to lodging and to the diseases prevalent in the area. With few exceptions, producers prefer varieties that can be classed as "medium" in maturity.

A new variety, Scotian, has been developed.—Through the combined efforts of cereal breeders at the Central Experimental Farm, Ottawa and the Experimental Farm, Nappan, N.S., a new variety, Scotian, has been developed from the Vanguard ×Erban cross. Varieties previously derived from this cross are Beaver and Abegweit. Scotian resembles Beaver in maturity, disease resistance, and in general plant characteristics. The decision to make this variety available to producers was reached on the basis of its superior yielding ability, its good resistance to lodging, and its maturity, which is satisfactory in the major oat-producing areas of the province.

Seed of this variety will be available in limited quantities in the spring of 1954.

Strength of straw improved.—Annual losses resulting from lodged crops are high and considerable attention is now being given to developing varieties with greater lodging resistance. Oat hybrid 4274, derived from a cross between Ardri and Clinton, has produced several lines that excel in straw strength. The possibility of selecting high yielding material within these lines is good.

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Oat Variety Trials

Performance trials of oat varieties and strains were conducted at 15 locations throughout Nova Scotia. Information obtained from these tests is used as a basis for recommending varieties for the province.

FIGURE 4. Severe straw breakage in Beaver oats caused by stem rot.

TABLE 14.—AVERAGE WHOLE-KERNEL YIELD IN BUSHELS PER ACRE, GROAT YIELD IN POUNDS PER ACRE AND DAYS-TO-MATURITY OF OAT VARIETIES AT 15 LOCATIONS IN NOVA SCOTIA, 1947–52, INCLUSIVE

Variety	Whole-kernel yield (53 trials)	Groat yield† (43 trials)	Days to maturity* (9 trials)
	bu.	lb.	days
Scotian	61·7	1,507	94·4
Abegweit	60·6	1,428	97·6
Erban	59·1	1,426	94·8
Beaver	57·3	1,414	94·0
Ajax	58·5	1,372	91·8

†—Groat yield (hulled kernel) average based on data 1949–52, incl.
*—Days-to-maturity determined from Nappan trials.

On the basis of the performance of the varieties listed in Table 14, it is recommended that in Nova Scotia, Scotian should replace Erban, Beaver, and Ajax. While this variety is most generally suited throughout the province, certain growers find that a later-maturing variety is more suitable in their production program. Abegweit is recommended in such cases.

Oat Lodging Studies

The Cereal Crops Division, Central Experimental Farm, Ottawa, undertook leadership in a study of the causes of lodging in oats in order that plant breeders might conduct their breeding programs on a sounder basis in relation to this problem. Results were based on a standard series of plots studied at several Experimental Farms and Stations throughout Canada.

The conclusions reported by the project leader were as follows: "differences in development of basal culms, along with differences in root anchorage and height of plants, seem to reveal to a large extent why certain varieties are able to resist bending and uprooting better than others. Large culms not only have more internal strengthening tissue but appear to be associated with better root anchorage and a more robust type of plant in general. In other words, there is evidence to show that lodging is associated with the anchorage of the plant to the ground. Resistant oat varieties appear to have sufficient anchorage to withstand the force exerted on the panicles, culms, and leaves when they are being blown back and forth by the wind and particularly when the soil has been softened by rain."

A complete report of this work may be found in Scientific Agriculture 31 : 286–315, July, 1951.

Barley

The barley acreage in Nova Scotia is increasing rapidly primarily because of increased seedings of mixed grain. Approximately 6,000 acres of barley and 10,000 acres of mixed oats and barley are produced annually.

Root rot caused by *Helminthosporium sativum*, has been observed in the province for several years. Until 1951, however, the damage caused by the disease was slight and of little economic importance. In that year and again in 1952 numerous fields were seriously affected by this disease.

FIGURE 5. Different varieties show varying degrees of resistance to disease, this plot of Olli barley is severely infected by root rot.

Barley Breeding

The main objective of the barley breeding program at this Farm is to combine strength of straw, resistance to loose smut and root rot, and high yield. Smooth-awned types which thresh readily are given preference in the selection program.

Strain N-C13-13 was selected from a hybrid composite of 32 strong-strawed varieties. It has smooth awns, high yield, and exceptionally strong straw. Also it is a possible source of resistance to barley jointworm, an insect which is causing

considerable concern on Prince Edward Island. Several hybrids designed to incorporate resistance to loose smut and root rot into N-C13-13 are now under study in the Maritime Provinces.

Strain 3944-N7 was selected from a cross between Montcalm and Olli. It has demonstrated high yielding ability and good strength of straw; its smooth awns are easily removed in threshing. Resistance to root rot and loose smut and increased resistance to lodging are now being added to this strain through hybridization.

Barley Variety Trials

Barley variety trials were conducted at 15 locations in Nova Scotia. The results shown in Table 15 form the basis for variety recommendations.

TABLE 15.—AVERAGE YIELD IN BUSHELS PER ACRE, DAYS-TO-MATURITY, AND AVERAGE RESISTANCE TO LODGING OF BARLEY VARIETIES AT 15 LOCATIONS IN NOVA SCOTIA

Variety	Yield (42 trials 1947–52)	Days-to-maturity* (6 trials 1947–52)	Resistance to lodging† (40 trials 1949–52)
	bu.	days	(1–9)
Montcalm	43·9	91	2·5
Charlottetown No. 80	43·1	95	1·9
Fort	40·9	92	2·1
O.A.C. 21	38·3	87	3·1

* Days-to-maturity determined from Nappan Trials.
† Resistance to lodging 1 = no lodging, 9 = completely lodged.

Fort or Charlottetown 80 *are most satisfactory.*—On highly fertile soils the superior yields of Montcalm indicated in Table 15 are not generally realized because of losses resulting from lodging. On such soils Fort displays a superior resistance to lodging and, although its plot yield is usually lower than that of Montcalm or Charlottetown 80, the amount of grain that can be harvested is frequently higher. The awns of Fort are usually difficult to remove in threshing.

Charlottetown #80 *best performer.*—Charlottetown #80 is generally most suited to soil and climatic conditions of Nova Scotia. Its yields are most consistent and soil fertility is not, as a rule, sufficiently high to cause excessive lodging. In mixtures with oats, Charlottetown #80 matures well with varieties such as Erban, Beaver, Scotian, and Abegweit. O.A.C. 21 is not recommended for the Province. Registered seed of Charlottetown #80 barley is produced and distributed by this Farm.

Barley Lodging Studies

A study of plant development in relation to lodging, similar to that conducted with oats, is now being made with barley. Findings will be reported at a later date.

Spring Wheat

At the present time the spring wheat acreage in Nova Scotia approximates 1,000 acres. Although this crop is not generally so well adapted to the province as are oats and barley, it can be very profitably grown if well-drained, fertile fields are selected. Many poultry producers, particularly those with small or average-sized flocks, have found it advantageous to grow their own feed wheat. Earlier maturing varieties would be of definite advantage in this area and the development of such varieties is now being given particular attention by plant breeders.

TABLE 16.—AVERAGE YIELD PER ACRE AND DAYS-TO-MATURITY OF THREE SPRING WHEAT VARIETIES IN EIGHT TRIALS, 1945-52, INCLUSIVE

Variety	Bushels per acre	Days-to-maturity
Acadia	39·3	100
Cascade	37·7	100
Huron	36·3	103

Acadia Excels

Acadia, a hard, red, bearded wheat, was first distributed to growers in 1952. It was developed particularly for conditions in Eastern Canada and is recommended only in that area. This variety has been on test in Nova Scotia since 1941 and its performance leaves no doubt that it is superior to all other varieties being grown in the province. In addition to high yield, Acadia possesses moderate resistance to prevailing forms of leaf and stem rust, loose smut, and root-rot. It is resistant to bunt and black chaff. Seed of Acadia is produced and distributed by this Farm.

Cascade has the serious disadvantage of being very suceptible to sprouting in the stook. In this area, where harvesting conditions are frequently unsuitable, it is not a highly recommended variety. This is a semi-hard, white grained, beardless variety.

Although yields of Huron are occasionally exceptionally high, it is susceptible to the rusts and in years when these diseases are present, heavy losses are encountered.

Winter Wheat

Although winter wheat has many advantages in an agricultural program, it is not widely used in this province. The percentage of land in Nova Scotia that is plowed by late August or early September, when winter wheat should be sown, is small. This situation is changing somewhat with the increasing use of grass silage, and winter wheat may find a place under this cropping system. This crop is very useful in preventing sheet erosion during the fall, winter, and early spring. It is generally harvested during early August, when climatic conditions are usually favorable.

TABLE 17.—AVERAGE YIELD IN BUSHELS PER ACRE OF WINTER WHEAT VARIETIES AT TWO LOCATIONS, 1945-52, INCLUSIVE

Variety	Nappan* Bushels per acre	Pictou† Bushels per acre
Yorkwin	37·8	.....
Fairfield	36·4	37·0
Rideau	36·4	36·7
Kawvale	32·9	.....
Kharkov M.C. 22	25·9	33·3

* Years 1948 and 1949 omitted at Nappan.

† Years 1948 and 1950 omitted at Pictou.

Consistent High Yields from Fairfield

Yorkwin lacks the winter hardiness of Fairfield and Rideau. This is reflected in lower yields during adverse seasons. Until recently Rideau was the most commonly recommended variety for the province. Fairfield has at least equalled the average yield of Rideau and its performance has been more consistent.

FIELD HUSBANDRY

E. T. GORING AND L. P. JACKSON

The work of this Division includes weather recording; studies of the value of manure, fertilizers, and limestone; the control of weeds; rates of seeding; and the cost of crop production.

During the past five years rainfall has varied from a high of 48·2 inches in 1951 to a low of 34·7 inches in 1952. Winter snow cover has varied from 134 inches of snow in the winter of 1951–52 to 33 inches in the winter of 1952–53. With variations such as these the results of experiments conducted during these years are of particular interest, as they should be applicable to any conditions that are apt to occur.

In general, the past five years have been good crop years. The only exception was 1952 when late seeding, followed by extremely dry weather, cut the yields of grain crops in half, and materially reduced the yields of clover meadows.

Manure and Fertilizers

A knowledge of the amounts and combinations of manure and fertilizers that may be expected to give the most satisfactory returns is necessary in planning a cropping program. Many projects have been undertaken to study these problems on upland and marshland soils, both on the Farm property and in co-operation with farmers in Cumberland county.

Manure is Important

The most important factor in maintaining fertility on upland soils is the proper use of manure to replace fertility and build up organic matter in the soil. In one experiment, begun twenty-nine year ago, manure was plowed under for swede turnips in a four-year rotation at rates of 12, 16, and 20 tons per acre, in comparison with no manure. The yields and returns are given in Table 18.

TABLE 18.—AVERAGE YIELDS AND VALUE OF CROPS GROWN WITH DIFFERENT RATES OF BARNYARD MANURE, 29-YEAR AVERAGE, 1924-52, INCLUSIVE

Rate of applying manure per acre	Average yields per acre				Average annual value of crop
	Swedes	Oats	Clover hay	Timothy hay	
tons	tons	bu.	tons	tons	$
0	2·87	31·8	0·56	0·83	11·38
12	11·70	43·7	1·11	1·39	21·29
16	12·95	48·6	1·38	1·60	24·17
20	13·88	50·4	1·56	1·84	26·04

It may be noted in Table 18 that twelve tons of manure applied every four years gave an annual return over the check of $3.30 per ton of manure, while an additional four tons gave only an annual increased return of $2.88 a ton, and a further four tons only $1.87 per ton. Where manure is in short supply, as it is on most farms in Nova Scotia, greater returns from the manure will be obtained where it is applied at a moderate rate over as large an acreage as possible, than where it is spread lavishly on a small area.

Manure Alone Will Not Maintain Yields

In this same experiment, the yields have been decreasing since the experiment began. For the first ten years the decline was small, then very rapid for some years, and now the yields are declining more slowly. The yields for the past five years have been only 70 per cent of those for the first five-year period. With all rates of application the decrease has followed the same trend. Manure alone, even when applied at twenty tons per acre every fourth year, was not sufficient to maintain yields in this experiment.

Manure and Fertilizer Combined Increase Yields

Another experiment has been conducted since 1936, in which combinations of manure and chemical fertilizer have been applied on swedes, potatoes, or corn in three-year rotations, consisting of hoed crop, oats, and clover.

In this test the manure has been supplemented with chemical fertilizers. Comparisons of the yields for the first three years of the test with those of the last three show that while the manure alone has barely maintained production, the combination of manure and fertilizer has resulted in increasing yields.

An experiment was started in 1936, in which various rates of different fertilizers were applied broadcast before the hoed crop in a three-year rotation consisting of hoed crop, (swedes, potatoes, or corn), oats, and clover hay. The fertilizer formulae used were 2-12-6 for swedes, 4-8-10 for potatoes, and 4-8-8 for corn.

Rate of Applications Most Important

The results show that these formulae can be varied somewhat without affecting the yields, provided that all three elements are included in the mixture. Since the start of this experiment, the basic commercial fertilizer formulae on the market have been changed to 3-15-6 and 5-10-10. These changes, made to eliminate the use of filler, have not been large, and the results of this trial are applicable to the new fertilizer formulae. The rate of application had a far greater effect than variations in the formulae.

In Table 19 the average yields of the crops in the potato rotation are presented as an example of the effects produced by fertilizer rates.

TABLE 19.—YIELDS PER ACRE OF POTATOES, OATS, AND CLOVER IN RESPONSE TO 4-8-10 FERTILIZER APPLIED AT SIX RATES FOR POTATOES IN A THREE-YEAR ROTATION, 1936-52, INCLUSIVE

Rate of 4-8-10 in pounds per acre applied to the potato crop	Potatoes marketable size av. 17 yr.	Oats av. 16 yr.	Clover hay av. 15 yr.
	bu.	bu.	tons
No fertilizer (check)	75·6	53·1	1·09
500 lb.	131·7	55·8	1·75
1,000 lb.	183·8	53·6	1·92
1,500 lb.	220·7	57·3	2·02
2,000 lb.	240·1	64·4	2·05
3,000 lb.	241·8	70·1	2·05

Fertilizer at 2,000 lb. per acre is upper limit for potatoes.—The balance between the cost of the fertilizer and the value of the increased yields, will determine the point at which an increase in the application of fertilizer to potatoes on a clay loam soil will be profitable, but these results show that there is a definite limit at 2,000 pounds.

In the rotation where 2-12-6 fertilizer is applied for swedes, at rates of 500, 750, 1,000, and 1,500 pounds per acre, yields show a trend similar to those in Table 19. At current prices the 750-pound rate would have shown a profit, but the larger applications would not.

With corn, during the past five years, it is doubtful if applications of more than 500 pounds of a 5-10-10 fertilizer would have shown any profit, on the basis of the yields obtained in this experiment.

FIGURE 6. Manure and fertilizer combined give best results with potatoes. Upper: No manure or fertilizer—average yield 17 years 122 bushels. Centre: 4-8-10 fertilizer at 1,000 pounds per acre—average yield 17 years 293 bushels. Lower: 4-8-10 fertilizer and 10 tons manure per acre, 354 bushels per acre average yield 17 years.

FIGURE 7. A complete fertilizer is necessary for swedes. Upper: Nitrogen and potash, no phosphorus. Centre: Nitrogen and phosphorus, no potash. Lower: Nitrogen, phosphorus, and potash. Average yields for the latter treatment over a 17-year period were 47 per cent greater than the first and 14 per cent greater than the second.

Liming is an Essential Practice

The application of ground limestone serves two purposes. It supplies the essential element calcium, required as a plant food, and it neutralizes soil acidity.

Tests have shown that liming is one of the most important treatments that can be given to the soils of the Maritimes. All soils require lime to a greater or lesser degree, and sound farming plans should include liming. While the actual requirements for any soil can be ascertained only by analysis, tests have shown that in general, at least two tons, and usually more, of ground limestone per acre are required on soils where liming has not been practised.

Lime can be applied in many ways.—An experiment was begun six years ago, to determine whether limestone should be plowed in, harrowed into plowed soil, or applied on the surface. Three tons per acre of ground limestone was the rate used, and the results in Table 20 show that it makes very little difference when or how it is applied.

TABLE 20.—RESPONSE OF CROPS TO PLACEMENT OF LIMESTONE IN A ROTATION, 1947-52, INCLUSIVE

Limestone application per acre	Yields per acre			
	Swedes average 6-year	Oats average 6-year	Clover hay average 5-year	Timothy hay average 4-year
	tons	bu.	tons	tons
3 tons harrowed in before swedes	9·13	51·6	1·51	1·63
3 tons harrowed in before oats	9·09	49·7	1·65	1·54
3 tons on oat stubble before clover	8·04	50·0	1·74	1·55
3 tons on timothy sod plowed under	9·19	52·3	1·58	1·42

While the yields reported in this table are not large, the point of interest is that the variations are so small that they are not worth considering.

The first application of limestone will give a quicker effect if it is harrowed into plowed soil, but succeeding applications can be made when most convenient. However, tests have proved that if the rotation is to be of long duration with several years of hay, it is inadvisable to apply the lime on the early years of grass, since it may have a depressing effect on yields of hay if it is not worked into the soil.

Blast lime is equal to ground limestone.—Some comparisons have been made with Sydney blast lime and ground limestone. All results indicate that ton for ton, the materials are of equal value for agricultural uses. The blast lime has been a little slower to act, but is more easily stored and is easier to spread by hand if machinery is not available.

Major Soil Types

Five tests begun in 1945 were conducted on Tormentine, Pugwash, Nappan Queens, and Acadia soil types in co-operation with farmers. Four of the soil types are upland soils, while the fifth, Acadia, is the soil of the marshlands. The first four types respond, to a greater or lesser degree, in the same way to treatments, but Acadia soil responds differently. All soils have responded to applications of ground limestone, and to the use of phosphate fertilizers. The Acadia type responds to lime and fertilizers, and gave little returns from manure, whereas the upland soil types have all shown a very definite need of organic material in the form of manure. Nitrogen has been profitable on upland soils, but not on marsh soil. On upland soils potash, in combination with the other elements, has been beneficial.

On the basis of these results, recommendations for general cropping in a hay-grain rotation on all upland soil types tested are: liming to correct soil acidity, manure, at about 12 tons per acre, to increase organic material; and 3-15-6 fertilizer at 350 to 500 pounds per acre. The fertilizer is applied on the grain crop and the manure on the hay.

Marshland Improvement

Studies have been continued on practical methods of improving the yields of crops grown on marshland. Experiments laid down years ago, have been continued, and attention has been turned to problems of drainage.

Limestone Pays Well on Marshland

Experiments begun in 1922, show that next to drainage, liming is the most essential practice on marshlands. Applications of ground limestone without any other fertilizer treatment, have increased yields of hay in an eight-year rotation by 23 per cent. From the returns obtained each year it has been computed that for each dollar spent on ground limestone, a return of $7.90 was obtained from the increase in the crop.

Superphosphate Also Pays

While liming is the most necessary practice on marshland, fertilization also is worthwhile. The three major elements have been tried and of these, only phosphorus has been profitable. When applied at 250 pounds per acre every third year, it has increased yields of oats by 34 per cent and yields of hay by 8 per cent. Over a period of 17 years every dollar spent for superphosphate has returned $5.37 in increased yields. The most profitable combination has been superphosphate and ground limestone. Nitrogen has given small increases in yields but these have not been sufficient to pay for the fertilizer. Potash, whether applied alone or in combination with other elements, has failed to give any increase, and in many instances has reduced the yields.

Manure Is More Profitable on Upland

Experiments have been undertaken comparing barnyard manure and chemical fertilizers on marsh flats. The results show that while manure will give profitable results on marsh soil, an application of 8 tons does not equal 200 pounds of fertilizer per acre on a four-year rotation of grain and hay. As manure is usually in short supply it is recommended that it be reserved for upland areas and that chemical fertilizers be used on marsh soils.

Drainage Methods Under Study

The conventional dale ditch method of drainage has certain serious drawbacks. The ditches are expensive to maintain in working condition; it is not easy to work the flats with tractors and large machinery; and this type of ditching does not lend itself to pasturing, as the livestock tramp the ditch banks and cause them to cave in, ruining the drainage system. Projects have been started with wider flats, and different shapes of ditches, but the work has not advanced far enough for definite results, although certain ideas appear to be promising.

Rates of Seeding Oats and Barley

No appreciable difference in yield of crops was obtained when nurse crops of oats or barley were sown at three different rates. The lowest rates produced as large yields of grain as the higher rates and were followed by slightly larger yields of clover and timothy hay crops. The rates tested were, with oats, 2, 2¾, and 3½ bushels, and with barley, 1½, 2¼, and 3 bushels per acre.

These results show that on the clay loam soils of this area, 2 bushels of oats and 1½ bushels of barley are sufficient seed per acre, provided, of course, that the seed is of good quality and the soil in a reasonable state of tilth and fertility.

Liquid Fertilizers for Oats

A test was conducted comparing liquid fertilizers applied to the seed before sowing, micro-dust fertilizers in which a very minute amount of special fertilizer is sown with the seed, chemical fertilizer of a 3-15-6 formula at 350 pounds per acre, and no fertilizer. The results showed very clearly that neither the liquid nor the micro-dust fertilizer produced yields that were larger than where no chemical fertilizer was used and did not begin to equal the yields produced by 350 pounds of 3-15-6.

Herbicides

T.C.A. Can Kill Couch Grass

The weed killer, T.C.A., was used on couch grass, both on upland and marshland soils. It was applied at rates of 25, 50, 75, and 100 pounds per acre in June and in another test in September. The heaviest rates of application, that is, 75 and 100 pounds per acre, killed the couch with the June application on both soils, but the September treatment was more effective on the marshland, as even the lowest rates of application produced satisfactory control of the couch grass.

At the present price of the material, it is considered that this method of controlling couch grass on large areas is too costly. The material can be of great value, however, in cleaning out fence rows and other such areas where the couch grass cannot be controlled by cultural methods such as summerfallow, and which would serve as a source of reinfestation for fields that have been cleaned.

FIGURE 8. T. C. A. kills couch grass on marshland. Left: 75 pounds T.C.A. per acre applied in September of the previous year. Right: check plot, no treatment.

Spraying with 2,4-D Standard Practice

The herbicide 2,4-D is used to control annual weeds such as mustard on the fields of the Farm. Its use has progressed beyond that of experiment to standard farm practice. It has been found that four to six ounces of pure acid per acre gives effective control of many annual weeds. Field nettle and corn spurrey, however, have not been controlled with 2,4-D.

Other Herbicides

Polybor chlorate and Borescu have been tried on marsh ditches in an effort to kill the grasses which grow in and block the dale ditches. Neither of these materials has given satisfactory results. They appear to check the grasses, but by the next season the treated areas are not distinguishable from the untreated.

Synthetic Soil Conditioner Under Test

A test with one of the new soil conditioners that have been developed recently was begun in 1952. While the summer was so dry that the Krilium was not so effective as it might have been in more normal seasons, it was observed that soil treated with Krilium would have been workable more quickly following a rain than the untreated soil. The yield of potatoes was no greater where Krilium had been applied, but it was found that a more uniform crop was obtained with fewer small unmarketable tubers. This test is continuing with oats, followed by hay, in the rotation.

Cost of Producing Crops

A knowledge of the factors involved in producing crops may be a very helpful guide in planning a farming program. During the past 30 years records have been kept on operations performed in producing the commonly grown crops of eastern Nova Scotia. These operations can be measured in several ways, either in dollars and cents, or in terms of the work involved. The advantage of using the later system, is that every farmer can apply local or seasonal prices to these terms and arrive at the cash costs, whereas the former gives an inelastic picture of conditions that exist in one locality.

Methods have changed, especially with respect to the use of tractors and machinery. The data presented in the following table are the averages for the past ten years. During this period, the growing of swede turnips was discontinued and grass silage has been introduced. The figures for these two crops are for eight and three years respectively.

TABLE 21.—AVERAGE HOURS PER ACRE OF MAN, HORSE, AND TRACTOR LABOR REQUIRED TO PRODUCE CERTAIN CROPS DURING THE PERIOD 1943-52, INCLUSIVE

Crop	Man hours	Horse hours	Tractor hours	Yield	Pounds T.D.N. per man hour
				bu. or tons	
Oats (10 years)	16·0	6·6	5·4	47·9	71
Barley (10 years)	11·2	5·9	3·3	26·1	87
Clover hay (10 years)	13·7	12·5	1·3	2·33	178
Timothy hay (10 years)	13·8	10·7	1·9	2·98	211
Swedes (8 years)	147·9	44·9	9·0	18·22	24
Grass silage (3 years)	14·4	4·1	4·5	7·04	187

In order to arrive at a comparison, the yields per acre have been converted into terms of "Total Digestible Nutrients" (T.D.N.) using the analyses given in Morrison's "Feeds and Feeding" 21st edition. Dividing these figures by their respective man hours, gives the comparative production of feed per hour of human effort as shown in the extreme right hand column. These figures on the product of man labor explain the increasing use of grass silage and the rapid decrease in swede production.

The yield of grass silage has not been high. The season of 1952, in particular, was poor, with production between five and six tons per acre. In spite of this, the production of feed per man hour was surpassed only by timothy hay, where yields over a 10-year period have been very satisfactory with almost three tons per acre.

Comparing the production from the cereal crops, it would appear that on productive land the barley crop will give greater returns than oats for the labor involved in its production, and that this crop should be receiving more attention.

FORAGE CROPS

J. D. E. Sterling and J. E. Langille

Advances in forage crop production in Nova Scotia during the past few years can, for the most part, be measured in terms of increased acreage of improved pasture and increased production of grass silage. A survey conducted by the Nova Scotia Department of Agriculture in 1949 showed production of such silage on 37 premises in Nova Scotia. Similar surveys in 1951 and 1952 reported 381 and 500 silos in operation, respectively. Producers who have previously found it necessary to limit the amount of leguminous species, such as red clover and alfalfa, because of the difficulty in curing this type of hay, are now profiting from the use of increasing percentages of these types.

The general theme of improved grassland farming is having a desired effect on pasture improvement through the use of more productive and nutritious species.

The major objective of the Forage Crops Division at this Farm is to produce new forage crop varieties that are specifically adapted to Maritime conditions and to introduce and test species and varieties developed in other areas.

Timothy

Timothy remains the most widely used grass in cultivated hay and pasture mixtures in Nova Scotia. The species is faulted particularly for its low production of aftermath.

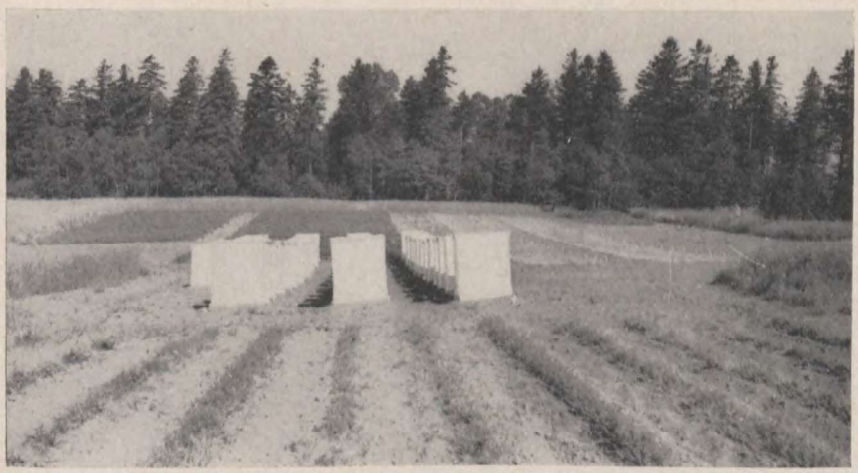

Figure 9. Late maturing timothy strains are being developed. Crossing is controlled through the use of these cages.

Marshland hay, which is composed largely of timothy, is generally harvested after upland crops and is usually past the most nutritious stage when cut. An extensive breeding program was designed to develop later maturing varieties with high productivity for the dykelands in particular. A number of selections have been made. These indicate ability to transmit highly desirable characters to their progeny in crosses. They mature two to three weeks later than commercial timothy. A number of varieties have been produced by crossing these selections in various combinations. These varieties will be placed on test in 1953.

New timothy trials containing a large number of varieties and strains were established in 1951 and 1952. Definite conclusions cannot be drawn until more data have been obtained.

The superiority of Climax, Milton, Medon, and Drummond over general commercial timothy is evident. Of the four, Climax and Milton have given the best performance to date.

Red Clover

Red clover is the most commonly used cultivated legume in Nova Scotia. There are two types, single-cut red clover and double-cut.

Several newly introduced varieties have been placed on test; however, more data are required before specific recommendations can be made regarding these.

The rapidly growing interest in pasturing aftermath is increasing the popularity of double-cut types. In favorable years a considerable acreage of aftermath is profitably used in seed production. The varieties Dollard and Ottawa are high yielders in this group and are superior to commercial red clover.

Each year a considerable amount of seed is imported from countries whose winter climatic conditions are more moderate than those of Canada.

Twenty-six samples from seed imported during 1949 were studied during 1950 and 1951. The average winterkilling of crops produced from Canadian seed was 15 per cent while that of the imported lots was 66 per cent.

It is recommended that growers purchase seed with caution and, whenever possible, obtain seed that is known to have been produced in an area where climatic conditions approximate those of their own area.

Alfalfa

With drainage improvements and the use of lime, alfalfa is gradually becoming recognized as a useful species in Nova Scotia's agriculture. When grown under suitable soil conditions this crop provides an abundance of highly nutritious hay, silage, or pasture. As pasture, it should not be grazed too close to the ground.

The object of the alfalfa breeding program at this Farm is to develop varieties that are capable of long-term high productivity on the acid soils of the Maritime Provinces. A large number of agronomically desirable, hardy plants have been selected. These and their progeny are being studied under conditions of high soil acidity in a search for suitable breeding stocks.

The number of alfalfa varieties and strains available for testing has increased rapidly as a result of expanding breeding programs. In view of the interest now being shown in this crop in Nova Scotia, the alfalfa testing program at this Farm has also increased. The majority of new varieties have not proved sufficiently hardy for this area and only those varieties that have indicated satisfactory survival are considered in Table 22.

TABLE 22.—AVERAGE YIELD IN TONS OF DRY MATTER PER ACRE OF ALFALFA VARIETIES IN NOVA SCOTIA, 1950-52, INCLUSIVE

Variety	Tons dry matter per acre
Rhizoma	2·34
Ladak	2·27
Viking	2·22
Grimm	2·02
Canauto	1·77
Ranger	1·72
Ferax	1·64

The data accumulated on the performance of Rhizoma indicate that this variety is well adapted to conditions in Nova Scotia. In addition to its high yield, it is recommended because it is equivalent in hardiness and aftermath production to Ladak and Grimm. Viking is as hardy as these three varieties but is inferior in aftermath production.

Alfalfa seed was obtained from countries that frequently export seed to Canada. Crops from this seed were compared with Canadian-grown seed for hardiness. An average of 49 per cent killing occurred in the foreign varieties while only 5 per cent occurred in Canadian varieties. The importance of using seeds produced under Canadian, or similar climatic conditions is again demonstrated.

Hay and Pasture Mixtures

In 1951 the following grass and legume species were seeded in various combinations in order that their usefulness for hay and pasture production might be ascertained: timothy, brome grass, meadow fescue, Kentucky blue grass, reed canary grass, red top, single-cut red clover, double-cut red clover, alsike, Grimm alfalfa, Rhizoma alfalfa, birdsfoot trefoil, white Dutch clover, and ladino clover. The eighteen mixtures involved are being studied under three types of management; (1) two years as hay followed by one year as pasture, (2) one year as hay followed by two years as pasture, (3) three years as pasture. In this trial the pastures are clipped frequently to simulate grazing.

Swede Breeding for Clubroot Resistance

Although grass-legume silage has largely replaced roots in livestock rations in the Maritime Provinces, many still find the swede crop profitable. A common practice is to market those roots that have good table type and to feed the remainder of the crop.

FIGURE 10. A purple top, yellow fleshed hybrid developed from crosses between Danish Giant, Wilhelmsburger, and Laurentian. It is highly resistant to clubroot and has good quality.

Since 1944 approximately one thousand swede hybrids have been studied for clubroot reaction at this Farm. Several of these hybrids have provided a desirable combination of quality and resistance to clubroot. Although further selection is necessary, these hybrids will form the foundation of a new variety or varieties.

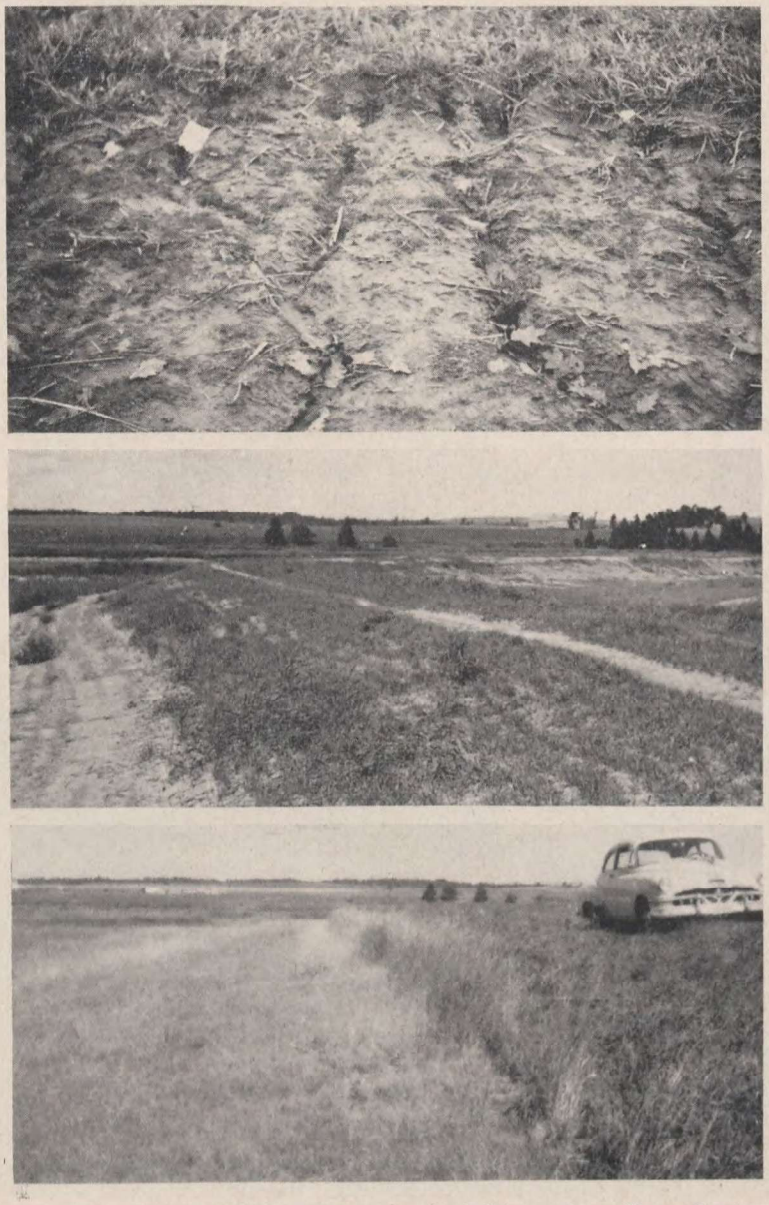

FIGURE 11. Certain varieties of grass can retard dyke erosion. Upper: Erosion starting on unprotected toe of dyke. Centre: Dyke seeded in 1951 with species lacking salt tolerance, growth has terminated at high-tide mark. Lower: Same area as in *Upper* protected by growth of *Puccinellia maritima*, a salt-tolerant species.

TABLE 23.—THE CLUBROOT REACTION OF TWO PROMISING SWEDE HYBRIDS IN COMPARISON WITH COMMERCIAL VARIETIES, 1952

Variety or Hybrid	Clubroot Index*
Hybrid 329	6·5
Hybrid 515	6·8
Wilhelmsburger	36·6
Ditmar's Bronze Top	78·1

* Clubroot Index: 0 = no clubroot, 100 = complete clubroot infection.

Control of Dyke Erosion

Since its establishment in 1949 the Maritime Marshland Rehabilitation Administration has constructed approximately 40 miles of new dykes which prevent the flooding of over 40,000 acres of marshland.

In 1950 a study was begun at the Experimental Farm at Nappan to determine the value of different plant species for protecting dykes against erosion. As a result of these studies a mixture of brome grass, meadow fescue, perennial rye grass, timothy, red top, crested wheat grass, and wild white clover is being seeded extensively on dykes where the soil contains little or no salt. The mixture may be modified to some extent as more information is obtained on the performance of the different species under study.

The most seriously eroded area of any dyke, and that which requires the greatest protection, is the area subjected to the wave action of the tide waters. With few exceptions, the water causing the damage, and therefore the dyke area being washed, has a high concentration of salt. Plant species that are tolerant of these salt conditions and moderate amounts of flooding are required. *Puccinellia maritima*, a native species sometimes referred to as seaside Puccinellia, is being used with considerable success at the present time. Use of this species is facilitated by its abundant production of easily harvested seed. Recent observations indicate that tall wheat grass, *Agropyron elongatum*, may also withstand salt water flooding to some degree. Further studies with this species are in progress.

TABLE 24.—AVERAGE GREEN YIELD IN TONS PER ACRE AND STAGE OF MATURITY AT HARVEST OF CORN HYBRIDS AT TWO LOCATIONS IN NOVA SCOTIA, 1945–50, INCLUSIVE

Hybrid	Nappan		Windsor*	
	Green yield	Maturity	Green yield	Maturity
	tons		tons	
DeKalb 65	18·4	Early milk	15·8	Late milk
Pioneer 355	18·1	Water	15·5	Milk
Canada 606	17·6	Water	15·0	Late milk
Funks G184	17·0	Early milk	14·0	Milk
Canada 275	16·1	Milk	12·1	Late dough
Canada 355	15·3	Early milk	11·6	Dough
Canada 240	14·2	Early dough	10·1	Early glaze

* Windsor summary for 1949 and 1950 only.

Ensilage Corn Variety Trials

Although ensilage corn can be produced economically in Nova Scotia, the crop has been utilized only on a very limited scale. Many stockmen who previously ensiled corn are using grass-legume silage with at least equal satisfaction.

Since 1914 approximately 30 corn varieties and 40 corn hybrids have been studied by this Farm. Of these, some of the more recent double-cross hybrids have been most satisfactory. A yield and maturity summary of the most suitable hybrids is presented in Table 24. Testing of corn for ensilage purposes was discontinued in 1950.

Under Nappan conditions the superior yields of DeKalb 65 and Pioneer 355 may be of less benefit than the more satisfactory maturity of Canada 240. The maturity of DeKalb 65 is more satisfactory in areas corresponding to the Windsor, N.S., district.

POULTRY

T. M. MacIntyre and M. H. Jenkins

Facilities available at Nappan for experimental work in poultry include two laying houses, providing housing space for 1,000 laying hens in 20 pens with a capacity of 50 birds each. Three laying batteries provide laying facilities for 300 birds in individual cages. There are four, four-deck electrically heated battery brooders for experimental work with groups of 15 to 20 chickens from day old up to six weeks, and pen facilities for brooding up to 1,600 chickens.

Sources of Calcium for Poultry

Oyster shells, clam shells, ground limestone, and oyster shells plus insoluble grit, were compared as sources of calcium for growing chickens and laying hens. These products are all available from sources in the Maritime Provinces. While oyster shells are generally preferred by poultrymen, clam shells and crushed limestone are almost pure calcium carbonate and should be equally good as a source of calcium for chickens and hens. The limestone used in these tests was a non-dolomitic magnesium-free limestone.

One experiment was carried out with growing chickens and one with laying hens. In the chick experiment, two groups of 28 chicks each were placed on each treatment. The treatments were as follows (one per cent of the finely ground calcium supplement was added to a common basal ration in each case): (1) Oyster shells; (2) clam shells; (3) ground limestone; (4) oyster shells, with insoluble grit fed ad lib. The chickens were allowed free access to feed and water at all times.

In the experiment with laying hens, 800 Barred Plymouth Rock hens were used. They were housed in 40 similar pens, with 20 birds in each pen. There were 10 pens on each treatment, a total of 200 birds. The treatments were as follows:

(1) Basal ration plus 1½ per cent finely ground oyster shell; coarsely broken oyster shell fed ad lib.

(2) Basal ration plus 1½ per cent finely ground clam shell; coarsely broken clam shells fed ad lib.

(3) Basal ration plus 1½ per cent finely ground limestone; coarsely broken limestone fed ad lib.

(4) Basal ration plus 1½ per cent finely ground oyster shell; coarsely broken oyster shell and insoluble grit fed ad lib.

Oyster shells, clam shells, and limestone all good sources of calcium.—There were no differences in growth, egg production, or feed efficiency between the lots fed the different sources of calcium, (Table 25).

While oyster shells are generally used as a source of calcium, this work shows that clam shells or ground limestone may be used in lieu of oyster shells where these products are readily available at a favorable price. Dolomitic limestone such as is commonly used for liming land is not suitable for poultry and should not be used. Only a pure limestone low in magnesium should be used.

TABLE 25.—SOURCES OF CALCIUM FOR GROWTH AND EGG PRODUCTION

Treatment	Weight of chicks at six weeks	Per cent egg production	Doz. eggs per 100 lb. feed	Av. specific gravity of eggs
	lb.			
Oyster shell	1·24	63	17·2	1·0729
Clam shell	1·24	62	17·2	1·0739
Limestone	1·33	63	17·4	1·0725
Oyster shell and grit	1·32	63	17·2	1·0748

Grit beneficial.—The feeding of insoluble grit, in addition to oyster shell, improved egg shell quality as measured by the specific gravity of the egg. This points out the importance of feeding insoluble grit to laying hens.

No beneficial effects accrue from the feeding of insoluble grit to growing chickens to six weeks of age. However, if chickens are grown in confinement without access to the soil they should be supplied with a source of insoluble grit as they grow older. Further information on this work will be found in Scientific Agriculture 31 : 429—1951 and 32 : 645—1952.

Coarse Versus Fine Feed for Laying Hens

Two trials were conducted to study the efficiency of coarse, medium, and finely ground rations for laying hens. Rations of different texture were made up by grinding the grains going into the rations to different degrees of fineness. The medium ration was about the same in texture as is normally found in commercial laying mashes. The coarse ration was coarser than is normally found and the fine ration was of a finer texture than is normally found in commercial laying rations. The rations were fed as all-mash rations. No whole grains were fed. Feed and water were kept before the birds at all times.

Experiment 1 was conducted in laying pens and Experiment 2 in individual laying batteries. In Experiment 1 there were 10 pens of 20 birds each on each ration of different texture. In Experiment 2 there were 90 birds in individual laying cages on each ration of different texture. The palatability of the coarse, medium, and fine rations was tested by allowing a pen of birds freedom to choose between the three rations for a period of 100 days.

Hens prefer coarse feeds.—This study shows that hens prefer coarse feeds when allowed freedom to choose. A pen of birds given the opportunity to choose between a coarse, medium, and fine mash, consumed three times as much of the coarse as of the fine mash. In both experiments the birds were a little slow in adapting themselves to the more finely ground mashes.

No improvement in average egg production on coarse feeds.—Despite the obvious preference for coarse feeds, there was no improvement in average egg production on the coarse ration as compared with the medium and fine rations. In Experiment 1 the percentage egg production was 57, 56, and 59, respectively, for the coarse, medium, and fine rations, while in Experiment 2 the percentage egg production was 45, 47, and 43, respectively.

Fine rations used more efficiently.—The birds fed the fine ration consumed less feed than the birds fed the medium or coarse rations, to produce the same number of eggs, showing increased feed efficiency for the fine ration. Thus, despite an obvious preference for coarsely ground grains, laying hens are apparently adaptable and will quickly adjust themselves to rations of different texture with little effect on egg production. Unless the feed is so finely ground as to tend

to become pasty, the degree of grinding of the ration does not appear to be an important factor in egg production, so that feeds varying in texture may be safely fed to laying hens.

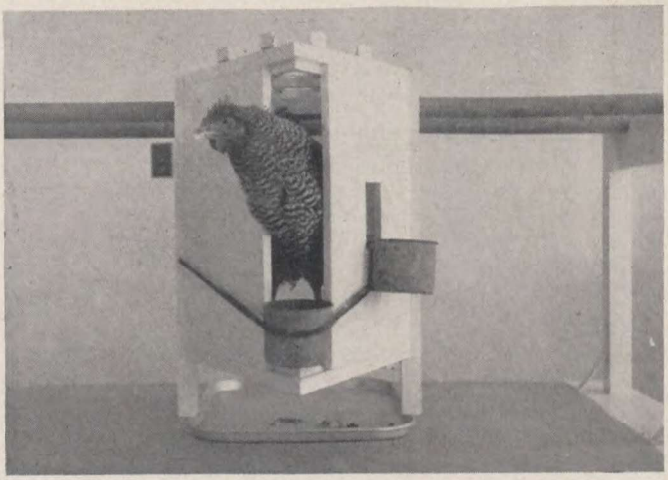

FIGURE 12. Metabolism cages such as this provide information on the digestibility of poultry feeds.

Lobster Meal for Growing Chickens

Lobster meal is manufactured from the lobster waste from lobster canning operations. It is prepared by drying and grinding this waste material. It is fairly high in protein (about 35 per cent) but is also high in ash (about 25 per cent). Substantial quantities of lobster waste are available from Maritime lobster canning factories for conversion into meal.

Feeding trials.—A number of feeding trials have been carried out to test the value of lobster meal as a source of protein for growing chickens. Results of these tests indicate that when fed in moderate amounts with fishmeal, lobster meal may be used as a source of protein. However, the high ash content has a depressing effect on growth if too much lobster meal is included in the ration. At present it is not recommended that lobster meal be used as the only source of animal protein. It should be fed with fishmeal, and not more than 10 per cent of lobster meal should be included in the ration. Lobster meal is inferior to fish meal as a source of animal protein and cannot replace all of the fishmeal in the rations of growing chickens.

Seaweed Meal for Growing Chickens and Laying Hens

Due to the presence of large quantities of seaweed along the Atlantic coast some interest has been shown in the use of this material as a source of feed for livestock and poultry. Experiments have been undertaken to study the effect of feeding dried ground seaweed meal to growing chickens and laying hens.

Seaweeds not a high quality feed.—Chemical analysis of seaweeds shows that they are variable in composition from species to species and from season to season. Average analysis runs about 6 per cent protein, 45 per cent carbohydrate and 30 per cent ash. The protein content is too low and the ash content too high for this to be considered a high quality poultry feed. Its main value would appear to be a source of trace minerals which are abundant in the ash.

Seaweed meal for growing chickens.—Four experiments were carried out with growing chickens. The seaweed meal was used to replace ground oats in the ration in two trials and as a straight addition to a balanced ration in the other two trials. The results of this work are summarized in Table 26.

TABLE 26.—THE EFFECT OF FEEDING DRIED GROUND SEAWEED UPON THE GROWTH OF CHICKS

Experiment[1]	Treatment[2]	Percentage kelp in ration[3]	Number of chicks per group[4]	Mortality	Average feed consumption	Average final body weight	Gm. feed per gm. body weight
				%	gm.	gm.	
4	1	—	22	6·1	1,191	472	2·52
	2	2·5		6·1	1,198	473	2·53
	3	5·0		3·0	1,208	460	2·63
	4	10·0		13·6	1,274	460	2·77
	5	20·0		12·1	1,227	400	3·07
5	1	—	27	8·6	1,268	497	2·55
	2	2·5		3·7	1,243	462	2·69
	3	5·0		1·2	1,241	426	2·91
	4	10·0		7·4	1,297	461	2·81
	5	20·0		11·1	1,300	388	3·35
6	1	—	20	5·0	1,419	533	2·66
	2	5·0		8·3	1,456	541	2·69
	3	9·7		8·3	1,486	527	2·82
7	1	—	20	11·7	1,202	448	2·68
	2	9·7		11·7	1,200	441	2·72
	3	9·7[3]		13·3	1,222	444	2·75

[1] Experiment 4. Kelp meal fed as a substitute for ground oats in the ration.
Experiment 5. Kelp meal fed as an addition to a balanced ration.
Experiment 6. Kelp meal fed as an addition to a balanced ration with soybean meal added to compensate for the calculated protein in the kelp meal.
Experiment 7. Kelp meal fed as a substitute for ground oats in the ration with soybean meal added to compensate for the calculated protein in the kelp meal.

[2] Treatment 1 is the control treatment in all four experiments. Other treatments differ from the control by the substitution and/or addition of kelp meal as indicated. Kelp meal contains about 2 per cent of salt and an adjustment in the salt added to the ration was made to compensate for this.

[3] Kelp meal washed with water.

[4] Three groups on each treatment.

The addition of seaweed meal resulted in decreased feed efficiency in all cases. However, weight gains were not adversely affected except when more than 10 per cent of seaweed meal was added to the ration. Seaweed meal has a laxative effect; hence soft droppings result from feeding this material. It is recommended that this material be used sparingly in the ration of growing chickens.

Seaweed meal for laying hens.—Three trials were carried out with laying hens. Kelp meal was fed at the rate of 2·5 and 10 per cent as an addition to a balanced ration. Trial 1 was conducted in laying pens housing 20 birds each. Trial 2 was carried out in individual laying batteries and Trial 3 was conducted on a commercial poultry flock. The results are summarized in Table 27.

When laying hens were fed rations containing up to 10 per cent of seaweed meal, increased feed consumption resulted, but no effect was noted on mortality, egg production, eggshell strength, hatchability, or body weight. Very moist droppings resulted when 10 per cent of seaweed meal was included in the ration, necessitating more frequent cleaning of the pens. Ten per cent of seaweed meal

would appear to be the maximum for laying hens. Where seaweed meal is available it may be safely fed to laying hens in small amounts. For additional information on this work see Scientific Agriculture 32 : 559–1952.

TABLE 27.—EFFECT OF FEEDING KELP MEAL IN THE RATION OF LAYING HENS ON EGG PRODUCTION, FEED CONSUMPTION, EGG WEIGHT, BODY WEIGHT, AND SPECIFIC GRAVITY OF EGGS

		Trial 1		Trial 2		Trial 3	
		Control	Kelp	Control	Kelp	Control	Kelp
Percentage kelp meal	%	Nil	10·0	Nil	2·5	Nil	2·5
Number of birds	No.	200	200	96	96	994	998
Percentage egg production	%	56	56	58	59	62	62
Pounds feed per 100 birds per day	lb.	29	32	33	33	.....	.....
Average final body weight	lb.	6·8	6·7	6·4	6·5	.....	.....
Average egg weight	gm.	62·0	61·6	61·5	61·5	.....	.....
Average specific gravity of eggs		1·0853	1·0846	1·0856	1·0861	1·0819	1·0819
Percentage of set eggs hatched	%	.....	.....	.....	.....	79·4	79·9

Methods of Feeding Laying Hens

The most common method of feeding laying hens practised by commercial poultrymen is to feed mash ad lib. in hoppers and to hand-feed grain in the litter in the morning or evening or both. Many individual poultrymen have developed feeding patterns peculiar to themselves which they regard as essential to good results. In recent years interest has been shown in the all-mash method of feeding, the feeding of pellets, and the feeding of super-green pellets as appetizers.

Different methods of feeding as commonly practised by poultrymen have been made the subject of study over a three-year period. The following common feeding practices were compared using flocks of 200 birds.

1949–50

(1) Mash fed ad lib. in hoppers, with grain fed as a supplement in the litter in the evening.

(2) Mash fed ad lib. in hoppers, with wet mash fed about noon on top of the dry mash in the feed hoppers and grain fed in the litter in the evening.

(3) Mash fed ad lib. in hoppers with pelleted mash fed in the litter at noon and grain in the litter in the evening.

(4) Pelleted mash fed ad lib. in hoppers with grain fed in the litter in the evening.

1950–51

(5) All-mash ration fed ad lib. in hoppers.

(6) Mash fed ad lib. in hoppers, grain fed in the litter in the evening.

(7) Mash in pellet form fed ad lib. in hoppers; grain fed in the litter in the evening.

(8) All-mash ration fed in hoppers in an intermittent manner such that the hoppers were empty of feed for about half the day.

1951–52

(9) All-mash ration fed ad lib. in hoppers.

(10) All-mash ration in pellet form fed ad lib. in hoppers.

(11) Mash and grain both fed ad lib. in hoppers.

(12) All-mash ration fed ad lib. in hoppers with super-green pellets fed in the litter at noon each day.

TABLE 28.—RESULTS OF FEEDING TRIALS

——	Lb. feed per 100 birds per day	Doz. eggs per 100 lb. feed	Av. weight of eggs oz. per doz.	Av. final weight lb.
1. Mash ad lib. + grain in litter	31	16·3	26·6	6·6
2. Mash ad lib. + wet mash + grain in litter	31	16·4	26·4	6·8
3. Mash ad lib. + pellets + grain in litter	32	16·2	26·7	6·8
4. Pellets ad lib. + grain in litter	33	16·0	27·5	7·0
5. All-mash ad lib.	29	15·7	26·9	6·7
6. Mash ad lib. + grain in litter	32	14·5	27·0	6·9
7. Pellets ad lib. + grain in litter	33	13·1	27·4	7·6
8. All-mash fed intermittently	29	15·6	27·0	6·7
9. All-mash ad lib.	30	15·7	26·7	6·5
10. Pellets ad lib.	31	14·9	27·3	7·0
11. Mash + grain both ad lib.	30	13·5	26·6	6·9
12. All-mash ad lib. + super-green pellets	31	15·7	27·0	6·8

Mash and grain both fed ad lib. in hoppers appears to be a poor method of handling the laying flock and the feeding of pellets ad lib. with grain in the litter does not appear to be so economical as other feeding methods studied. The all-mash method of feeding compares favorably with other methods studied and may be used to advantage in some cases. The feeding of pellets in place of mash invariably results in heavier birds and heavier eggs, both of which are of doubtful value, since the increase in weight of the birds is almost all abdominal fat and the average weight of eggs is more than that required by present standards. There is no apparent advantage in feeding wet mash or pellets as a supplement in a mash grain ration under normal conditions.

The results of this work indicate that variations in the common feeding practices may be tolerated without materially affecting egg production, and that within reasonable limits most common feeding practices give good results.

ILLUSTRATION STATIONS

F. W. CALDER

On the Illustration Stations problems are studied under local climatic and soil conditions, as an extension of the experimental work carried on at the Experimental Farm. Illustration Stations are operated on privately-owned farms on the basis of a co-operative agreement entered into between the owner and the Experimental Farms Service.

Work supervised from the Experimental Farm at Nappan at present is conducted on eight Illustration Stations in Eastern Nova Scotia. They are owned and located as follows:—

Owner	*Location*	*County*
Beaton, J	Glenora Falls	Inverness
MacIntyre, A.	Big Pond	Cape Breton
McDonald, D.	Knoydart	Antigonish
Paine, E. V.	Churchville	Pictou
Ross, T. E.	N. E. Margaree	Inverness
Setchell, F.	Salt Springs	Pictou
Sinclair, R.	Goshen	Guysborough
Tattrie, D.	Brule	Colchester

A crop rotation has been established on each farm designed to integrate with the type of farming enterprise being practised. The most common has been a five-year rotation of roots, grain, clover hay, mixed hay, mixed hay. In the past few years farmers have become increasingly conscious of the importance of grass land. With this realization changes have been made in rotations with more crop land being put down to grass. In certain cases the length of the rotations has been increased to make better use of alfalfa, which is being established on all Illustration Stations. In many cases a simple grain-hay rotation is practised.

The owner of the Glenora Falls Illustration Station has turned to a grain-hay rotation and stores part of his grass crop as silage in a trench silo.

Business Studies

A complete farm business study is made of all Stations. Farm revenues and expenditures are reported weekly by each operator and at the end of each year an inventory is taken on each farm, listing kind, acreage and production of crops grown, capital investment in land and buildings, livestock, machinery, and equipment, feeds and supplies, accounts receivable, and liabilities such as mortgage indebtedness, and a summary of sources of revenue derived from farm operations.

Net Worth Increasing Yearly

The average net worth of five Stations has increased from $15,413.20 in 1948 to $20,306.17 in 1952. One of the chief causes for this is the increasing degree of mechanization of the farms, largely necessitated by the ever-narrowing farm labor field.

Largest Percentage of Revenue is From Cattle and Dairy Products

The weekly revenue and expenditure reports of the operators over the past five years show that animal products contributed 78·9 per cent of the total revenue. This indicates that a large proportion of the field crop production is being fed to animals on the farm and consequently sold as animal products, thus reducing to a minimum the transference of fertility from the farm.

TABLE 29.—PERCENTAGE CONTRIBUTION OF THE DIFFERENT FARM ENTERPRISES TO TOTAL REVENUE ON ILLUSTRATION STATIONS IN EASTERN NOVA SCOTIA, 5-YEAR AVERAGE, 1948-1952, INCLUSIVE

Farm enterprise	Per cent
Cattle and dairy products	55·2
Field crops	12·1
Hogs	3·7
Poultry	17·5
Sheep	2·4
Horses	·1
Garden and orchard	·9
Miscellaneous	1·2
Consumed on farm	6·9

The average yearly revenue from all farm enterprises on Illustration Stations in eastern Nova Scotia for the five-year period 1948–1952, inclusive, was $5,810.48 per Station; and the average expenditure was $3,545.31, leaving a net revenue of $2,265.17 per Station.

Size of Herd Influences Cost of Milk Production

A detailed study has been made on three milk-producing Stations over the five-year period 1948–1952, inclusive, of the cost of milk production and of the factors affecting this cost. All aspects of the farm business were considered, such as labor, interest on capital, and general farm expenses. A factor that appeared to influence the cost of milk production considerably was size of herd—the larger the size of herd, the lower the cost of production.

Grass and Legume Seed Mixtures for Hay

Five grass and legume seed mixtures were seeded and the yields compared at Churchville, Salt Springs, Knoydart, and N. E. Margaree, through the years 1949 to 1952. Species used in these mixtures were timothy, brome, reed canary, meadow fescue, alfalfa, red clover, alsike clover, and ladino clover. The mixture giving the highest yield was made up of 8 pounds of timothy, 5 pounds of alfalfa, 5 pounds of red clover and 2 pounds of alsike clover. A satisfactory yield was also obtained when brome was substituted in the mixture for timothy. However, brome grass cannot be successfully seeded with ordinary seeders, since it will not go through a grass-seed box and should be seeded to a depth of only one-quarter inch.

Soil Fertility Studies

Manure, commercial fertilizer, and lime are all vital to successful general farming in eastern Nova Scotia. A number of tests have been conducted on Illustration Stations, comparing rates of fertilizer application as a supplement to manure; the effect of fertilizer when applied on different crops in the rotation; and different formulae.

Manure and Lime are a Good Combination

A test was conducted in which four rates of fertilizer were compared, all being supplements to a basic application of manure. An additional plot received two tons per acre of limestone, as well as the 800-pound-per-acre application of fertilizer. All treatments except lime were applied to the swede crop; lime was applied to the grain crop. This trial was conducted at Knoydart and Salt Springs for five years.

FIGURE 13. Alfalfa has responded well on all Illustration Stations when lime was applied to the soil.

At Knoydart the addition of commercial fertilizer to a 12-ton-per-acre application of manure did not increase yields when the calculated total digestible nutrients produced over the entire rotation were considered as a unit. At Salt Springs some small response was obtained from the addition of the 4-8-10 fertilizer. On both farms lime at the rate of two tons per acre gave good results, the increases in yield being most marked at Knoydart.

Application of Manure Makes Outstanding Difference

Manure, commercial fertilizer, and lime were applied at different times through a five-year rotation of two years grain and three years hay at Glenora Falls from 1947–1951, inclusive.

Comparison of results was based on total digestible nutrients for the entire rotation. All plots received 1,000 pounds of 4-12-6 fertilizer per acre and some received 12 tons of manure per acre and others varying amounts of lime. Where manure was used there was an increase of from 2·73 to 3·75 tons of total digestible nutrients per acre over the areas receiving fertilizer only.

Plots on which limestone was applied on the first year of grain produced 0·34 tons of T.D.N. per acre more than those plots on which the limestone was applied on second-year grain. The application of two tons of limestone on both the first- and second-year grain gave an increased yield of T.D.N. of 0·73 tons per acre over plots that had received only one ton of limestone per acre on both first- and second-year grain.

Weed Control

Ragwort, commonly referred to as "Stinking Willie" in eastern Nova Scotia, is a serious pest on many farms in this district because of its poisonous effects on cattle and horses.

Areas were sprayed with 2,4-D weed killer at Glenora Falls and New Glasgow at three rates of 4, 8, and 12 ounces per acre. It was found that the 8 ounce per acre application gave good control of ragwort without injuring the clover plants too severely. Application should be made in late May or early June and, if possible, a second application should be made in late July.

Pasture Investigations

Much pasture land in eastern Nova Scotia is low in fertility and does not provide satisfactory grazing for the cattle that are pastured on it. Two types of pasture trials are being conducted on Illustration Stations in this district: one test compares different fertilizer elements applied to the surface of the pasture and the other involves different cultural methods for pasture rejuvenation.

Fertilizer Increases Pasture Yields

(**a**) Areas receiving applications of superphosphate and muriate of potash produced over 66 per cent more herbage than did the untreated area.

(**b**) Annual applications of superphosphate and muriate of potash produced only slightly more herbage than did the application of these fertilizers every third year.

(**c**) There was little difference in the herbage yield between the fields that received superphosphate and potash with and without ammonium sulphate.

Surface Treatment Gives Good Results in Pasture Rejuvenation

On low-fertility pastures at New Glasgow, Knoydart, and Glenora Falls, trials were established to test different methods of renovating old, unproductive pasture swards. The five treatments under study are listed below in descending order of effectiveness.

1. Reseeding on the sod surface, along with the application of 800 pounds 3-15-6 and 2 tons lime per acre on surface.
2. Reseeding after the surface had been worked with a disk or spring-tooth harrow, along with the application of 800 pounds of 3-15-6 and 2 tons lime per acre.
3. Reseeding without a nurse crop on a plowed and harrowed seedbed; 800 pounds 3-15-6 and 2 tons lime per acre were applied on the plowed land.
4. Reseeding without a nurse crop on a plowed and harrowed seedbed; 800 pounds 3-15-6 and 2 tons lime per acre were applied on the sod prior to plowing.
5. Reseeding on the sod surface, along with the application of 800 pounds 3-15-6 per acre.

The treatment where plowing was done gave the greatest yield the first year but fell back in favor of all surface treatments the second and third year of the test.

Number 1 and 5 treatments differed in that lime was used only in the former case. This response from surface application of lime occurred because the sod on these pastures was extremely poor, containing a high percentage of bare spots and shallow-rooted weeds.

Surface Applications of Lime to Pasture Fail to Improve Yield

Where lime was applied to the surface of the pasture across all the fertilized plots there was an insignificant increase of 0·65 tons per acre green herbage. The sod on these pastures was dense and did not benefit from surface lime applications as did the thin sod mentioned above where seed, also, was used in the treatment.

ACTIVE PROJECTS

Animal Husbandry

Breeding trials

- Performance testing and heritability studies with Shorthorn cattle.
- Influence of degree of face cover on productivity of Shropshire sheep.

Nutritional trials

- Effect of age of weaning on efficiency of feed utilization in swine.
- Roughages for wintering breeding ewes.

Management

- Wintering beef cattle.
- Pasture management of dairy cattle.

Pasture

- Lime and fertilizer for upland and marshland pastures.

Cereal Crops

Breeding

- Breeding and selection of varieties and strains of oats and barley.
- Study of culm, crown, and root development in barley as related to lodging.

Variety testing

- Testing varieties and strains of spring wheat, winter wheat, oats, and barley.
- Production and maintenance of seed stock of spring wheat, winter wheat, oats, and barley.

Field Husbandry

Soil fertility

- Fertility studies on different soil types.
- Fertilizer rates for upland and marshland soils.
- Fertilizer formulae for upland and marshland soils.
- Fertilizer placement studies.
- Manure for upland and marshland soils.
- Rates of application and place in rotation of lime on upland and marshland soil.

Crop rotations

- Four-, five-, and six-year rotations

Weed control

- Chemical control of annual and perennial weeds.
- Cultural control of annual and perennial weeds.

Pasture

- Lime and fertilizer for upland and marshland pastures.
- Fertilizer formulae and rates for upland pastures.

Crop sequence trials.

Agricultural meteorology.

Forage Crops

Breeding

- Breeding timothy for later maturity.
- Breeding alfalfa for acid tolerance.
- Breeding swedes for resistance to clubroot.

Variety tests

- Variety testing of timothy, alfalfa, and red clover.
- Evaluating species as to their usefulness in protecting dykes against erosion.
- Verification trials.

Pasture

- Hay-pasture mixture studies.

Illustration Stations

Soil fertility

- Rates, formulae, and place in rotation of fertilizers.

Pasture

- Fertilizer rates and formulae.
- Seeding and pasture renovation studies.

Weed control

- Chemical and cultural weed control studies.

Farm management studies

Farm production studies

- Dairy cattle, sheep, swine, and poultry.

Cereal variety tests

Hay-pasture mixture tests.

Poultry

Nutritional

- High efficiency rations for laying hens.
- Chick growth studies with lobster meal, fishmeal, and seaweed meal.
- Biological value of fishmeal proteins from various sources and methods of preparation.
- Fowl digestibility studies.

Management

- Rations and methods of feeding laying hens.

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