DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

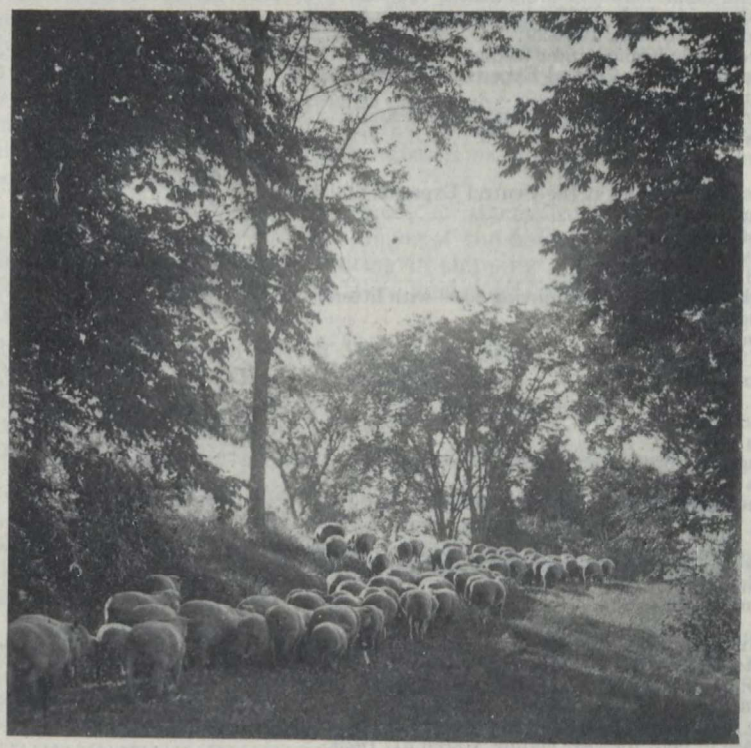
DOMINION EXPERIMENTAL FARMS

ANIMAL HUSBANDRY DIVISION

REPORT OF THE DOMINION ANIMAL HUSBANDMAN

G. B. ROTHWELL, B.S.A.

FOR THE YEAR ENDING MARCH 31, 1929



Published by the direction of the Hon. W. R. MOTHERWELL, Minister of Agriculture,
Ottawa, 1930

TABLE OF CONTENTS

REPORT OF THE ANIMAL HUSBANDRY DIVISION*

G. B. ROTHWELL, DOMINION ANIMAL HUSBANDMAN

BEEF CATTLE

No breeding beef cattle were maintained on the Central Experimental Farm during the past year, but with the increased facilities in the way of both land and buildings, it is possible that a breeding herd may be established in the near future.

Work with feeding cattle has consisted of the grazing of eastern and western steers on the Connaught Range property during the summer of 1928, and the winter feeding of a number of these steers during the winter of 1928-29. The western steers were delivered direct to the Range on April 21, 1928, and turned out on grass immediately. While this may seem early grazing for eastern conditions, nevertheless, where sufficient of the old grass from the previous season is available so that the cattle get started on it, and then get the new grass gradually as it comes up through the old, they seem to get away to a better start than if purchased later in the season and turned directly on the fresh green grass. This point has been well brought out as the result of a number of trials. The eastern steers were purchased on May 16, but as they had been on grass previously they were under the same conditions as the western steers, and went right ahead making excellent gains.

One objection to such early shipment of steers from the western stockyards to eastern grazing fields is the danger of the animals contracting colds in the yards, or en route, and these resulting in shipping fever on landing at their destination. On this occasion losses were sustained between time of purchase and week after delivery as follows:—

1, Reacted to tuberculin test in Winnipeg yards.
1, Died of acute indigestion in Winnipeg yards.
1, Injured and had to be disposed of in Winnipeg yards.
1, Died en route from shipping fever.
2, Died on Range shortly after arrival, from shipping fever.

In addition to the above losses, one steer was a complete loss, and another was injured and had to be sold during the summer, through having stopped stray bullets. Under the conditions, the latter loss is liable to take place at any time, and it is considered fortunate that we have not suffered in this respect to a greater extent in the past.

The pasture season was a good one, and the cattle made good gains right from the start, the older ones putting on flesh and the younger ones making good growth. Those which were sufficiently well finished were sold in September, 1928, just before the market dropped, due to the run of cattle on the market. The remainder were held over for later sale, off grass, but owing to the drop in the market had to be held and be stall-fed for a period, ultimately being sold in two groups in December and February, respectively.

* In the preparation of this report, Mr. G. W. Muir has been responsible for the sections on Beef Cattle and Dairy Cattle and Mr. H. B. Fraser for the section on Swine.

A statement of the financial outlay and returns, except for labour, follows:—

FINANCIAL STATEMENT OF STEER FEEDING, 1928-1929

April 13, 1928	To 87 steers, 72,970 pounds ex Winnipeg, Man.	$6,632 29
	To loading, feed, etc.	108 60
	To freight	675 25
May 16, 1928	To 32 steers (app. 28,445 pounds) ex Dunrobin, Ont.	2,560 00
	Total cost	$9,976 14
April 18, 1928	By sale 1 crippled steer	$ 52 57
	By sale 1 reactor steer	71 40
	By sale carcass dead steer	4 25
Sept. 13, 1928	By sale 1 crippled steer off range	74 00
Sept. 18, 1928	By sale 54 steers at $120 each	6,480 00
Dec. 13, 1928	By sale 21 steers at $114.33	2,401 00
Feb. 5, 1929	By sale 36 steers at $118	4,248 00
	Total return	$13,331 22
	Gross profit	3,355 08

Cost of Feed

To pasture at 50 cents per head per month	$269 25
To 5,900 pounds ground oats at $42 per ton	123 90
To 7,800 pounds ground corn at $47 per ton	183 30
To 3,900 pounds ground wheat at $36 per ton	64 80
To 4,600 pounds bran at $32 per ton	73 60
To 4,600 pounds oil meal at $50 per ton	115 00
To 300 pounds Palm Nut Meal at $50 per ton	7 50
Total cost of feed	$ 837 35
Net profit	$ 2,517 73

DAIRY CATTLE

The dairy cattle work of the Division of Animal Husbandry continues as one of the most important activities. At the close of the fiscal year there were on hand one hundred and forty-eight head of dairy cattle, made up as follows—

DAIRY CATTLE AT C.E.F., 1928-29

Breed	Milk cows	Heifers	Bulls	Total
Ayrshire	29	43	14	86
Holstein	25	31	6	62
				148

AYRSHIRES

Recovering from the setback reported a year ago, the Ayrshire herd has been making substantial progress. The unusually large increase in numbers is due, in part, to the transfer of thirty-one head from the Experimental Station at Lennoxville, P.Q., to the Central Experimental Farm, Ottawa, Ont. As many of these animals were sired by bulls bred at Ottawa, they will work into the breeding program very nicely.

Twenty-three calves were dropped during the year, of which one was sired by the bull Ottawa Lord Kyle 35th —98029— A.R. No. 45, Class AA, seven by the bull Ottawa Supreme 10th —91809— A.R. No. 16, Class AA, three by the

bull Ottawa Supreme 15th —94145— A.R. No. 299, Class A, three by Ottawa Supreme 20th —99327— A.R. No. 19, Class AA, and nine by the bull White Beauty's Good Gift —76818— A.R. No. 1, Class AA.

Of these twenty-three calves eighteen were normal, healthy calves; one was an abortion; one was slightly premature, but living; one died at birth in pasture; and two were seriously deformed, having stiff joints, etc., causing difficult calving and the loss of one cow, and serious injury to the other. It is significant to note that both of the last two calves mentioned above were from bulls that later were condemned for breeding purposes, on account of having infected genital organs. The quality of the normal calves was very good throughout. No animals were added to the herd, other than the draft from the Lennoxville Experimental Station already mentioned, and no animals were exhibited during the year. Bulls used in service during the year were as follows:—

AYRSHIRE BULLS USED AT C.E.F. DURING 1928-29

Name	Age	Reg. No.	A.R. No.	Class
White Beauty's Good Gift	14 years	76818	1	AA
Ottawa Supreme 10th	4 years	91809	16	AA
Ottawa Supreme 37th	1 year	112627	.....	.....
Ottawa Supreme 40th	1 year	113116	447	A

The average yearly milk production of the five best producing Ayrshire cows in the herd, including one three-year-old, was 10,437·7 pounds milk testing 4·10 per cent fat. The average for the whole herd of eighteen cows was 8,306·5 pounds, testing 4·33 per cent fat.

This constitutes a fairly high level of milk production, and a fat percentage well above the average for the breed.

In a comparison of the breeds maintained, using the average production of the herds as a basis, the Ayrshires are second in economy of milk production, first in economy of fat production, and second in profit over feed consumed.

HOLSTEINS

The Holstein breeding herd has been receiving particular attention during the past year, as it had fallen behind considerably in numbers. Fifteen head of females were added to the herd, nine of these coming from the Experimental Farm at Agassiz, B.C., and six from breeders in the Agassiz district. In addition, one exceptionally good cow was received from the Experimental Station at Fredericton, N.B. The addition of these animals, together with the calves they have dropped since, has made considerable improvement in the herd.

Of the twenty-two calves dropped during the year, seven were sired by the bull Ottawa Pietje Fayne —66931— A.R. No. 141, Class X, and eight by the bull Ottawa Pietje Faforit —68848— A.R. No. 200, Class X. The remaining seven were calves dropped from the cows brought down from Agassiz. Nineteen of these calves were normal and healthy; one was an abortion; one died of calf scours and pneumonia; and one as a result of mal-presentation, and consequent difficult calving. The type and quality of the calves raised was particularly good.

In addition to the female additions to the herd mentioned above, a good bull was purchased in the animal Abegweit Silver Chieftain —58694— A.R. No. 161, Class XX. This is a deep, straight, and breedy looking bull, with an abundance of dairy quality. He is a fully developed five-year-old bull, himself

a show animal, and a sire of some exceptionally good young show animals. He is richly bred along one of the most popular lines at the present time in that the famous bull Prince Colanthus Abbekerk —15017— appears three times as a great grandsire, while two of his other great grandparents are by Francy 3rd Calamity De Kol, another noted sire. This bull should leave his mark on the herd in a most desirable way.

The bulls used in service during the year were as follows:—

HOLSTEIN BULLS USED AT C.E.F. DURING 1928-29

Name	Age	Reg. No.	A.R. No.	Class
Ottawa Pietje Faforit	2	68848	206	X
Abegweit Silver Chieftain	5	58694	161	XX

The average yearly milk production of the five best producing Holstein cows in the herd, these being made up of two two-year-olds and three three-year-olds, was 11,639·1 pounds testing 3·75 per cent fat. The average for the whole herd of six cows was 11,002 pounds milk testing 3·74 per cent fat.

These figures show a good level of milk production, and a high average per cent fat for these young cows, showing that continued progress is being made towards raising the average per cent fat of the Holsteins in the herd.

In the comparison of breeds maintained, using the average production of the herd as a basis, Holsteins are first in economy of milk production, second in economy of fat production, and first in profit over feed consumed.

JERSEYS

A small herd of the Jersey breed of cattle has been maintained on the Central Experimental Farm for a period of twenty-five years or more. In July, 1928, however, the remainder of the herd was transferred to the Experimental Station at Lennoxville, Que., this change being made necessary by the adoption of the policy of not keeping more than two breeds of cattle on any one farm or Station, it having been found that the best breeding work could not be accomplished where too many breeds were kept. The Station at Lennoxville already had the foundation of a good Jersey herd, and as it is in the heart of a Jersey district it seemed the logical place for Jerseys.

ADVANCED REGISTRATION OF DAIRY BULLS

This work has been closely followed up since its inception, with the result that four Ayrshire bulls and three Holstein bulls received Advanced Registration certificates during the year.

ADVANCED REGISTRATION OF DAIRY FEMALES

The Advanced Registration of Holstein females has been followed up since its inception. During the fiscal year ending March 31, 1929, nineteen two-year-old heifers were submitted for inspection with the result that one "Gold Medal", one "Excellent", fourteen "Good", and two "Fair" certificates were issued, while the certificate for one animal was cancelled, as she was classed "Poor".

SALES OF BREEDING STOCK

A feature of the dairy cattle breeding work is the sale of pure bred bulls for the improvement of farmers' herds. These bulls are for the most part sold

to farmers in the outlying districts, who are purchasing pure bred bulls for the first time, though many of these farmers have come back for their second bull from the same source. During the year ending March 31, 1929, there were six Ayrshire and six Holstein bull calves sold. In addition to these bulls sold to breeders, herd sires of exceptionally high quality were supplied to the Experimental Stations at Charlottetown, P.E.I., Fredericton, N.B., Morden, Man., and Invermere, B.C., thus carrying out the policy of supplying the necessary new blood from within the Farms' System as much as possible.

TUBERCULOSIS ERADICATION

Following the outbreak of tuberculosis in the fall of 1927, and subsequent clean-up in January and March of 1928, the herd has enjoyed comparative freedom from this disease. The first regular test conducted in November, 1928, revealed one reactor. This case was in a Holstein cow, one of the last that had been associated with the animals that had reacted in the previous tests. Fortunately, this animal had been in semi-isolation during the previous summer; consequently there was little possibility that she had been acting as a spreader in the herd. It is to be hoped, therefore, that this herd will now become eligible for an accredited herd certificate.

CONTAGIOUS ABORTION

As reported in the 1928 report of this Division, particular attention was given to the problem of contagious abortion during the latter part of 1927 and early in 1928. In co-operation with the Pathological Division of the Health of Animals Branch, the agglutination and complement fixation blood tests for contagious abortion were applied to all the animals in the herd at frequent intervals, with the result that at the time the cattle were turned to pasture in May, 1928, it was possible to segregate them into four groups, as follows: Group 1, non-reacting milk cows; group 2, reacting milk cows; groups 3, non-reacting heifers; and group 4, reacting heifers, all two-year-olds, and in calf. For a short time a fifth group of questionable reactors was established, but on a later test being conducted these were disposed of in one or another of the first four groups.

In the case of the milch cows the two groups were housed in separate barns, attended to by different attendants, went to the pasture by the same lane, but were pastured in separate pastures, i.e., a temporary fence was run across the main pasture field, and one lot of cows pastured on each side of this fence.

In the case of the non-reacting animals no abortions occurred during the remainder of the fiscal year, i.e., up to March 31, 1929.

In the case of the reacting groups there were five abortions, one in group two, the segregated milch cows; and four in group four, the reacting two-year-old heifers.

These results bear out certain observations with regard to contagious abortion, and the blood test for detecting the presence of this disease in a herd. First, that heifers in their first pregnancy are most susceptible to the disease. Secondly, that by means of the blood test possible aborters may be segregated or eliminated from the herd entirely. Thirdly, that all reactors are not necessarily aborters. That is, they are carriers of the disease, even though they do not abort, and may infect other non-infected cows or heifers with which they come in contact; consequently, they are a source of danger in any herd.

One year's work is insufficient on which to base any conclusions, but by carrying on this work for a number of years on the Central and Branch Experimental Farms, it is hoped that a system may be evolved whereby herds free from the scourge of contagious abortion may be developed along practical lines.

EXPERIMENTAL FEEDING

Fish meal vs. oilcake meal as a source of protein in the ration for dairy cows.

This experiment was undertaken to check a previous experiment reported in the Report of this Division for the year ending March 31, 1916, comparing fish meal and oilcake meal as a source of protein and to provide material for the Chemistry Division with which to determine the effect, if any, of the feeding of fish meal on the iodine content of the milk.

A group of cows in the Main Barn was set aside for this experiment, and fed the following rations:—

Period 1.—Standard roughage and meal ration plus *iodized salt* (commercial).

Period 2.—Standard roughage ration with fish meal replacing oilcake meal in the grain ration plus *common salt.*

Period 3.—Standard roughage and meal ration plus *common salt.*

Period 4.—Same as second.

The standard ration consisted of mixed hay, silage, roots and a meal mixture made up of bran, 400 pounds; ground oats, 200 pounds; ground wheat, 200 pounds; gluten feed, 200 pounds; and oilcake meal, 200 pounds. Salt, either plain or iodized, was added at the rate of one per cent of the meal mixture.

The following two tables give the results of the experiment:—

FISH MEAL VS. OILCAKE MEAL

Period		1	2	3	Average 1 and 3
Experimental ration		Oilcake meal and iodized salt	Fish meal and common salt	Oilcake meal and common salt	Oilcake meal and salt
Number of cows in experiment	No.	9	9	9	9
Duration of test	days	21	21	21	21
Milk produced first 7 days	lb.	2,312·5	2,221·0	2,169·5	2,241·0
Milk produced second 7 days	lb.	2,258·5	2,209·5	2,121·5	2,190·0
Milk produced last 7 days	lb.	2,234·0	2,205·5	2,155·0	2,194·5
Average per cent fat in milk	%	3·49	3·11	3·21	3·35
Total fat produced	lb.	77·97	68·51	69·08	73·52
Total fat corrected milk	lb.	2,063·3	1,909·85	1,898·2	1,980·70
Total meal consumed at $33.20 per ton	lb.	724·5	.....	724·5	724·50
Total meal consumed at $35.80 per ton	lb.	.....	724·5	.....	.....
Total hay consumed at $7.25 per ton	lb.	504·0	504·0	504·0	504·0
Total roots consumed at $3.40 per ton	lb.	2,520·0	2,520·0	2,520·0	2,520·0
Total silage consumed at $4.25 per ton	lb.	1,785·0	1,785·0	1,785·0	1,785·0
Cost of meal fed	$	12 02	12 97	12 02	12 02
Cost of hay fed	$	1 83	1 83	1 83	1 83
Cost of roots fed	$	4 28	4 28	4 28	4 28
Cost of silage fed	$	3 79	3 79	3 79	3 79
Total cost of feed	$	21 92	22 87	21 92	21 92
Feed cost to produce 100 pounds fat corrected milk	$	1 06	1 20	1 15	1 10
Profit over feed F.C. milk at $1.75 per cwt.	$	14 19	10 55	11 20	12 74

FISH MEAL VS. OILCAKE MEAL

Period		2	3	4	Average 2 and 4
Experimental ration		Fish meal and common salt	Oilcake meal and common salt	Fish meal and common salt	Fish meal and common salt
Number of cows in experiment	No.	10	10	10	10
Duration of test	days	21	21	21	21
Milk produced first 7 days	lb.	2,448·0	2,442·0	2,391·5	2,419·75
Milk produced second 7 days	lb.	2,467·0	2,404·5	2,332·5	2,399·75
Milk produced third 7 days	lb.	2,482·5	2,444·0	2,287·5	2,385·0
Average per cent fat in milk	%	3·13	3·18	3·30	3·21
Total fat produced	lb.	78·76	77·75	75·65	77·20
Total fat corrected milk	lb.	2,174·40	2,143·85	2,049·75	2,112·07
Total meal consumed at $33.20 per ton	lb.	.....	794·5	.....	.....
Total meal consumed at $35.80 per ton	lb.	794·50	.....	794·5	794·50
Total hay consumed at $7.25 per ton	lb.	560·0	560·0	560·0	560·0
Total roots consumed at $3.40 per ton	lb.	2,800·0	2,800·0	2,800·0	2,800·0
Total silage consumed at $4.25 per ton	lb.	1,960·0	1,960·0	1,960·0	1,960·0
Cost of meal fed	$	14 22	13 19	14 22	14 22
Cost of hay fed	$	2 03	2 03	2 03	2 03
Cost of roots fed	$	4 76	4 76	4 76	4 76
Cost of silage fed	$	4 16	4 16	4 16	4 16
Total cost of feed	$	25 17	24 14	25 17	25 17
Feed cost to produce 100 pounds fat corrected milk	$	1 11	1 13	1 22	1 16
Profit over feed F.C. milk at $1.75 per cwt	$	12 88	13 37	10 70	11 79

The foregoing results go to show that the fish meal was not superior to oilcake meal as a source of protein for dairy cattle, even though it carries considerably more protein. When it is considered, therefore, that fish meal costs upwards of 25 per cent more per ton than oilcake meal, it will readily be seen that it would only be under very special circumstances that it could be used to replace oilcake meal as a source of protein in the ration for dairy cows.

For data on the iodine content phase of this experiment the reader is referred to the Report of the Dominion Chemist.

OIL CAKE MEAL VS. PALM KERNEL CAKE VS. PALM KERNEL MEAL

Early in the year 1928 representations were made to this Division with regard to the possibility of carrying on some experiments as to the feeding value of Palm Kernel cake and Palm Kernel meal (extracted). These materials are the by-products of the manufacture of palm kernel products from palm kernels grown in British West Africa, the pressing out and extracting of the oils having been done by the British Oil and Cake Mills, Limited, by whom we were supplied with two tons of each of these feeds. These feeds were allowed to enter the country only after considerable difficulty, on account of restrictions imposed by the Health of Animals Branch under the Contagious Diseases of Animals Act.

As soon as possible after the receipt of the materials a feeding experiment was gotten under way. A group of milch cows was set aside for this work. The experiment was run in periods of three weeks each, and data from the third week of each period only was used in the calculation of the results. In order to overcome the factor of gradual decline in milk flow, the results of the first and third periods were averaged and compared with the results obtained in the second period. This practice was followed throughout all three phases of the experiment.

Analyses were made by Dr. F. T. Shutt, Dominion Chemist, of the palm kernel cake and palm kernel meal, as well as of the oilcake meal, with which the palm kernel by-products were compared. The following are the results:—

ANALYSES OF EXPERIMENTAL FEEDS

Lab'y No.	Item	Moisture	Protein	Fat	Carbohydrate	Fibre	Ash
		%	%	%	%	%	%
96456	Oil cake meal (screw process)	9·90	34·36	9·25	34·05	7·41	5·03
96458	Palm kernel cake	5·85	16·68	5·48	57·23	10·95	3·81
96457	Palm kernel meal (extracted)	9·95	20·68	1·16	51·08	12·67	4·46

It might be stated at this juncture that the Palm Kernel cake was shipped as cake, and had to be broken up and ground. This could not be done in any ordinary grinder, consequently, the material was sent out to a crusher in a Government ore-dressing plant, where it was thoroughly broken up and ground until it was comparable to the Palm Kernel meal and oilcake meal in texture.

As regards costs of these materials, the list price delivered Ottawa, in two-ton lots in the case of the Palm Kernel cake and meal, and in car lots in case of the oilcake meal, were as follows:—

Oil cake meal	$60 00 per ton, delivered Ottawa
Palm Kernel cake	64 00 per ton, delivered Ottawa
Palm Kernel meal	60 00 per ton, delivered Ottawa

The cows were fed a standard ration composed of mixed hay, corn silage, roots, and a meal mixture made up of bran, 400 pounds; ground oats, 200 pounds; ground wheat, 400 pounds; gluten feed, 200 pounds; and oil cake meal, 200 pounds. In the test rations the oil cake meal was replaced by equal quantities of Palm Kernel cake meal, or Palm Kernel meal (extracted) as the case may be. The above was the only change instituted in the ration, the hay, silage and roots, and quantity of meal remaining the same throughout the first four periods. At the close of the fourth period the root supply became exhausted, consequently, a new ration of hay, silage, and meal was formulated, and a new rate of grain feed established and fed throughout periods five, six, and seven. Two comparisons of Palm Kernel cake meal and oilcake meal are possible from periods one to four, while a comparison of Palm Kernel meal (extracted) and oilcake meal is covered in periods five, six and seven. Unfortunately, owing to having to turn the cows out to pasture, it was not found possible to conduct a check period on the feeding of Palm Kernel meal.

The tables making the above-mentioned comparisons follow:—

TABLE I.—PALM KERNEL CAKE VS. OIL CAKE MEAL

Period		1	2	3	Average 1 and 3
Experimental ration		Oil cake meal	Palm Kernel cake	Oil cake meal	Oil cake meal
Number of cows in experiment	No.	9	9	9	9
Duration of test	days	21	21	21	21
Milk produced first 7 days	lb.	1,700·5	1,739·5	1,604·0	1,652·25
Milk produced second 7 days	lb.	1,780·0	1,664·5	1,620·5	1,700·25
Milk produced last 7 days	lb.	1,784·5	1,589·5	1,611·0	1,697·75
Average per cent fat in milk	%	4·05	4·30	4·16	4·10
Total fat produced	lb.	72·39	67·33	66·96	69·67
Total fat corrected milk produced	lb.	1,799·65	1,645·75	1,648·80	1,724·22
Total meal consumed at $33.20 per ton	lb.	581·0	.....	581·0	581·00
Total meal consumed at $33.80 per ton	lb.	.....	581·00	.....	.....
Total hay consumed at $7.25 per ton	lb.	504·0	504·0	504·0	504·0
Total roots consumed at $3.40 per ton	lb.	2,520·0	2,520·0	2,520·0	2,520·0
Total silage consumed at $4.25 per ton	lb.	1,575·0	1,575·0	1,575·0	1,575·0
Cost of meal fed	$	9 64	9 82	9 64	9 64
Cost of hay fed	$	1 83	1 83	1 83	1 83
Cost of roots fed	$	4 28	4 28	4 28	4 28
Cost of silage fed	$	3 35	3 35	3 35	3 35
Total cost of feed	$	19 10	19 28	19 10	19 10
Feed cost to produce 100 pounds fat corrected milk	$	1 06	1 17	1 16	1 11
Profit over feed, fat corrected milk at $1.75 per cwt.	$	12 89	9 52	9 75	11 07

TABLE II.—PALM KERNEL CAKE VS. OIL CAKE MEAL

Period		2	3	4	Average 2 and 4
Experimental ration		Palm Kernel cake	Oil cake meal	Palm Kernel cake	Palm Kernel cake
Number of cows in experiment	No.	10	10	10	10
Duration of test	days	21	21	21	21
Milk produced first 7 days	lb.	2,019·0	1,926·5	1,748·0	1,883·50
Milk produced second 7 days	lb.	1,969·50	1,946·5	1,707·5	1,838·50
Milk produced third 7 days	lb.	1,907·50	1,901·0	1,698·5	1,803·0
Average per cent fat in milk	%	4·26	4·14	4·13	4·20
Total fat produced	lb.	81·37	78·80	70·17	75·77
Total fat corrected milk produced	lb.	1,983·55	1,942·40	1,731·95	1,857·75
Total meal consumed at $33.20 per ton	lb.	.....	658·0	.....	.....
Total meal consumed at $33.80 per ton	lb.	658·0	.....	658·0	658·0
Total hay consumed at $7.25 per ton	lb.	560·0	560·0	560·0	560·0
Total roots consumed at $3.40 per ton	lb.	2,800·0	2,800·0	2,800·0	2,800·0
Total silage consumed at $4.25 per ton	lb.	1,750·0	1,750·0	1,750·0	1,750·0
Cost of meal fed	$	11 12	10 92	11 12	11 12
Cost of hay fed	$	2 03	2 03	2 03	2 03
Cost of roots fed	$	4 76	4 76	4 76	4 76
Cost of silage fed	$	3 72	3 72	3 72	3 72
Total cost of feed	$	21 63	21 43	21 63	21 63
Feed cost to produce 100 pounds fat corrected milk	$	1 09	1 10	1 25	1 17
Profit over feed, fat corrected milk at $1.75 per cwt.	$	13 08	12 56	8 68	10 88

TABLE III.—OIL CAKE MEAL VS. PALM KERNEL MEAL (EXTRACTED)

Period		5	6	7	Avergae 5 and 7
Experimental ration		Palm Kernel meal	Oil cake meal	Palm Kernel meal	Palm Kernel meal
Number of cows in experiment	No.	9	9	9	9
Duration of test	days	21	21	21	21
Milk produced first 7 days	lb.	1,547·50	1,554·00	1,444·50	1,496·00
Milk produced second 7 days	lb.	1,505·50	1,537·0	1,405·50	1,455·50
Milk produced third 7 days	lb.	1,572·0	1,497·0	1,323·50	1,447·75
Average per cent fat in milk	%	4·26	4·16	3·62	3·97
Total fat produced	lb.	67·06	62·32	47·90	57·48
Total fat corrected milk produced	lb.	1,634·70	1,533·60	1,247·90	1,441·30
Total meal consumed at $33.20 per ton	lb.	518 00	518 00	518 00	518 00
Total hay consumed at $7.25 per ton	lb.	504 00	504 00	504 00	504 00
Total silage consumed at $4.25 per ton	lb.	1,890·0	1,890·0	1,890·0	1,890·0
Cost of meal fed	$	8 60	8 60	8 60	8 60
Cost of hay fed	$	1 83	1 83	1 83	1 83
Cost of silage fed	$	4 02	4 02	4 02	4 02
Total cost of feed	$	14 45	14 45	14 45	14 45
Feed cost to produce 100 pounds fat corrected milk	$	0 88	0 94	1 16	1 02
Profit over feed, fat corrected milk at $1.75 per cwt.	$	14 15	12 39	7 38	9 88

It will be noted in the foregoing tables that after giving the actual milk production and butterfat percentage of the milk, an entry is made showing the amount of "fat corrected milk". That is, the milk is corrected to four per cent milk by the formula F.C.M.=.4M + 15F where M is the milk in pounds and F the pounds of butterfat it contains, this formula being one derived by Davidson & Gains of the University of Illinois. The comparisons drawn from these tables are based on the fat corrected milk.

In table I it will be noted that the oil cake meal ration produced 79 pounds or 4·5 per cent more milk than the Palm Kernel cake ration; also, that the feed cost was lower; consequently, the oil cake meal ration gave $1.55 greater return for the week's milk than the Palm Kernel cake ration.

In table II, which was a check of table I, it will be noted that the oil cake meal ration produced 85 pounds, or 4·3 per cent more milk than the Palm Kernel cake ration; also, that the oil cake meal ration again gave the greater monetary return by $1.68. These two tests are, therefore, in complete agreement.

In table III, giving the results of the test of Palm Kernel meal (extracted) vs. oil cake meal it will be noted that the oil cake meal produced 92 pounds or 6·1 per cent more milk than the Palm Kernel meal ration; also, that there was a difference of $2.51 in profits over feed in favour of the oil cake meal ration.

It will be seen, therefore, that for feeding dairy cows for milk production, for which purpose the Palm Kernel cake and meal seem best adapted under our Canadian systems of feeding, Palm Kernel cake and meal are not as efficient or profitable as our own home produced oil cake meal. It may be said by some that the foregoing tests were not fair tests inasmuch as equal amounts of protein were not fed in each case, due to the lower protein content of the Palm Kernel cake and meal. Such a point might be well taken, but, on the other hand, here were two feeds costing as much, or more, than oil cake meal, therefore, if they were not equal to oil cake meal, pound for pound, they could hardly be made more profitable by feeding larger proportions of them.

Apart from their feeding value there is the difficulty of getting such materials into the country, to say nothing in the case of the Palm Kernel cake, of the necessity for breaking and grinding, as not every farmer would have access to ore-dressing or stone-crushing machinery. It would seem, therefore, that so long as we have an abundant supply of home-grown oil cake meal at a reasonable price, with home-grown soya bean meal and cake gradually coming on the market, and with cottonseed meal readily available across the line to the south, there is very little prospect that Palm Kernel cake or meal will ever become a profitable feed to the Canadian farmer.

DAIRY HERD RECORDS OF PRODUCTION

Following will be found a table giving the milk and fat production, and feed consumption records for all cows and heifers which have completed a normal lactation period during the year ending March 31, 1929; also, a table giving the average production of the five best cows of each breed, and of the whole herd of each breed for the same period.

INDIVIDUAL MILK RECORDS

Name and Breed of Cow	Age at commencement of lactation period	Date of dropping calf	No. of days in lactation period	Total pounds of milk for period	Daily average yield of milk	Average percentage fat in milk	Pounds of butter produced in period	Value of butter at 45c. per pound	Value of skim milk at 30c. per cwt.
				lb.	lb.	%	lb.	$	$
Ottawa Grace Echo..... H.	2	Dec. 6, 1927	396	14,886·5	37·59	3·92	686·89	309 10	42 91
Relief Lucy..... A.	5	Nov. 22, 1927	338	12,313·9	36·43	3·86	558·56	251 35	35 52
Helena Plus Perfect..... H.	3	Nov. 18, 1927	285	13,346·5	46·83	3·58	561·76	252 79	38 31
Lennoxville Roxie..... A.	11	April 8, 1928	327	11,288·3	34·52	3·92	520·24	234 11	32 54
Lennoxville Roxie 3rd..... A.	7	Mar. 15, 1928	302	9,420·6	31·39	4 35	482·53	217 14	27 03
Ottawa Supreme Starlight.... A.	3	Nov. 22, 1927	465	9,810·4	21·10	4·30	496·16	223 27	28 17
Johanna Segis Jewel..... H.	3	Jan. 14, 1928	320	9,963·5	31·14	3·98	467·04	210 17	28 70
Lennoxville Pansy 2nd..... A.	5	Mar. 20, 1928	290	9,285·1	32·02	4·17	455·39	204 93	26 69
Bessie Ann Echo..... H.	3	Oct. 23, 1927	375	10,684·6	28·49	3·59	451 65	203 24	30 90
Lennoxville Mary 4th..... A.	2	Nov. 15, 1927	327	8,161·0	29·46	4·31	414·01	186 30	23 43
Lennoxville Marjorie 3rd..... A.	6	Feb. 29, 1928	276	8,428·0	30·54	4·19	415·76	187 09	24 22
Ottawa Kyle Marjorie..... A.	2	Dec. 26, 1927	340	6,286·7	18·46	5·02	371·60	167 22	17 81
Ottawa Dignity Dot..... A.	8	May 11, 1928	300	8,244·0	27·48	4·13	401·46	180 66	23 71
Perfect Bessie Bos..... H.	2	Nov. 25, 1927	269	9,314·5	34·63	3·63	397·31	178 79	26 93
Lennoxville Bettina 3rd..... A.	6	Mar. 14, 1928	298	8,745·6	29·35	4·60	402·16	180 97	25 21
Ottawa Supreme Flavia..... A.	3	Nov. 25, 1927	294	7,967·5	27·10	4·01	376·02	169 21	22 94
Lennoxville Roxie 2nd..... A.	8	Nov. 17, 1927	337	8,742·3	25·94	3·97	408·13	183 66	25 00
Ottawa Supreme Lady..... A.	2	Nov. 6, 1927	455	7,343·0	16·14	4·41	380·98	171 44	21 06
Ottawa Kyle Blossom..... A.	3	Nov. 26, 1927	293	7,368·5	25·15	4·16	360·60	162 27	21 19
Dalfibble Orange Blossom.... A.	5	Nov. 18, 1927	273	7,845·1	28·74	3·79	350·01	157 50	22 70
Lennoxville Roxie 4th..... A.	2	Dec. 5, 1927	324	7,285·0	22·48	4·18	357·98	161 09	20 94
Ottawa Victorine..... A.	6	Nov. 30, 1927	261	6,362·7	24·38	4·21	315·46	141 96	18 28
Perfect March Korndyke..... H.	2	Nov. 10, 1927	322	7,817·5	24·38	3·71	341·59	153 72	22 58
Ottawa Auchenbay Mina 2nd.. A.	4	Oct. 29, 1927	258	4,681·5	17·90	4·23	230·00	103 50	13 27
Total for herd (24 cows).....	103	.....	7,725	215,529·4	.....	.....	10,203·29	4,590 48	620 04
Average for herd (24 cows)....	4·3	.....	322	8,980·39	27·90	4·02	425·14	191 27	25 84

AVERAGE PRODUCTION OF FIVE AYRS

Name and Breed of Cow	Age at commencement of lactation period	Date of dropping calf	No. of days in lactation period	Total pounds of milk for period	Daily average yield of milk	Average percentage fat in milk	Pounds of butter produced in period	Value of butter at 45c. per pound	Value of skim milk at 30c. per cwt.
				lb.	lb.	%	lb.	$	$
Relief Lucy.....	5	Nov. 23, 1927	338	12,313·9	36·43	3·86	558·56	251 35	35 52
Lennoxville Rosis.....	11	April 8, 1928	327	11,288·3	34·54	3·92	520·24	234 11	32 54
Lennoxville Roxie 3rd.....	6	Mar. 15, 1928	302	9,420·6	31·19	4·35	482·53	217 14	27 03
Ottawa Supresme Starlight.....	3	Nov. 22, 1927	465	9,810·4	21·10	4·30	496·16	223 27	28 47
Lennoxville Pansy 2nd.....	5	Mar. 20, 1928	290	9,285·1	32·02	4·17	455·39	204 93	26 69
Avergage of 5 best cows.....	6	.....	344	10,437·7	31·06	4·10	502·58	226 16	30 05
Average of herd (18 cows).....	4·9	.....	320	8,306·5	25·97	4·33	405·39	182 43	23 87

HOL

Ottawa Grace Echo.....	2	Dec. 6, 1927	392	14,886·5	37·98	3·92	686·89	309 10	42 91
Helena Plus Perfect.....	3	Nov. 18, 1927	285	13,346·5	46·83	3·58	561·76	252 79	38 31
Johanna Segis Jewel.....	3	Jan. 14, 1928	320	9,963·5	31·14	3·98	467·04	210 17	28 70
Bessie Ann Echo.....	3	Oct. 23, 1927	375	10,684·6	28·49	3·05	451·65	203 24	30 90
Perfect Bessie Bos.....	2	Nov. 25, 1927	269	9,314·5	34·63	3·63	397·31	178 79	26 93
Average of 5 best cows.....	2·6	.....	328	11,639·1	35·47	3·75	512·93	230 82	33 55
Average of herd (6 cows).....	2·5	.....	327	11,002·2	33·63	3·74	484·37	217 97	31 72

COMPLETED DURING THE YEAR

Total value of product	Amount of meal eaten at $34 per ton	Amount of ensilage eaten at $4.25 per ton	Amount of roots eaten at $3.40 per ton	Amount of hay eaten at $7.25 per ton	Amount of beet pulp eaten at $35 per ton	Months on pasture at $2 per month	Total cost of feed between calvings	Cost to produce 100 pounds of milk	Cost to produce one pound of butter skim-milk neglected	Profit on one pound of butter skim-milk neglected	Profit on cow between calvings, labour and calf neglected
$	lb.	lb.	lb.	lb.	lb.		$	$	cts.	cts.	$
352 01	3,918	10,665	5,880	2,608	.....	5	118 72	0 80	17·3	27·7	233 29
286 87	2,836	7,350	7,640	2,208	.....	4	92 82	0 75	16·6	28·4	194 05
291 10	3,254	9,285	8,100	2,192	.....	3	102 77	0 77	18·4	26·6	188 33
266 65	3,215	4,424	4,480	2,723	248	4½	84 52	0 75	16·2	28·8	182 13
244 17	2,767	7,845	1,000	2,554	311	4½	88 61	0 94	18·4	26·6	155 56
251 44	2,924	10,860	5,240	2,912	.....	4	100 27	1 02	20·2	24·8	151 17
238 87	2,979	8,530	4,320	2,112	.....	4	91 77	0 92	20·0	25·0	147 10
231 62	2,580	8,135	1,890	2,554	290	4	86 70	0 93	19·0	26·0	144 92
234 14	2,998	8,710	6,440	2,200	.....	4	96 41	0 90	21·3	23·7	137 73
209 73	2,110	6,355	.....	2,228	366	4½	72 37	0 89	17·5	27·5	137 36
211 31	2,357	7,090	.....	2,058	341	4½	77 07	0 91	19·0	26·0	134 24
185 03	820	7,320	3,940	1,952	.....	4	51 28	0 82	13·8	31·2	133 75
204 37	2,214	8,114	310	2,439	.....	4	72 25	0 88	18·0	27·0	132 12
205 72	2,436	6,395	6,360	1,624	.....	5	81 70	0 88	20·6	24·4	124 02
206 18	2,409	8,515	1,100	2,554	260	4½	83 43	0 95	21·0	24·0	122 75
192 15	2,102	6,090	4,440	1,624	.....	4	70 11	0 88	18·6	26·4	122 04
208 66	2,917	8,545	450	2,504	488	4½	94 64	1 08	23·2	21·8	114 02
192 50	2,319	9,150	4,260	2,744	.....	4	84 05	1 14	22·1	23·9	108 45
183 46	2,122	7,320	5,646	1,952	.....	4	76 31	1 04	21·2	23·8	107 15
180 20	2,020	7,740	7,840	2,064	.....	2½	76 45	0 97	22·0	23·0	103 75
182 03	2,363	7,015	150	2,248	366	4½	79 05	1 09	22·1	22·9	102 98
160 24	1,836	6,090	4,880	1,624	.....	3	64 34	1 01	20·4	24·6	95 90
176 30	2,646	6,395	6,920	1,624	.....	5½	86 72	1 11	25·4	19·6	89 58
116 77	1,538	7,350	6,210	1,960	.....	2	63 44	1 37	28·0	17·0	53 33
5,211 52	59,680	185,288	97,496	53,442	2,670	95½	1,995 80	.....	.....	.....	3,215 72
217 15	2,487	7,720	4,062	2,227	111	4·0	83 16	0·93	19·6	25·4	133 99

BEST COWS AND OF TOTAL HERD IN EACH BREED

HIRES

Total value of product	Amount of meal eaten at $34 per ton	Amount of ensilage eaten at $3.40 per ton	Amount of roots eaten at $7.25 per ton	Amount of hay eaten at $7.25 per ton	Amount of beet pulp eaten at $35 per ton	Months on pasture at $2 per month	Total cost of feed between calvings	Cost to produce 100 lbs. of milk	Cost to produce one pound of butter skim-milk neglected	Profit on one pound of butter skim-milk neglected	Profit on cow between calvings, labour and calf neglected
$	lb.	lb.	lb.	lb.	lb.		$	$	cts.	cts.	$
286 87	2,836	7,350	7,640	2,208	.....	4	92 82	0 75	16·6	28·4	194 05
266 65	3,215	4,424	4,480	2,723	248	4½	84 52	0 75	16·2	28·8	182 13
244 17	2,767	8,745	1,000	2,554	311	4½	88 61	0 94	18·4	26·6	155 56
251 44	2,924	10,860	5,240	2,912	.....	4	100 27	1 02	20·2	24·8	151 17
231 62	2,580	8,135	1,890	2,554	290	4	86 70	0 93	19·0	26·0	144 92
256 15	2,864	7,903	4,050	2,590	170	4·1	90 58	0 87	18·0	27·0	165 57
206 30	2,303	7,517	3,304	2,282	148	3·6	78 76	0 95	19·4	25·6	127 54

STEIN

352 01	3,918	10,665	5,880	2,608	.....	5	118 72	0 80	17·3	27·7	233 29
291 10	3,254	9,285	8,100	2,192	.....	3	102 77	0 77	18·3	26·7	188 33
238 87	2,979	8,530	4,320	2,112	.....	4	91 77	0 92	19·6	25·4	147 10
234 14	2,998	8,710	64.40	2,200	.....	4	96 41	0 90	21·3	23·7	137 73
205 72	2,436	6,395	6,360	1,642	.....	5	81 70	0 88	20·6	24·4	124 02
264 37	3,117	8,717	6,220	1,792	.....	4·2	98 27	0 84	19·2	25·8	186 09
249 69	3,039	8,330	6,327	2,063	.....	4·4	96 36	0 88	19·9	25·1	153 34

In the case of heifers with their first calves charges for feed include the consumption from a date approximately two months prior to parturition to the time of being dried off preparatory to their second calving. In the case of cows with their second or later calves charges for feed include the period from the time of drying up at the end of the previous lactation period to the end of the lactation period herein reported.

In estimating the cost of feeds the following values were used:—

Pasture	$2 00 per month
Meal and other concentrates	34 00 per ton
Hay	7 25 per ton
Roots	3 40 per ton
Silage (corn)	4 25 per ton
Beet pulp	35 00 per ton

The values represent the cost of production in the case of home-grown feeds, and the actual cost price in the case of mill feeds factory by-products, etc., that are purchased.

In calculating the value of the product, the actual average cash price per pound received for butter was used, while in the case of the by-product skim-milk, this was valued at thirty cents per hundredweight.

The labour of caring for the cattle, the cost of manufacture of the butter, etc., have not been taken into consideration. On the other hand, the value of the manure and the value of the calves at birth will offset these items, though probably not sufficiently to cover other overhead charges such as interest, depreciation, etc.

OFFICIAL RECORDS

In order that the many surplus bull calves may have the necessary credentials in the way of official records, all normal cows and heifers that had not previously been tested or that looked like bettering previous records, were entered in the Canadian Record of Performance for Pure-bred Dairy Cattle, conducted by the Live Stock Branch.

The following table gives the lists of cows qualifying during the year:—

CANADIAN RECORD OF PERFORMANCE TESTS ON CENTRAL EXPERIMENTAL FARM, APRIL 1, 1928, TO MARCH 31, 1929

Name and number of cow	Breed	Age at commencement of test	Number of days milking	Pounds milk	Pounds fat	Average per cent fat
		years		lb.	lb.	%
Lennoxville Mary 4th -95171-	Ayrshire	2	305	7,953	364	4·58
Lennoxville Pansy 2nd -85614-	"	4	291	9,282	394	4·24
Lennoxville Roxie 3rd -82180-	"	5	303	9,421	394	4·18
Lennoxville Roxie 4th -92931-	"	2	305	7,180	296	4·12
Ottawa Kyle Blossom -87406-	"	3	292	7,369	335	4·55
Ottawa Kyle Marjorie -96955-	"	2	305	6,103	309	5·06
Ottawa Supreme Flavia -91683-	"	3	294	7,968	319	4·00
Ottawa Supreme Starlight -92441-	"	2	365	9,262	396	4·28
Relief Lucy -83933-	"	5	305	11,931	479	4·01
Bessie Annie Echo -129343-	Holstein	2	365	10,646	401	3·77
Colony Daisy McKinley Abbekerk -137919-	"	2	365	13,671	545	3·99
Helena Plus Perfect -118447-	"	3	285	13,347	501	3·75
Johanna Segis Jewel -134727-	"	2	305	9,881	401	4·06
Ottawa Grace Echo -132935-	"	2	365	14,599	571	3·91
Perfect Bessie Bos -131915-	"	2	271	9,315	331	3·55
Perfect Butter Maid -119903-	"	3	344	15,041	535	3·56

THE DAIRY

During the year, 361,160 pounds of milk were received at the Dairy from the farm herds. Close to ten thousand pounds of butter have been manufactured, this being the main channel of marketing the product. The making of Cheddar cheese has been continued and in a lesser way the production of cream, buttermilk and Meilleur cheese.

Comparison of this year's output with that of previous years reveals a falling off, due to losses in the herd and consequent reduction of milk flow until the junior herd in development comes into production. The incoming year should see a marked increase in production, which should shortly reach full capacity.

For many years pasteurization of all milk has been a feature, each individual pasteurization being checked by a self-recording thermometer. A further check is now maintained, through the assistance of the Division of Bacteriology, from which source a monthly report is received as covering bacteriological examinations of milk made during the year. The following is a copy of one of these monthly reports.

DIVISION OF BACTERIOLOGY—LABORATORY REPORT

Summary of Milk Analyses, C.E.F. Dairy, for month of August

Date of run	Raw milk		Pasteurization		Pasteurized milk		% Efficiency	Bottled milk	
	Total count	B. coli in 0·1 cc.	Temp.	Time	Total count	B. coli in 1·0 cc.		Total count	B. coli in 0·1 cc.
			° F.	minutes					
Aug. 1	35,400	.....	143	32	150	.....	99·58	230	.....
6	3,800	.....	151	30	20	.....	99·47	40	.....
8	4,000	.....	148	32	30	.....	99·25	40	.....
13	4,500	.....	145	28	30	.....	99·33	40	.....
15	11,500	.....	147	32	150	.....	98·70	60	.....
21	4,100	.....	155	30	20	.....	99·51	20	.....
22	25,200	.....	145	30	30	.....	99·88	60	.....
27	3,800	.....	150–148	32	60	.....	98·42	80	.....
28	11,700	.....	146	30	100	.....	99·15	200	.....
29	5,200	.....	151	32	60	.....	99·85	180	.....
Average	10,920	90·0%	148	31	65	0·5%	99·40	95	0·0%

Attention might be drawn to the comparatively low counts of raw milk. The effectiveness of the pasteurizing process is indicated by the very low counts of the pasteurized and bottled milk. During this particular month there was no trace of bacillus coli in either raw or pasteurized product. The efficiency of the process is not far from 100 per cent, and although in many months the total count in the case of raw milk, runs much higher than shown here, the percentage efficiency remains at comparatively the same level. It will be noted that this report covers the month of August.

Cleanliness throughout the whole process of production with pasteurization superimposed, and adequate ice cold storage conditions have guaranteed not only clean, reliable, wholesome milk, but also uniformity, day by day, of the final product, butter, buttermilk, cheese of various kinds, etc.

Where examination reveals that counts of raw milk are running high, the reason is immediately sought and the condition corrected.

HORSES

Owing to the omission of reference to horses in the report for 1928, certain references will be made to the previous year in this section.

There has been a slight increase in the number of horses on hand from last year—36 head in 1928 as compared with 40 head on March 31, 1929. On the latter date, these were made up of eleven grade geldings and mares, three general purpose horses and the balance of registered Clydesdales, fifteen mares and eleven head of younger stock. The days of work performed in 1929 were practically identical to those of the previous year—8,104 days.

FEED AND MAINTENANCE COST OF DRAUGHT HORSES (1927-28)

The following tables show the yearly feed cost and the yearly feed and maintenance cost of 18 work-horses.

YEARLY FEED COST OF EIGHTEEN WORK-HORSES

101,034 pounds oats	at $46·71 per ton	$2,359 65
5,796 pounds bran	at $31·00 per ton	89 84
105,678 pounds hay	at $ 6·75 per ton	356 66
10,800 pounds carrots	at $ 3·50 per ton	18 90
180 pounds salt	at $20·00 per ton	1 80
Total feed cost		$ 2,826 85
Feed cost per head		157 05

YEARLY FEED CONSUMPTION PER HORSE

	Pounds
Oats	5,613
Bran	322
Mixed timothy hay	5,871
Carrots	600
Salt	10

YEARLY FEED AND MAINTENANCE COST OF EIGHTEEN WORK HORSES

Total feed	$2,826 85
Labour (stable attendance)	780 00
Interest, $4,050 at 6 per cent	243 00
Depreciation, $4,050 at 6 per cent	243 00
Shelter estimated at $25 each	450 00
Harness and repairs, $13.94 per head	250 92
Shoeing, $20 per head	360 00
Total yearly cost	$5,153 77
Yearly cost per head	286 32

FEED AND MAINTENANCE COST OF DRAUGHT HORSES (1928-29)

The following tables show the yearly feed cost, the individual feed consumption and the yearly feed and maintenance cost of eleven draught horses.

YEARLY FEED COST OF ELEVEN WORK-HORSES

61,464 pounds oats	at $45 00 per ton	$1,382 94
79,248 pounds hay	at 7 25 per ton	287 27
3,432 pounds bran	at 31 00 per ton	53 20
12,152 pounds carrots	at 3 50 per ton	21 27
110 pounds salt	at 20 00 per ton	1 10
Total feed cost		$1,745 78
Feed cost per head		158 71

YEARLY FEED CONSUMPTION PER HORSE

	Pounds
Oats	5,588
Hay	7,204
Bran	312
Carrots	1,105
Salt	10

YEARLY FEED AND MAINTENANCE COST OF ELEVEN WORK-HORSES

Total feed	$1,745 78
Labour (stable attendance)	475 00
Interest, $2,475 at 6 per cent	148 50
Depreciation, $2,475 at 6 per cent	148 50
Shelter, estimated at $25 each	275 00
Harness and repairs, $14 per head	154 00
Shoeing, $20 per head	220 00
Total yearly cost	$3,166 78
Yearly cost per head	287 89
Number of hours worked	30,888 00
Cost of horse labour per hour	0 103

From the above table it is seen that the cost of horse labour on this Farm during the past year amounted to ten cents per hour. At first glance, this might seem rather high, but it must be remembered that only horses of the approved heavy draught type and breeding are kept and also that they are always well conditioned.

COST OF REARING FOALS (1927-28)

The following table shows the feed cost of two foals from May 31 and June 21, 1927, to March 31, 1928.

1,148 pounds oats	at	$46 71 per ton	$26 81
614 pounds bran	at	$31 00 per ton	9 52
3,240 pounds hay	at	6 75 per ton	10 04
960 pounds carrots	at	3 50 per ton	1 68
4 months' pasture	at	0 50 each	4 00
8 pounds salt	at	20 00 per ton	0 08
Total cost			$ 53 03
Feed cost per head			26 52

COST OF REARING FILLY FOAL

The following tables show the feed cost of a filly foal from birth to two years of age.

FEED COST FOR FIRST YEAR; APRIL 21, 1926, TO MARCH 31, 1927

1,274 pounds hay	at	$ 6 60 per ton	$4 20
1,031 pounds oats	at	34 70 per ton	17 89
364 pounds bran	at	26 00 per ton	4 73
4 pounds salt	at	20 00 per ton	0 04
480 pounds carrots	at	3 50 per ton	0 84
4 months' pasture	at	0 50 per ton	2 00
Total cost during first year			$ 29 69

FEED COST FOR SECOND YEAR: APRIL 1, 1927, TO MARCH 31, 1928

2,460 pounds hay	at	$ 6 75 per ton	$8 30
1,097 pounds oats	at	46 71 per ton	25 62
394 pounds bran	at	31 00 per ton	6 11
8 pounds salt	at	20 00 per ton	0 08
480 pounds carrots	at	3 50 per ton	0 84
5 months' pasture	at	1 50 per ton	7 50
Total cost during second year			$ 48 45

FEED COST TO RAISE FILLY FOAL TO TWO YEARS OF AGE

Cost of feed during first year	$29 69
Cost of feed during second year	48 45
Total feed cost for two years	$ 78 14

COST OF REARING FOALS, 1928-29

The following table shows the feed cost of five foals from birth during May and June, 1928, to March 31, 1929.

COST OF FEEDING FOALS

3,315 pounds oats	at $45 00 per ton		$74 59
1,380 pounds carrots	at 3 50 per ton		2 38
1,805 pounds bran	at 31 00 per ton		27 98
7,845 pounds hay	at 7 25 per ton		28 44
5 months' pasture	at 0 50 per month		12 50
20 pounds salt	at 20 00 per ton		0 20
Total cost of feed			$ 146 09
Average cost per foal			29 22

The following table shows the gains of the foals used in the cost study above during the five months of winter feeding:—

GAINS OF FIVE FOALS DURING WINTER FEEDING

	Pounds
Weight of five foals on Nov. 1, 1928	3,715
Average foal weight, Nov. 1, 1928	743
Weight of five foals on March 31, 1929	4,288
Average foal weight, March 31, 1929	858
Total gain from Nov. 1, 1928, to March 31, 1929	513
Average gain per foal (150 days)	103
Daily gain per foal	0·7

FOAL REARING AT THE CENTRAL EXPERIMENTAL FARM

In 1927, seven foals were reared and in 1928, the number was five, with eight mares bred to foal in 1929. All foals are sired by "Sandy Mac" and in-foal mares bred to the same horse. As a number of his fillies are coming to breeding age, it is contemplated transferring him to some other field of usefulness on one of the Eastern Branch Farms.

Reports for the past several years will have indicated the disappearance of joint ill or navel ill in foals raised at the Central Experimental Farm. The procedure employed in the care and management of stallions and mares, and this with certain prophylactic measures in the case of foals, has been described fully. Under similar conditions, and following the same general practice, there has been no case of joint ill in foals reared during the past two years. The effect which the stallion may have had in this desirable result is conjectured as yet. It is entirely probable that the sire is a contributing factor to much of the trouble experienced with foals. "Sandy Mac" has been singularly sure at service, his foals have been rugged and strong—generally he has been of the clean breeding kind. Future results with the use of other stallions will be watched with interest.

SHOW RING ACTIVITIES

There were no animals shown during the year 1928-29. The practice of the Division is to show only occasionally and so nothing of this sort was attempted since several horses were shown at the Central Canada Exhibition in Ottawa in 1927 and were given the following awards: Grand Champion male, "Sandy Mac" (Imp.) —24318— and Reserve Grand Champion male, "Baron Mac" —24689— the latter being a son of the Grand Champion, "Sandy Mac" mentioned above. The Grand Champion female was "Dawn of Peace" —44700— and her daughter, "Princess Mac" —52306— by "Sandy Mac" was Reserve Grand Champion female.

PRACTICAL RESULTS IN THE USE OF CRUSHED, ROLLED OR BRUISED WHOLE OATS FOR HORSES

As previously reported from time to time, much attention has been given to the ultimate value of rolling whole oats for horses.

The horse at ordinary farm work is rather a difficult subject for experimentation and in work carried on in the past, no very definite economy has been

proven concerning the value of rolling or bruising oats as compared to feeding it whole. However, there would seem to be certain advantages in the use of the rolled grain as viewed from the standpoint of practice, over a term of years.

1. Records reveal that since an oat roller was installed, after which rolled oats was fed regularly, there has been to all intents and purposes an almost complete elimination of the common digestive troubles of work horses, mainly as represented by colic.

2. The use of western oats is becoming increasingly common in Eastern Canada. It would seem that the better the quality of such grain, the harder and more "flinty" it is. Frequently the hull is thick and very hard. It has been noted that with certain individuals amongst the aged horses and with this group, indeed, in a general way, and with yearlings and two-year-olds as well, the loss from voided undigested grain runs high. Rolling or bruising, of course, prevents this loss, renders each grain subject to digestive action, and would seem to exert this action with special benefit in the case of Western oats.

3. A continuation of the examination and germination of droppings would substantiate previous results, that thorough rolling or bruising allows of complete digestion and that little or no germinable grain is present in droppings. In the matter of land preparation for pure seed growing and the possible introduction of other varieties through the droppings of horses, rolled oats might be fed, therefore, provided the rolling was thoroughly done and the rollers set close. Otherwise, the use of ground oats would be necessary, and although grain is not thus in its most acceptable form for horses, the feeding of oats, ground, for a few weeks would do no harm and constitute the most reliable safeguard.

FEEDING OF PURINA OMOLENE

During the spring and summer of 1928, the feeding value of Purina Omolene for work horses was determined. Purina Omolene is a "ready to use" balanced feed for horses, and is manufactured, sold and distributed by the Ralston Purina Company at Woodstock, Ontario.

VALUE OF FEEDS

	per ton
Oats	$45 00
Timothy hay	7 25
Purina Omolene	60 30
Bran	31 00

The following table shows the loss and gain in weight and the total amount and cost of feed consumption of the oats and Omolene lots.

OATS VERSUS PURINA OMOLENE

—		Lot I Oats, check lot	Lot II Purina Omolene
Number of horses	No.	3	3
Initial weight, gross	lb.	4,865	4,725
Initial weight, average	"	1,622	1,575
Final weight, gross	"	4,860	4,745
Final weight, average	"	1,620	1,582
Total gain or loss in weight	"	Loss 5	Gain 20
Average gain or loss per horse	"	Loss 2	Gain 7
Number of days on test	No.	49	49
Total oats consumed	lb.	3,412·5	.....
Total Omolene consumed	"	.....	2,730
Total bran consumed	"	147	147
Total hay consumed	"	2,940	2,940
Total feed cost	$	89 72	95 25
Feed cost per head	$	29 91	31 75
Daily feed cost per head	$	0 61	0 65

From the above table, it will be noted that the oat fed horses showed a slight but negligible loss in weight, whereas during the same period of seven weeks the Omolene fed horses increased their weight an average of seven pounds. However, this latter would also be considered negligible and might in part show the fattening tendency of the corn containing Omolene. In considering the feed costs of the two groups, it will be remembered that oats cost $45 per ton while the Omolene was priced at $60.30 per ton. Thus in a comparison of the feed cost of the two groups it will be seen that the oats fed lot were fed for 61 cents each per day while the Omolene lot ate a ration costing 65 cents each per day; a difference of four cents in favour of the oats lot.

OBSERVATIONS AND CONCLUSIONS

It would seem necessary to handle the Omolene in small quantities. Thus no large amount of it could be kept on hand. In this instance, it was noted that the weight of the feed, when stored, caused the mass at the bottom of the bag to cake or consolidate. The same condition was observed on the sides when the bags were closely packed.

It was considered that the Omolene likely constituted a rather heating feed for horses which were accustomed to oats. It was noted during the test that one of the Omolene fed horses was losing some of the hair from its legs. This could not be directly and definitely blamed to Omolene feeding but nevertheless would more than likely seem to have been caused by it. It was expected, considering the physical composition of Omolene, that the horses on this feed would tend to show greater thrift. However, after seven weeks' feeding, no differences could be detected in relative sleekness of coat, general health or ability to work, between horses fed oats and Omolene.

From th results of this one test, the following deductions concerning Omolene would seem justified.

1. Purina Omolene seems equal to oats in feeding value for working horses.
2. It contains considerable corn and would seem to be a rather heating feed for horses which have been accustomed to oats.
3. No differences were found between the oats and Omolene fed horses in condition or thrift.
4. At the relative costs herein recorded, Omolene proved to be the more expensive feed.

SWINE

The herd of swine at the Central Farm, Ottawa is composed of Yorkshires and Berkshires. These two breeds are the only ones which have been kept for quite a few years. The Yorkshire herd is the larger and consists of two boars, thirty-three sows, twenty gilts, fifteen feeders and seventy-eight young pigs. The Berkshire herd is made up of two mature boars, one young boar, eleven sows, seven feeders and eighteen young pigs.

During the year there was a fair demand for breeding stock. However, not nearly as many pigs were sold as in the previous year. There were in all sixty-five head of breeding stock sold. Of these, thirty-three were Yorkshire boars, eleven Yorkshire sows, fourteen Berkshire boars and seven Berkshire sows.

As well as the sales of breeding stock, quite a considerable amount of pork was marketed. There were 3,346 pounds of fresh pork sold and 35,684 pounds of pork, marketed on the hoof.

There are in a general way two main objects in keeping a well bred herd of swine. First, to furnish sufficient pigs to carry on rather extensive experimental work; secondly, to supply breeding stock to farmers and livestockmen

at fair prices. Thus, it is not always possible to supply the demand for breeding stock, since of necessity, the requirements for research investigations must always be kept in mind when accepting breeding stock orders.

EXPERIMENTAL WORK

The lines of experimental work conducted were, as in previous years, planned to be practical solutions of the most pertinent problems in the successful raising of swine. Since there was quite a fair demand for young breeding animals, the number of feeder pigs available for experimental study was necessarily limited. However even with limited accommodation and small numbers of experimental animals, considerable work of both a scientific and practical nature has been accomplished.

COST OF FEEDS

In comparison with the previous year, the cost of the cereal grains for the year was somewhat higher while in the case of mill feeds there was a slight lowering of prices. The following table shows the cost of feeds used in the feeding trials with swine.

FEED COSTS

Ground oats, per ton	$46 12 to $48 20
Ground barley, per ton	53 00
Shorts, per ton	32 00
Tankage, 45 per cent protein, per ton	65 20
Tankage, 60 per cent protein, per ton	80 20
Oil cake meal, per ton	47 00
Alfalfa meal, per ton	40 00
Bran, per ton	30 00 to 30 80
Middlings, per ton	35 00
Pig Chow, per ton	68 60
Baconrite, per ton	270 00
Ground feed wheat, per ton	35 80
Bone char (spent bone black), per ton	20 00
Salt, per ton	20 00
Buttermilk and skim-milk, per ton	6 00
Provendine, per package (about 3 pounds)	1 50

ANALYSIS OF FEEDS

The Division of Animal Husbandry is indebted to Dr. F. T. Shutt, the Dominion Chemist, for his kind co-operation in many phases of the experimental work and for the following analyses of feeds:—

Lab'y No.	Feed	Source of Manufacture	Moisture	Protein	Fat	Carbo-hydrates	Fibre	Ash
			%	%	%	%	%	%
95612	Oats	Home grown	9·97	10·15	4·91	60·22	11·62	3·13
95613	Barley	Home grown	11·99	12·73	2·30	65·19	5·00	2·79
95614	Shorts	Maple Leaf Mlg. Co	11·40	15·37	6·03	55·50	7·29	4·41
95616	Tankage (45 per cent)	City Renderers, Ltd., Montreal, Que	8·42	57·83	10·44	.....	.....	21·16*
95617	Tankage (60 per cent)	City Renderers, Ltd., Montreal, Que	8·36	61·62	10·00	.....	.....	17·87**
95618	Oil cake meal	Sherwin-Williams Co., sold by W. R. Cummings, Ottawa.	9·27	36·48	9·05	33·55	6·90	4·75
95619	Alfalfa meal	Beaver Valley Alfalfa Meal Co., Thornburg, Ont.	9·87	12·48	2·08	39·64	29·03	6·90
95620	Bran	Lake of the Woods Mlg. Co., Montreal, Que	9·39	14·32	5·47	62·68	12·04	6·10
95108	Ogilvie's middlings	Ogilvie Flour Mill	11·98	16·59	6·01	56·94	5·33	3·15
95485	Pig chow	Ralston Purina Co., Ltd	10·49	20·29	5·01	49·84	6·65	7·72
94153	Baconrite	Thrift Tonic Stock Foods	9·37	15·73	4·69	60·59	5·89	3·73
96027	Feed wheat (ground)		10·71	14·63	2·53	68·10	2·51	1·52
95614	Bone char		Phosphoric acid 34·69 per cent; nitrogen 0·44 per cent.					

* Containing bone phosphate 17·86 per cent. **Containing bone phosphate 13·93 per cent.

SWINE PARASITES

Some systematic work was undertaken in the control and eradication of swine parasites. Of these latter, the most troublesome and costly seem to be the common round worm, lung worm, and hog louse.

In the eradication of round worms a modification of the McLean County System produced very good results. Under this treatment, the pregnant sows were treated for worms about two weeks to a month before farrowing. Nema capsules, which are composed of tetrachlorethylene, were found to be a sure remedy. Another equally good worm expellant is oil of chenopodium. In treating for worms it is necessary to starve the pigs for from twelve to twenty-four hours before treatment, and they should not be fed or watered for two or three hours after treatment.

About three or four days before farrowing the sows were washed with tepid water. The udder and teats were carefully washed, using creolin as a disinfectant. About this time the farrowing pen was thoroughly cleaned and the sow was put into it after being washed. The only certain method in cleaning the farrowing pen is scrubbing with boiling water containing a strong solution of lye, one pound of lye being used with forty gallons of water.

Wherever possible, it is good practice to move the sow and litter within a few weeks after farrowing to clean ground, which has not been used as pig runs for some time.

To make sure that the young pigs would be free from worms and thus given a good start in life, all of the pigs were treated for worms within two weeks after weaning time. Pigs which were raised under the above conditions, grew well, thrived nicely and from all appearances were entirely free from worms.

Common hog lice are invariably present where conditions are not entirely clean and sanitary. However, they are so easily eradicated that there is no excuse for lousy hogs. Any oil is fatal to lice. However, some oils are of an irritating nature and so should not be used. Fuel oil, castor oil and pale paraffin No. 1 are all efficient remedies. The last named, pale paraffin No. 1, has proven very efficient at this Farm. It is non-irritating, fairly cheap, and is procured without difficulty from refineries, or distributing oil plants. It can be applied along the back of the pig and on the badly infested places or can be used in a hog oiling device.

SUNLIGHT AND EXERCISE FOR NURSING SOWS WITH LITTERS

In order to determine, at least partially, the value of direct sunlight and of exercise in the open air, the following experiment with brood sows and their litters, was undertaken during the fall of 1928.

The experiment was conducted with brood sows and their litters from farrowing time until weaning age of the pigs at eight weeks. A record was kept on the performance of five litters since only this number of litters were on hand during the fall months, which were considered suitable for purposes of comparison. The sow weight and litter weight of each were taken at farrowing time and again at the time of weaning. The feed consumption was kept during this period so that it might be determined if there were any differences in the feed requirement of sows and litters, when subjected to the various conditions.

The meal ration of the sows and litters was exactly similar to that used for all nursing litters at this Farm and consisted of the following feeds:—

	Pounds
Bran	100
Shorts	100
Ground oats	200
Middlings	100
Ground barley	100
Linseed oil meal	3 per cent by weight
Tankage, 45 per cent protein	3 per cent by weight
Skim-milk	hand fed.

The allotment and treatment of the lots was as follows:—

Lots 1 and 2.—Sows and litters remained indoors, throughout the experiment.

Lot 3.—Sow remained indoors, litter ran in and out.

Lots 4 and 5.—Sows and litters ran in and out.

The following table shows the gains in weight and the feed consumption of the sows and their litters:—

SUNLIGHT AND EXERCISE FOR NURSING SOWS WITH LITTERS

—		Lot 1 Sow and litter inside	Lot 2 Sow and litter inside	Lot 3 Sow inside, litter running outside	Lot 4 Sow and litter run outside	Lot 5 Sow and litter run outside
Number of pigs born	No.	15	13	11	11	10
Number of pigs raised to weaning	No.	8	7	9	8	6
Initial litter weight, live pigs	lb.	16	12	20	16	12
Final litter weight, 8 weeks	lb.	214	192	170	178	122
Gain in weight	lb.	198	180	150	162	110
Gain in weight per pig	lb.	24·8	25·7	16·7	20·3	18·3
Initial sow weight	lb.	500	475	500	510	475
Final sow weight	lb.	475	450	460	490	505
Gain or loss in sow weight	lb.	Loss 25	Loss 25	Loss 40	Loss 20	Gain 30
Meal consumption	lb.	568	560	536	536	564
Meal consumption per pound of litter gain	lb.	2·87	3·11	3·57	3·31	5·13
Buttermilk consumption	lb.	725	600	750	750	600
Buttermilk consumption per pound of litter gain	lb.	3·66	3·33	5·00	4·63	5·45

From a survey of the above table, it is noted that the number of pigs raised under the various treatments is practically the same. However, in this case the percentage of pigs raised is larger in the lots where the pigs, and sows and pigs respectively were allowed to run outside. Part of this at least may be due to the fact that the litters raised inside, contained a larger number of pigs at birth.

The pigs raised inside showed the greatest average gain in weight, and the pigs from the lot with the sow held inside and pigs running out showed the smallest average gain.

When the figures showing feed consumption are considered, the sows and pigs raised indoors are found to have required the smallest amount of feed per pound of litter gain. The other groups required both more meal and more buttermilk to produce equal litter gains. Since the pigs running outside exercised to a greater extent, they would thus need a greater amount of feed to take care of their body needs.

There are several factors which cannot be expressed in cold figures, but which nevertheless must be considered in the above experiment. For instance, some of the sows may have been in better condition than others at the termination of the experiment. Also, it is possible and even quite likely that the litter of pigs raised ouside were hardier, stronger and altogether better prepared to avoid any setback at weaning time. Thus it would be quite unfair to interpret the above figures too literally without giving other resulting but unmeasured data some due consideration. Nevertheless, the above figures would indicate that pigs raised to weaning age indoors will require less feed per pound of gain and will likely be heavier at that time. This is of course more than likely due to the fact that pigs having more scope for exercise, will actually take more exercise. This will of course require extra feed. Also, with considerable exercise there will not be the same tendency to lay on a covering of flabby fat, but nevertheless the pigs will likely be hardier and more thrifty.

FEEDING EXPERIMENTS

FEEDING VALUE OF FROSTED WHEAT

This experiment was undertaken to determine the relative feeding values of barley and frosted wheat when fed to fattening swine. Groups of five pigs each were fed on rations containing barley and frosted wheat respectively. The wheat used was Grade No. 6. This is the lowest standard grade. It should not be inferred that lower grades than No. 6 are not suitable for feeding purposes. However, No. 6 can be bought without inspection and yet with the assurance that it will be up to the required standard. Lower grades, on the other hand, are very variable and would be a very uncertain buy unless the shipment was bought on the guarantee of a representative sample.

The rations were planned to show a direct comparison of frozen wheat and barley. Each of these feeds was mixed with 25 per cent of ground oats, eight per cent of 60 per cent protein tankage, one per cent of bone char and one-half per cent of common salt.

The experiment was started with growing pigs which weighed approximately 137 pounds, and they were fed until they reached market weights of approximately 200 pounds.

The following table shows the comparative gains in weight, feed consumption and cost of gains for the two lots.

WHEAT VERSUS BARLEY

—		Lot 1 Frozen wheat	Lot 2 Barley
Number of pigs	No.	5	5
Total initial weight	lb.	684	686
Average initial weight	lb.	136·8	137·2
Total final weight	lb.	1,050	990
Average final weight	lb.	210	198
Total gain	lb.	366	304
Average gain per pig	lb.	73·2	60·8
Number of days on test	No.	41	41
Average daily gain per pig	lb.	1·79	1·48
Total meal consumed	lb.	1,480	1,275
Meal consumed per 100 pounds gain	lb.	404·37	419·41
Value of meal per cwt	$	2 10	2 69
Value of meal consumed	$	31 08	34 30
Feed cost per head	$	6 22	6 86
Feed cost per 100 pounds gain	$	8 94	11 28

The lot fed frozen wheat is found to have made the larger gain and thus shows the largest average daily gain. This same lot consumed more total feed than the barley lot, but nevertheless consumed less feed than the barley lot per pound of gain produced. The frozen wheat was a considerably cheaper feed than barley. Thus the meal cost for the frozen wheat group was the lower. Also in the calculation showing the feed cost per 100 pounds gain, it is found that the frozen wheat group made equal gains at a much lower cost than the barley lot.

Thus in years of plentiful wheat crop which would make available a larger amount of the lower grades of wheat, and in years of considerable damage to the wheat crop, such as frosting, it would seem that this feed can be used to good advantage in the feeding of live stock, and especially as this test seems to prove, in the feeding of hogs. It is a feed the available quantity of which varies considerably from year to year. It would therefore seem the wise policy to use it in live stock feeding when it is available at a moderate price, but always

having in mind that in years of comparative scarcity the price may be so high that other feeds may supply the same nutriment at a lower cost.

PROVENDINE FOR UNTHRIFTY PIGS

In order to test out the value of Provendine, an experiment was conducted with ten unthrify pigs. These were divided into two lots of five pigs each. Each of the lots was fed the same basal ration of mixed meals and buttermilk. As an addition, one lot was fed Provendine at the rate of one tablespoonful per pig per day. Provendine is what might be termed a condimental feed to correct rickets, lack of thrift, etc. It evidently contains corn meal, lime, etc. and according to its manufacturers is treated with ultra violet rays generated by a quartz mercury lamp. This treatment probably activates the compound, which in turn may supply health promoting vitamins.

A sample of Provendine was analyzed by Dr. F. T. Shutt, the Dominion Chemist, and found to have the following composition:—

	Per cent
Moisture	8·66
Ether extract (fat)	3·00
Protein	8·40
*Ash	25·23

*Ash contained 10·3 per cent phosphate of lime and 9·96 per cent carbonate of lime.

Traces only of chlorides and sulphates. Free from iodides, neutral to litmus. Microscopical examination shows corn starch.

"This preparation appears to be a mixture of corn meal, phosphate of lime and carbonate of lime."

The rations fed to the two lots of pigs were as follows:—

Lot	Number of pigs	How fed	Meal ration	Other feeds
I	5	Hand-fed...	Middlings.....8 parts by weight..... Bran.....1 part by weight..... Oats, ground.....8 parts by weight..... Oil meal.....3 per cent by weight Tankage (45 per cent protein).....3 per cent by weight.....	Buttermilk Provendine
IV	5	Hand-fed...	Same as Lot I.....	Buttermilk

The following table shows the results of the feeding of Provendine to one of the groups of unthrifty pigs.

PROVENDINE FOR UNTHRIFTY PIGS

—		Lot I Provendine	Lot IV Check (no condiment)
Number of pigs	No.	5	5
Initial weight, gross	lb.	105	154
Initial weight, average	lb.	21	30·8
Final weight, gross	lb.	336	388
Final weight, average	lb.	67·2	77·6
Total gain	lb.	231	234
Average gain per pig	lb.	46·2	46·8
Number of days on test	No.	60	60
Average daily gain per pig	lb.	0·77	0·78
Total meal consumed	lb.	340	395
Meal eaten per pound of gain	lb.	1·47	1·69
Total buttermilk consumed	lb.	1,670	1,750
Buttermilk eaten per pound of gain	lb.	7·23	7·48
Total condiment consumed (Provendine)		5 packages about 15 pounds	.....

PROVENDINE FOR UNTHRIFTY PIGS—*Concluded*

—		Lot I Provendine	Lot IV Check (no condiment
Total feed cost*	$	11·963	13·328
Feed cost per head*	$	2·393	2·666
Feed cost per pound of gain*	$	0·0518	0·0570
Value of Provendine at $1.50 per package	$	7·50	.....
Gross returns at $13	$	43·68	50·44
Net returns: Gross returns minus feed cost, original value and Provendine value	$	8·47	14·01
Difference in net profit between lots	$	−5·54	.....
What one could afford to pay for Provendine and make same margin as check lot	$	1·96	.....
What one could afford to pay for Provendine per package	$	0·39	.....

*Provendine not included.

The above data which were collected for the feeding period of sixty days show that the average daily gains for these two lots are practically equal. As will be noted, the check lot had a much greater initial weight. It is therefore considered that the check lot of pigs were hardly as unthrifty as the Provendine-fed pigs. The check lot ate more meal and also more buttermilk than the Provendine lot. Since the total gains were practically equal, both the meal and buttermilk consumption per pound of gain are higher for the check lot. Thus also the feed cost per head and the feed cost per pound of gain were found to be higher for the check lot than in the case of the Provendine-fed pigs.

From the results of the above experiment, the feeding of Provendine would seem to have had a beneficial effect. Although the average daily gains of the two lots were practically equal, nevertheless the feed cost per pound of gain was considerably lower for the Provendine lot. Thus the feeding of Provendine, excluding its own cost, was well worth while. However, when the cost of the Provendine is included in the feed cost, the cost of production is raised considerably above that of the check lot. The valuation of $1.50 per package is the cost of the Provendine on the open market. However, the Provendine did not return enough extra profit to pay for itself, and as will be seen in the above table, what one could afford to pay for it is very much below its actual cost.

Further experimentation is in order. In fact, it is proposed to carry on further work as soon as convenient. It is planned to vary the meal mixture somewhat and note the effect of Provendine from weaning to much heavier weights than recorded above. These data are desired, for it is considered of value to know the effect of the compound when fed over a longer period of time.

THE FEEDING VALUE OF ACID UTAL

An experiment was conducted with ten young pigs to test the tonic value of Acid Utal for unthrifty pigs. Unthrifty pigs were used because the compound had already been tested on healthy young growing pigs. The results of the former experiment were very indefinite and showed little or no benefit from the feeding of Acid Utal. This experiment was therefore planned to determine if the addition of Acid Utal to a swine ration would have any effect on the thrift and vigour of newly weaned pigs and on the rate and economy of gains during the early period of growth.

PLAN OF EXPERIMENT

Lot	Number of pigs	How fed	Meal ration	Other feeds
II	4	Hand-fed...	Middlings, 8 parts by weight Bran, 1 part by weight Oats, ground, 8 parts by weight Oil meal, 3 per cent by weight Tankage (45 per cent protein) 3 per cent by weight	Buttermilk Acid utal
IV	5	Hand-fed...	Same as Lot II	Buttermilk

A sample of the Acid Utal was analyzed by Dr. F. T. Shutt, the Dominion Chemist, Central Experimental Farm, Ottawa, and found to have the following composition:—

Acid Utal: Lab'y No. 90775—

	Per cent
Sodium formate	15·26
Free formic acid	9·18
Water	33·88
Silica	40·00
Undetermined	1·68

Accompanying the analysis, Dr. F. T. Shutt, the Dominion Chemist, sent the following observations:—

"Our analysis of this preparation shows that its active ingredient is formic acid.

"Formic acid is a powerful stimulant of muscular action; it retards fatigue; in small doses it improves appetite and general nutrition."

COST OF FEEDS.—The meal mixture for the 60 day period is charged at $2.045 per hundred pounds and the buttermilk at 30 cents per hundred pounds. The value of the Acid Utal was not charged in determining the feed costs.

The following table shows the results of feeding a group of unthrifty pigs. These were divided into two lots, one of which received in addition to the regular feed allowance one teaspoonful of Acid Utal per pig per day. The Acid Utal was mixed in the meal mixture just before each feed was made ready for the pigs.

THE FEEDING VALUE OF ACID UTAL

—		Lot II Acid Utal	Lot IV Check No condiment
Number of pigs	No.	4	5
Initial weight, gross	lb.	93	154
Initial weight, average	lb.	23·3	30·8
Final weight, gross	lb.	275	388
Final weight, average	lb.	68·8	77·6
Total gain	lb.	182	234
Average gain per pig	lb.	45·5	46·8
Number of days on test	No.	60	60
Average daily gain per pig	lb.	0·76	0·78
Total meal consumed	lb.	293·3	395·0
Meal eaten per pound of gain	lb.	1·61	1·69
Total buttermilk consumed	lb.	1,471·3	1,750·0
Buttermilk eaten per pound of gain	lb.	8·08	7·48
Total Acid Utal consumed		2 boxes about 4 pounds	
Total feed cost	$	10 412	13 328
Feed cost per head	$	2 603	2 666
Feed cost per pound of gain	$	0 0572	0 0570

*Acid Utal not included.

In this test with Acid Utal as a condimental pig feed, it will be noted that the check lot which received no condiment made greater gains than the lot which was fed Acid Utal. Some notice must, however, be taken of the fact that the check lot began with a considerably greater initial weight and so were in perhaps, a more thrifty condition than the Acid Utal lot. The meal mixture and buttermilk were each hand-fed to the pigs. The Acid Utal lot consumed less meal per pound of gain than the check lot. However, it will be noted that the Acid Utal group exceeded the check lot in buttermilk consumption per pound of gain. In a comparison of feed costs, which includes meal mixture and buttermilk, the two lots are practically the same in feed cost per pound of gain. However, these cost figures do not include the cost of the Acid Utal, which if figured as a part of the feed cost would of course make the cost per pound of gain considerably higher for the Acid Utal lot than that of the check lot. Thus from a practical standpoint it would seem from the results shown in this experiment that the added gains, if any, or lowered feed cost derived from the feeding of Acid Utal would not justify the feeding of this condimental feed even if the price of it were not a deciding factor.

THE FEEDING VALUE OF BACONRITE

An experiment was conducted with unthrifty pigs to test the value of Baconrite as a protein supplement and condimental feed. The experiment was planned to note the effect of Baconrite on thrift, variation in gains, and the economy of gains with unthrifty pigs for the 60 day period following weaning. The pigs were all noticeably unthrifty and were picked for this test because of their condition. They were quite similar to a large number of farm-grown pigs, especially fall pigs, which, for some unaccountable reason, seem to receive a setback following weaning.

Ten pigs were used in the experiment and were divided into two groups of five pigs each. Each lot was hand-fed the same ration of mixed meals and buttermilk. As an addition one lot was hand-fed Baconrite at the rate of six tablespoonfuls (three ounces) per pig daily during the first five weeks of the experiment and two tablespoonfuls (one ounce) per pig daily until the close of the experiment. The Baconrite was yellowish in colour and evidently from its appearance consisted of a mixture of ground grains and protein feeds with very little if any medicinal additions.

Rations.—The rations for the two lots of pigs were as follows:—

Lot	Number of pigs	How fed	Meal ration	Other feeds
3	5	Hand-fed...	Middlings, 8 parts by weight Bran, 1 part by weight Oats, ground, 8 parts by weight Linseed oil meal, 3 per cent by weight Tankage, 45 per cent protein, 3 per cent by weight	Buttermilk Baconrite
4	5	Hand-fed...	Same as lot No. 3	Buttermilk

EXPERIMENTAL RESULTS.—The following table is a tabulation of the results of feeding Baconrite during the sixty days of the experiment:—

FEEDING VALUE OF BACONRITE

—		Lot No. 3 Baconrite	Lot No. 4 check No condiment
Number of pigs	No.	5	5
Initial weight, gross	lb.	132	154
Initial weight, average	lb.	26·4	30·8
Final weight, gross	lb.	361	388
Final weight, average	lb.	72·2	77·6
Total gain	lb.	229	234
Average gain per pig	lb.	45·8	46·8
Number of days on test	No.	60	60
Average daily gain per pig	lb.	·76	·78
Total meal consumed	lb.	390	395
Meal ea'en per pound gain		1·70	1·69
Total buttermilk consumed	lb.	1,500·0	1,750·0
Buttermilk eaten per pound of gain	lb.	6·55	7·48
Total Baconrite consumed	lb.	40·5	.....
Value of Baconrite at $13.50 per cwt	$	5 47	.....
Total feed cost	$	12 476	13 328
Feed cost per head	$	2 495	2 666
Feed cost per pound gain	$	0 0545	0 0570
Gross returns at $13	$	46 93	50 44
Net returns: gross returns minus feed cost, original value and Baconrite value	$	9 18	14 01
Difference in net profit between lots	$	−4 83	.....
What one could afford to pay for Baconrite and make same margin as check lot	$	0 64	.....
What one could afford to pay for Baconrite per cwt	$	1 58	.....

DISCUSSION OF RESULTS.—The two lots gained at almost the same rate, having average daily gains which are practically equal. However, the Baconrite lot showed an economy on feed. The pigs of this lot consumed less buttermilk and slightly less meal. It is realized that both of these feeds were hand-fed. Thus differences in feed consumption are comparable only when these data are used in conjunction with those on daily gains. The feed cost was noticeably lower in the case of the Baconrite lot. Also since the gains were practically equal, the feed cost per pound of gain (cost of Baconrite excluded) was lower for the Baconrite lot. However, when the cost of the Baconrite was included in the feed cost its feeding was found to be an unprofitable procedure. The rations used in this test contained slightly less than the optimum percentage of protein. It is true that the Baconrite group produced their gain at a slightly less cost, thus showing the food value of the additional protein, but the difference was not nearly sufficient to pay the cost of this added feed.

THE FEEDING VALUE OF SALT AND IODIZED SALT

This experiment was undertaken to determine the feeding value of salt and iodized salt in the ration of feeder pigs. Weanling pigs were used which had an average weight of approximately 34 pounds. These were fed until they reached market weights of practically 200 pounds each.

The salt used in the experiment was not mixed in the meal mixture until just before feeding time. The iodine was fed as potassium iodide and it was administered by thoroughly mixing with the salt in the desired proportions. This was accomplished by drying the salt and then spreading out evenly on a clean floor. The potassium iodide was dissolved in a small amount of water and this solution was sprinkled evenly over the salt. For the small and large amounts of iodine in the salt mixtures, potassium iodide was added to common salt in the ratios of one to 2,000 and one to 500 respectively by weight. After drying, the

salt was well mixed and then sacked, preparatory to using. The salt mixture was in each case fed at the rate of one-half pound per pig during each 30 days, the right amount being mixed in the meal mixture each day.

The meal mixture used in feeding the pigs was composed of various home-grown feeds and mill-feeds and was changed to suit the size and the age of the pigs.

The basal meal ration for all lots was as follows:—

1st 60 days	lb.
Middlings	200
Ground oats	100
Ground barley	50
Shorts	50
Bran	25
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent

60 to 90 days	lb.
Middlings	100
Ground oats	150
Ground barley	100
Shorts	50
Bran	25
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent

90 to 120 days	lb.
Ground oats	200
Ground barley	150
Shorts	100
Bran	25
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent

120 days to finish	lb.
Ground oats	150
Ground barley	200
Shorts	100
Tankage, 45 per cent protein	3 per cent

The meal mixture was mixed with buttermilk and water just previous to feeding and the feed was thus always fed in a sweet condition.

The following table shows the relative gains and costs of gains for the four lots:—

RESULTS FROM FEEDING SALT AND IODIZED SALT

—	Lot 1 Check	Lot 2 Common salt	Lot 3 Common salt and small amount of iodine 2,000 to 1	Lot 4 Common salt and large amount of iodine 500 to 1
Number of pigs ..... No.	5	5	5	5
Initial weight, gross ..... lb.	171	171	174	171
Initial weight, average ..... lb.	34·2	34·2	34·8	34·2
Final weight, gross ..... lb.	949·0	966·0	958·0	959·0
Final weight, average ..... lb.	189·8	193·2	191·6	191·8
Total gain ..... lb.	778·0	795·0	784·0	788·0
Average gain per pig ..... lb.	155·6	159·0	156·8	157·6
Number of days on test ..... No.	130	130	130	130
Average daily gain per pig ..... lb.	1·20	1·22	1·21	1·21
Total meal consumed ..... lb.	1,760·0	1,940·0	1,990·0	1,633·0
Meal eaten per pound gain ..... lb.	2·26	2·44	2·54	2·07
Total buttermilk consumed ..... lb.	4,155·0	4,340·0	4,340·0	3,905·0
Buttermilk eaten per pound gain ..... lb.	5·34	5·46	5·54	4·96
Total additional supplement to meal mixture ..... lb.	.....	13·0	13·0	13·0
Meal cost per cwt ..... $	2·33	2·33	2·33	2·33
Total feed cost ..... $	53·47	58·35	59·52	49·89
Feed cost per head ..... $	10·69	11·67	11·90	9·98
Feed cost per pound gain ..... $	0·069	0·073	0·076	0·063

In the above table, it wil be seen that all of the lots made gains which were practically equal. Even the greatest variations in gain were relatively quite small and so it is not considered that any of the differences are significant. However, since the gains are practically equal it is interesting to compare the amounts of feed necessary to produce them. The amounts of both meal and buttermilk necessary to produce one pound of gain are lower for the check lot than for either the common salt lot or the low iodized salt lot. But on the other hand the lot fed salt and the larger amount of iodine required both less meal and less buttermilk; to produce the given amount of gain. Since the same feeds were used in the various lots, the total feed cost, feed cost per head and most important of all, the feed cost per pound gain are all lowest for the lot fed the larger amount of iodine. Thus it would seem from the results of this one experiment that potas-

sium iodide had a beneficial effect when fed to growing and fattening hogs. The above data are somewhat contradictory to former results obtained with swine at this Farm. In the former experiment no beneficial effects could be noted from the feeding of potassium iodide to swine. However, since the results of only one lot in this experiment were favourable, more experimental work will be necessary before the results could be considered conclusive. In the above experiment, the favourable results with potassium iodide were obtained when it was fed at the rate of one-30,000 pound (15·1 mg.) per pig per day. When the potassium iodide was fed in smaller amounts, that is $\frac{1}{120000}$ pound (3·8 mg.) per pig per day, the results could not be considered favourable. Thus is indicated the need of more work before definite conclusions can be drawn concerning the nutritional value of potassium iodide for growing and fattening pigs.

ALFALFA MEAL FEEDING

An experiment was conducted with alfalfa meal to determine its feeding value for growing and fattening pigs. Green feed is not easily procurable during the winter months and it is at that time of the year that it seems hardest for an animal to secure the necessary vitamins and minerals. Thus alfalfa meal was fed to one of two lots of pigs to determine its value as a supplement to the winter meal ration.

The basal meal ration for all lots was as follows:—

1st 60 days	Pounds
Middlings	200
Ground oats	100
Ground barley	50
Shorts	50
Bran	25
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent
Buttermilk.	

60 to 90 days	Pounds
Middlings	100
Ground oats	150
Ground barley	100
Shorts	50
Bran	25
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent
Buttermilk.	

90 to 120 days	Pounds
Ground oats	200
Ground barley	150
Shorts	100
Bran	25
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent
Buttermilk.	

120 days to finish	Pounds
Ground oats	150
Ground barley	200
Shorts	100
Tankage, 45 per cent protein	3 per cent
Buttermilk.	

The above ration was fed to one group of pigs (lot 1) and the same plus an addition of three per cent of alfalfa meal to another group (lot 5). This meal was mixed in the meal ration and fed as part of the grain mixture.

The following table shows the gains and feed consumption of feeding growing and fattening pigs with and without an addition of alfalfa meal.

RESULTS FROM FEEDING ALFALFA

—		Lot 1 Check	Lot 5 Alfalfa meal
Number of pigs	No.	5	5
Initial weight, gross	lb.	171	177
Initial weight, average	lb.	34·2	35·4
Final weight, gross	lb.	949	978
Final weight, average	lb.	189·8	195·6
Total gain	lb.	778	801
Average gain per pig	lb.	155·6	160·2
Number of days on test	No.	130	130
Average daily gain per pig	lb.	1·20	1·23
Total meal consumed	lb.	1,760	2,115
Meal eaten per pound gain	lb.	2·26	2·64
Total buttermilk consumed	lb.	4,155	3,935
Buttermilk eaten per pound gain	lb.	5·34	4·91
Meal cost per 100 pound	$	2·33	2·23
Total feed cost	$	53·47	58·97
Feed cost per head	$	10·69	11·79
Feed cost per pound gain	$	0·069	0·074

As will be seen from the above table the alfalfa meal lot made a slightly larger gain and also had a slightly larger average daily gain. The difference is not very large but is nevertheless in favour of the alfalfa fed lot. The groups were hand fed and in comparing results, it is found that one group was fed the larger amount of meal, while the other was fed more buttermilk. Thus the data on meal and buttermilk eaten per pound of gain are hardly comparable in this case. However, in a comparison of figures under feed cost per pound gain, that of the alfalfa fed lot was somewhat higher. Thus it would seem that alfalfa meal will produce slightly larger gains, but nevertheless, because of its cost, would hardly seem from the results of this one experiment, to be a profitable feed for growing and fattening pigs.

TANKAGE AS A PROTEIN SUPPLEMENT

Tankage is fed in a number of the Experimental Farm swine rations and from that standpoint it was deemed interesting to know just to what extent it could be used in the ration to supplement a meal mixture and butermilk. Tankage is useful mainly because of is protein and mineral content. An experiment was undertaken with growing pigs in which two groups of pigs were fed different levels of tankage. One group was thus receiving a larger amount of protein than the other, and the experiment was planned with the thought in mind of attempting to determine the optimum amount of protein for growing and fattening swine.

The meal ration was the same as that used in the experiment shown above (see alfalfa meal). Lot 1, the check lot, was fed a meal mixture containing three per cent of 45 per cent protein tankage. In lot 6, the high protein lot, tankage was fed at the rate of seven per cent of the meal ration.

The following table shows the results of feeding the two lots from weaning up to market weights of approximately 190 pounds.

RESULTS WITH TANKAGE AS A PROTEIN SUPPLEMENT

—		Lot 1 Check	Lot 6 Large amount of tankage
Number of pigs	No.	5	5
Initial weight, gross	lb.	171	174
Initial weight, average	lb.	34·2	34·8
Final weight, gross	lb.	949	1,001
Final weight, average	lb.	189·8	200·2
Total gain	lb.	778	827
Average gain per pig	lb.	155·6	165·4
Number of days on test	No.	130	130
Average daily gain per pig	lb.	1·20	1·27
Total meal consumed	lb.	1,760	2,095
Meal eaten per pound gain	lb.	2·26	2·53
Total buttermilk consumed	lb.	4,155	3,935
Buttermilk eaten per pound gain	lb.	5·34	4·76
Meal cost per 100 pounds	$	2·33	2·37
Total feed cost	$	53·47	61·46
Feed cost per head	$	10·69	12·29
Feed cost per pound gain	$	0·069	0·074

The high tankage lot made somewhat the larger gain and also made a slightly greater average daily gain. However, the high tankage lot consumed more feed and almost as much buttermilk as the low tankage lot. Thus the feed cost of the high tankage lot was the greater. The rather high price of tankage, since it was used in greater amount in the one case tended to make the feed cost greater. Although the gains of this lot were larger, nevertheless there was not enough difference to justify the larger feed cost and so the increased gains were made at a loss.

The high protein ration seemed to have a somewhat depressing effect on the pigs during the early stages of the experiment. It was noticed that the pigs on

the high protein ration did not thrive well during the first month of the experiment. It is of course recognized that young growing animals require a fairly high protein ration. However the above ration was evidently too high for optimum growth. The ration, as fed, contained approximatelly 25 per cent protein. This of course includes the buttermilk which was fed along with the meal. This is, according to other workers, somewhat too high for best results. The pigs received so much protein that there was likely what might be called a mild case of protein poisoning. However, the pigs survived and grew well later on in the experiment. Naturally, they would with such a ration. However the experiment serves as a good lesson in the feeding of rich protein feeds in large quantities. When milk is fed rather liberally as in the above case, there is not considered to be much need of tankage supplementation to the ration. The weaned pig, according to feeding authorities, should have a ration containing approximately 18 to 20 per cent protein. As the pig grows older, this can be decreased somewhat, so that at market age, the ration will only contain about 14 to 15 per cent protein. The latter is a much cheaper ration, and after all, the ration which is cheapest, but supplying the necessary food constituent is the most desired one. This will in turn return the most profits to the producer. It is thus seen to be possible to compound a ration which will be uneconomical and also not for the best interests of the animal. There are very few swine producers who err in compounding rations by including too much protein. More of them feed too little. The aim should be to feed the optimum amount, either too much or too little being uneconomical.

VALUE OF PURINA CHOW FOR HOG FEEDING

Purina Pig Chow Feed is fairly widely known as a ready-for-use hog feed and is recommended by its manufacturers as a supplement to farm grains for sows, pigs and market hogs.

An experiment was carried on with Purina Pig Chow using it to replace part of the meal mixture in a swine ration. For the first 60 days of the experiment the meal ration consisted of two parts of Purina Pig Chow Feed to three parts of the basic meal mixture. From 60 days until the close of the experiment at 130 days, the meal ration consisted of one-third Purina Pig Chow Feed and two-thirds of the basic meal mixture. The Purina lot was checked against a similar lot of pigs which received the basic meal mixture. Both lots were hand-fed buttermilk at the rate of about two pounds of buttermilk for each pound of meal.

Purina Pig Chow Feed has the following guaranteed composition: Digester tankage, linseed meal, alfalfa meal, corn gluten feed, shorts, molasses, corn meal, two per cent of salt and one per cent of charcoal.

The guaranteed analysis is as follows:—

Protein minmum	19·00
Fat minimum	2·50
Fibre maximum	8·00

The basic meal ration was changed somewhat as the pigs grew and matured. The following tables show the various mixtures used in the experiment:

1st 60 days

	Pounds
Middlings	200
Shorts	50
Ground oats	100
Ground barley	50
Bran	50
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent

60 to 90 days

	Pounds
Middlings	100
Shorts	50
Ground oats	100
Ground barley	100
Bran	50
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent

90 to 120 days	Pounds
Shorts	100
Ground oats	200
Ground barley	150
Bran	50
Linseed oil meal	3 per cent
Tankage, 45 per cent protein	3 per cent

120 days to finish	Pounds
Shorts	100
Ground oats	100
Ground barley	200
Linseed oil meal	3 per cent

In determining the cost of production, the feeds used in the experiment were charged at the following rates:—

Middlings	$35 00 per ton
Shorts	32 00 "
Ground oats	46 12 "
Ground barley	53 00 "
Bran	30 00 "
Linseed oil meal	47 00 "
Tankage, 45 per cent protein	65 20 "
Buttermilk	6 00 "
Purina Pig Chow feed	68 50 "

In the following table data are compiled for the two lots showing gains in weight, feed consumption and cost of gain.

MAY TO SEPTEMBER EXPERIMENT, 1928

—		Lot 1 Purina Chow	Lot 2 check
Number of pigs	No.	7	7
Initial weight, gross	lb.	235	228
Initial weight, average	lb.	33·6	32·6
Final weight, gross	lb.	1,338	1,338·2
Final weight, average	lb.	191·1	191·2
Total gain	lb.	1,103	1,110·2
Average gain per pig	lb.	157·6	158·6
Number of days on test	No.	130	130
Average daily gain per pig	lb.	1·21	1·22
Total meal consumed	lb.	2,655	2,704·9
Meal eaten per pound of gain	lb.	2·41	2·44
Total buttermilk consumed	lb.	4,850	5,267·0
Buttermilk eaten per pound of gain	lb.	4·40	4·74
Total Purina Pig Chow consumed	lb.	931·3	
Cost of Purina Chow at $3.43	$	31 94	
Total feed cost	$	83 58	73 96
Feed cost per head	$	11 94	10 57
Feed cost per 100 pounds of gain	$	7 58	6 66

In a survey of the above table, the gains of the two lots are noticed to be almost identical, the average gain per pig being one pound greater in the case of the check lot. Since the gains are practically equal it is quite convenient and very reliable to compare the figures showing feed consumption and cost of the feed consumed by the two lots. The Purina lot had a somewhat lower meal consumption per pound of gain than the check lot and in buttermilk consumption was low enough to be well outside the limits of error when compared to the check lot. The Purina Pig Chow thus seemed very efficient in the production of the same amount of gain and this with a considerably lower consumption of feed.

The Purina Pig Chow, although only used as a part of the ration contained considerable protein, vitamins and minerals, and so helped to supply any deficiency which may have existed in the basal meal ration. However, the price of the Pig Chow, since it is somewhat higher than farm-grown grains, naturally increases the cost of production. Thus in the experimental data cited above it was not profitable to use such a feed in the production of market hogs. However, if it is desired to grow out some breeding stock quickly, then it might be advisable to use such a feed when the cost would of course be unimportant.

Considerable more testing will be necessary before it will be possible to definitely assign a value to the Pig Chow. However, this first experiment would indicate that it may be a valuable supplement to home-grown grains and would seem especially so, when it is used to balance rations which would otherwise be left unbalanced. However, the cost of the feed seems to prohibit its use in large quantities or to any but the best of the stock which will respond to feed and thus show quick gains.

ADVANCED REGISTRATION OF SWINE

During the year, preliminary work was undertaken at this Farm to determine the advisability of formulating an Advanced Registry Policy for Swine. This project was carried out in co-operation with the Dominion Live Stock Branch, and the data obtained at this Farm were corroborated by almost duplicate experimentation which was carried out on several Branch Farms. Thus replicate work on Branch Farms throughout Canada should be at least the equivalent of having the experiment repeated many times. In this way considerable data were assembled in a short time, which taken together and surveyed in a broad way served as a nucleus so that the official policy could be properly begun during the year 1929.

Under the above policy it is desired to find which animals in our swine herds are productive of progeny which are best suited to our wants. It is well known that certain strains of pigs fatten quickly and with a minimum of feed. Others require larger amounts of feed to develop them to market weights. The pigs which produce 100 pounds of gain with the lesser amount of feed will more than likely return the most profit. The type of carcass produced is another very vital factor of hog breeding in catering to the present day market. The housewife is demanding pork with less fat and more lean meat. Of a similar type is the carcass which would yield bacon of an export grade. Such a side of bacon, commonly called a Wiltshire side, is well and evenly fleshed with lean meat, has a medium and even covering of fat, and is of medium width and exceptionally good length.

Several litters born in the spring of 1928 were chosen to be used under the preliminary Advanced Registry Policy. The amount of feed required for each sow and litter from farrowing to weaning was recorded. The pigs were weaned at eight weeks of age. At this time, three pigs were nominated from each litter as being representative of that litter. The whole litter was fed from weaning to market weights of approximately 200 pounds. The amount of feed used was recorded and the gains in weight and feed consumption per 100 pounds gain was calculated and averaged for each litter. Upon reaching market weights the pigs underwent a slaughter test. The following were some of the points noted concerning each carcass: Dressing percentage, percentage of export bacon, Wiltshire length, depth of shoulder and loin fat, width at flank, thickness of belly, firmness of fat and grade of carcass.

The lack of space prohibits the publishing of all the data gathered. However, suffice it to say that when these data were collected and calculated for each litter, it was possible to determine which produced both the cheapest pork and the type of carcass most suitable as export bacon. It was also determined just how far the three nominated pigs might be considered as representative of their litter.

As stated above, the above project was carried out on quite a number of the branch Farms throughout Canada as well as at the Central Experimental Farm, Ottawa. Such information, collected under a variety of conditions and from widely separated districts might be considered as quite representative and it proved very valuable in formulating a policy which would be practicable from its inception.

SHEEP

The flock of sheep at the Central Experimental Farm consists of pure bred Leicesters, pure bred Shropshires, cross breds of these two breeds and grade Shropshires. The flock of grade Shropshires was recently added to the already existing flock at this Farm. By this means an effort will be made through the gathering and recording of data to determine the advisability and possible profits in keeping a large farm flock in eastern Ontario.

On March 31, 1929, the composition of the entire flock was as follows:—

Leicester—

Breeding ewes	No.	39
Breeding ewes (cross breeding)	"	19
Shearling ewes	"	15
Lambs, pure bred (up to April 1, 1929)	"	33
Lambs, cross bred (up to April 1, 1929)	"	18
Rams	"	3

Shropshire—

Breeding ewes	No.	64
Breeding ewes (cross breeding)	"	35
Shearling ewes	"	19
Lambs, pure bred (up to April 1, 1929)	"	25
Lambs, cross bred (up to April 1, 1929)	"	35
Rams	"	6

Grades and Cross Breds—

Grade Shropshire ewes	No.	82
Grade Shropshire shearlings	"	5
Cross bred ewes	"	14
Cross bred shearlings	"	27
Lambs, cross bred dams (up to April 1, 1929)	"	7

LAMBING DATA

There were four breeding flocks which lambed during the year 1928. These consisted of pure-bred Shropshires and Leicesters and also pure-bred animals of these two breeds which had been crossed with a ram of the other breed. The following table shows the number and weight of lambs in each group:—

LAMBING DATA

—		Pure-bred Shropshire	Cross-breds (Shropshire dams)	Pure-bred Leicesters	Cross-breds (Leicester dams)
Total number of ewes	No.	53	43	30	49
Total lambs born	"	74	57	45	69
Average lambs per ewe	"	1·40	1·33	1·50	1·41
Weight of lambs at birth	lb.	521·5	437·5	299	528
Total lambs weighed	No.	61	56	38	68
Average weight of lambs at birth	lb.	8·55	7·81	7·87	7·76

From the above results the pure-bred Leicesters are found to have produced the heaviest lamb crop. The thirty ewes in this flock produced forty-five lambs or an average of 1·5 lambs per ewe. From the lambing of the whole flock it is noted that 175 ewes produced 245 lambs, an average of 1·4 lambs per ewe.

WOOL

Following the practice adopted several years ago, all wool produced at this Farm was sold on a graded basis to the Canadian Co-operation Wool Growers, Limited. The total shipment of wool amounted to 1,699 pounds and realized $515.76. It was possible to keep accurate data on about three-quarters of the above wool and in the following table, the weights and grading of fleeces from the two breeds are tabulated.

SUMMARY—WEIGHTS AND GRADING OF FLEECES

—		Shropshire Fleeces	Leicester Fleeces
Number of fleeces	No.	90	66
Total weight	lb.	752	486
Average weight per fleece	lb.	8·36	7·36
Gradings:—			
Medium staple—(⅜) fleeces	No.	45	.....
Percentage	%	50·00	.....
Low staple—(Low ⅜) fleeces	No.	45	23
Percentage	%	50·00	34·85
Low staple—(Low ¼) hard cotts	No.	.....	21
Percentage	%	.....	31·82
Coarse and braid	No.	.....	2
Percentage	%	.....	3·03
Coarse and braid, hard cotts	No.	.....	20
Percentage	%	.....	30·3(

The fleece grading shows that there is still some room for improvement in both flocks. In the Shropshire flock the aim will be to increase the percentage of ⅜ staple fleeces and in the case of the Leicesters to produce more low ¼ staple fleeces. In the Leicester flock a rather large percentage of cotted fleeces were shorn. It is considered that this was due in a large measure to the crowded conditions under which the sheep were kept. With more available housing space for sheep during the coming year, it is felt that this condition will not likely occur again.

Under the above mentioned wool-grading policy which was carried out in cooperation with the Dominion Live Stock Branch, each fleece was marked and weighed at the time of shearing. After the arrival at the warehouse, each fleece was graded separately and its grade was recorded on the attached tag. Then these tags carrying the number of the sheep and the grading of its fleece were returned to the Central Experimental Farm. The data thus secured on grade and weight of fleece have been found an effective and efficient means of crediting the sheep with their performance and in culling from the flock, those sheep which for future breeding purposes were producing fleeces of an undesirable type.

ANIMAL HYBRIDIZATION AT BUFFALO PARK, WAINWRIGHT, ALBERTA

(Under the immediate direction of Mr. A. G. Smith, Superintendent, Buffalo Park)

The inventory of animals in the animal hybridization project at Buffalo Park, Wainwright, Alberta, as on March 31, 1929, is as follows:—

Classes	Males	Females
Bison	2 full grown 1 yearling	1 full grown 4—5 years 1—3 years
		6
Domestic	2 full grown	10 full grown
Yak	1 full grown	3 full grown
Hybrids—1st generation—		
1. Bison—domestic		2—6 years 1—5 "
		3
2. Domestic-bison		1—yearling
3. Domestic-yak	1—5 years	1—4 years
4. Yak-domestic	1—6 years 1—4 " 1—3 "	3—6 years 2—4 " 1—3 "
	3	6
5. Yak-bison		1—6 years
Hybrids—2nd generation—		
1. 50 per cent bison, 25 per cent yak, 25 per cent domestic		1—2 years
2. 50 per cent domestic, 25 per cent bison, 25 per cent yak	1 yearling	1—3 years
3. 50 per cent yak, 25 per cent bison, 25 per cent domestic	2—4 years	1—2 years
4. 75 per cent domestic, 25 per cent bison	1—2 years 1—yearling	2—3 years
	2	
5. 75 per cent domestic, 25 per cent yak	3—3 years 2—2 " 3—yearlings	1—yearling
	8	
6. 75 per cent yak, 25 per cent domestic	1—4 years	
Hybrids—3rd generation—		
87½ per cent domestic, 12½ per cent bison	1—yearling	

Concerning this inventory, the later development of three individuals as appearing in last year's summary, has plainly indicated doubt as to the reliability of previous record of their origin. The doubt caused by later development, together with a checking-up of circumstances surrounding the groups when their dams were bred has indicated the advisability of reclassifying them as to origin.

Thus, a hybrid (domestic-bison) male has been transferred to the buffalo classification (see 1928 report, page 47, where this calf is wrongly described) and two calves, supposedly from domestic cows and sired by a hybrid (yak-domestic) appear now as domestic cattle, there being no doubt but that the cows were in calf prior to arriving at Wainwright from another farm. The fact that the supposed sire of these individuals was elsewhere sterile goes further in the way of proof.

1927 GROUP MATINGS

Group I	Yak bull	2 bison cows.
Group II	Bison bull	8 domestic cows.
		3 yak-domestics.
		2 yaks.
Group III	Hybrid bulls	2 domestics.
	(Domestic-yak)	1 bison.
	(Yak-domestic)	1 bison-domestic.
		1 yak.
Group IV	Domestic bulls	2 bison.
		2 bison-domestic.
		1 yak-bison.
		1 50 per cent domestic, 25 per cent bison and 25 per cent yak.
		2 75 per cent domestic and 25 per cent bison.
		3 yak-domestics.
		1 domestic-yak.

NATURAL INCREASE AS RESULTING FROM 1927 MATINGS

April, 1928—

1 male calf, 75 per cent bison, 25 per cent domestic.
(Dam—Bison-domestic hybrid; sire—bison.)
1 male calf, 75 per cent domestic, 25 per cent yak.
(Dam—domestic; sire—yak-domestic hybrid.)
(Later transferred to straight domestic.)
1 male calf, 75 per cent domestic, 25 per cent yak.
(Dam—yak-domestic hybrid; sire—domestic.)
1 female calf, 75 per cent domestic, 25 per cent yak.
(Dam—domestic; sire—yak-domestic hybrid.)
(Later transferred to straight domestic.)

May, 1928—

1 female calf, domestic-bison hybrid.
(Dam—bison; sire—domestic.)
1 male calf, 75 per cent domestic, 25 per cent bison.
(Dam—bison-domestic hybrid; sire—domestic.)
1 male calf, 50 per cent domestic, 25 per cent bison, 25 per cent yak.
(Dam—yak-bison hybrid; sire—domestic.)

June, 1928—

2 male calves, 75 per cent domestic, 25 per cent yak.
Dams—yak-domestic hybrids; sire—domestic.)
1 male calf, 75 per cent domestic, 12½ per cent bison, and 12½ per cent yak.
(Dam—50 per cent domestic, 25 per cent bison, 25 per cent yak; sire—domestic.)
(Lived only two days.)
1 male calf, 87½ per cent domestic, 12½ per cent bison.
(Dam—75 per cent domestic, 25 per cent bison; sire—domestic.)

July, 1928—

To the above natural increase, should be added the purchase of one female domestic in 1927 and not included in the 1927 reports.

With further reference to the group matings of 1927, the following observations have been made:—

Group I.—Headed by yak male. Neither of the females proved with calf. It would appear that in this instance and as a result of past experience, the breeding life or period of the yak male is comparatively short.

Group II.—Headed by bison males. There are no living calves as a result of this mating. However, certain particulars as with reference to the individuals are of interest. In December, a yak x domestic cow aborted. In January

another abortion occurred, this time a domestic. In February, another domestic aborted after showing excessive development of fluid (hydramnios as discussed in previous reports). Later in the same month another domestic discharged quantities of fluid and later aborted. Of these two cows showing hydramnios one died. The aborted fetuses of both cows were males, indicating the prevalence of abortion in this cross where male calves are conceived. (Refer comments in previous reports.) Later in the same month, a yak-domestic female also showing hydramnios, discharged quantities of fluid followed by abortion. In May a domestic cow gave birth to a female calf which died shortly afterward. This occurrence was duplicated the next month by another domestic cow.

One of the buffalo-domestic cows in Group IV jumped into the field with the Group II animals, was apparently bred by a bison bull, and later gave birth to a male calf, which calf died in January, 1929.

Group III.—Headed by hybrid males (domestic-yak and yak-domestic). Although it was first thought that two domestic cows in this group had produced calves sired by these bulls, it was later discovered that these calves were of straight domestic blood, as per previous comment.

Group IV.—Headed by domestic bulls. This mating was responsible for the greatest increase of the season. Calves were produced by females as described:—

One calf from a bison female.
One calf from a bison-domestic female.
One calf from a yak-bison female.
One calf from a 50 per cent domestic, 25 per cent bison, 25 per cent yak female.
One calf from a 75 per cent domestic, 25 per cent bison female.
Two calves from a yak-domestic female.
One calf from a domestic-yak female.

1928 GROUP MATINGS

In the 1928 groupings, two of the objectives might be commented upon:—

1. A more extensive trial of the domestic-bison cross as considered advisable by satisfactory results already reported.

2. Discontinuance of use of yak males owing to extent of this blood now in the hybrid herd; and instead to test the breeding powers and qualities of yak hybrid males produced.

The 1928 group matings were as follows:—

Groups I and II	Domestic bull	6 bison cows.
	Domestic bull	1 yak x bison.
		2 75 per cent domestic, 25 per cent bison.
		1 50 per cent bison, 25 per cent yak, 25 per cent domestic.
		1 50 per cent domestic, 25 per cent bison, 25 per cent yak.
		1 50 per cent yak, 25 per cent bison, 25 per cent domestic.
		3 bison x domestic.
Group III	2 bison bulls	3 domestic cows.
		1 domestic x yak.
		3 yak x domestic.
Group IV	2 50 per cent yak, 25 per cent bison, 25 per cent domestic	2 domestic cows.
Group V	75 per cent domestic, 25 per cent yak	3 domestic cows.
Group VI	Yak-domestic 5 year old, domestic-yak 4 year old	3 yak cows.
		3 yak-domestic.
		1 domestic.

It will be noted that arrangements have been made so that more light may be thrown on the domestic x bison cross.

Concerning the 1928 group matings as outlined, no calves had been dropped up to the end of March 31, 1929. Certain losses were reported during the winter of 1928-29, as resulting through premature delivery.

A domestic cow in calf to a bison aborted on November 29, 1928.

A hybrid (yak-domestic) heifer in calf to a bison aborted on January 10, 1929.

A domestic cow in calf to a bison aborted on March 19, 1929.

The prevalence of abortions in the first cross with the bison, as detailed, has already been mentioned in these Reports. The results of the 1927 matings and of 1928 in part, as in the foregoing paragraphs, indicate further the violence of the cross from this aspect, where the bison is represented as the male, and serves to illustrate further, too, the handicap which this factor of premature delivery presents to the investigator. Concerning the reverse cross—the domestic male with the bison female—only one calf (female) has been delivered to date. Here normal conditions prevailed as to pregnancy and birth—this as contrasted with the difficulties met with in the more commonly tried bison-domestic cross (see Report, 1928, page 47). Further in this connection and with reference to the group matings of 1928, while none of the six bison cows in the group with a domestic bull had calved on March 31, 1929, there is every evidence that these cows are in calf and that the period of pregnancy has been normal in every respect.

DECREASE IN HERD FOR YEAR ENDING MARCH 31, 1929

One bison-domestic hybrid ("Babe") a member of the original Mossom Boyd selection died.

One male third generation domestic-bison-yak calf died at two days.

One male calf, 75 per cent domestic, 25 per cent yak died.

One four year old yak-domestic hybrid male was destroyed because of an injury.

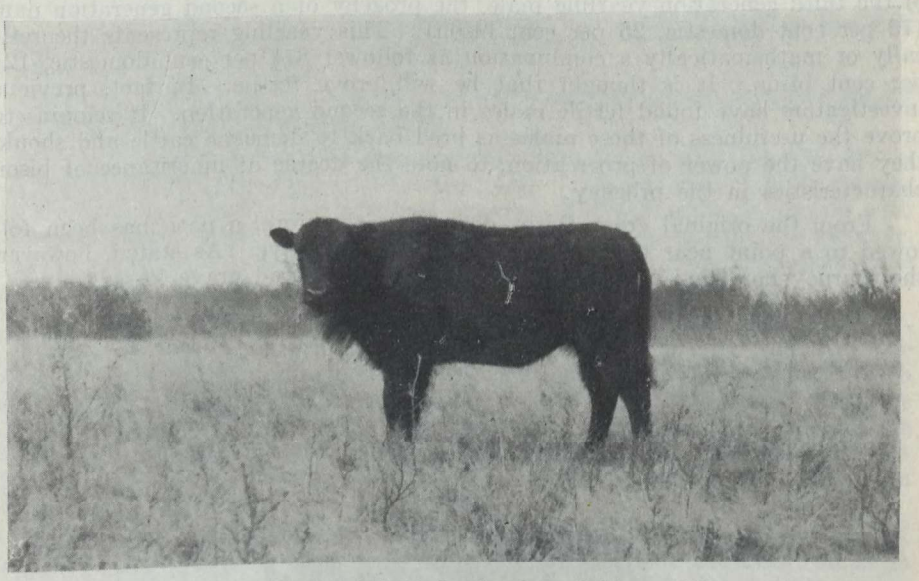
Six females of the original Mossom Boyd herd were destroyed because of their advanced age ("Miss Birkett", "Seaweed" and "Crugerito", all three "cattalo"; "Sealette", a bison-domestic hybrid; "Triabarda" and "Arabella", three-quarter bred bisons or first generation hybrids.

One male second generation hybrid calf, 75 per cent bison, 25 per cent domestic, was lost through illness.

THE DOMESTIC X BISON CROSS

During the year there has been much discussion relative to the possible elimination of certain lines of breeding carried on for past years concerning which evidence collected would indicate little progress made, little value likely to result or as surrounded by almost insurmountable difficulties.

The losses, abnormalities, trials and tribulations generally attendant upon the bison-domestic cross as shown by practically all investigators in the past have been experienced from all angles in the past few years at the Cattalo Enclosure. It is true that a way is opened toward the objective by the fact that the hybrid female is, in most cases, sexually normal, and may be mated with a domestic sire to produce second generation males and females. This process may be carried on indefinitely, if desired, producing succeeding generations and gradually eliminating the bison blood until fertile males result. It will be noted from the inventory of animals as on March 31, 1929, that males have been developed along these lines, the breeding power of which animals is now being tried out. Particular mention is made of the two second generation bulls



First generation hybrid female, domestic-bison, 1928.

Second generation hybrid male. Sire, domestic; dam, bison-domestic, 1928. Theoretically 75 per cent domestic, 25 per cent bison.

(75 per cent domestic, 25 per cent bison), the progeny of hybrid dams (bison x domestic). One of these bulls is a two-year-old; the other a yearling. Also of the third generation yearling male, the progeny of a second generation dam (75 per cent domestic, 25 per cent bison). This yearling represents theoretically or mathematically a combination as follows: 87½ per cent domestic, 12½ per cent bison. It is thought that he will prove fertile. In fact, previous investigators have found fertile males in the second generation. It remains to prove the usefulness of these males as bred back to domestic cattle and should they have the power of procreation, to note the degree of inheritance of bison characteristics in the progeny.

From the original cross (bison-domestic), therefore, a path has been followed to a point near the outside edge of the objective. As stated, however, the journey has been beset with extreme difficulties and grave losses.

Third generation hybrid male. Sire, domestic; dam, second generation hybrid, 75 per cent domestic, 25 per cent bison. Theoretically this calf is 87½ per cent domestic and 12½ per cent bison.

From present indications, the reverse cross (domestic-bison), untried by those previously interested in this work, indicates little or no abnormality at any stage. There is the rather remote prospect of fertile hybrid males, to be investigated from this angle. In any event, losses and much unnecessary suffering would seem to be largely eliminated. There is the further advantage of being able to secure bison females without difficulty, due to the kind co-operation of the Dominion Parks Branch. One very likely reason that this cross has received no attention in the past, has been that investigators have found it difficult or impossible to secure bison females in sufficient numbers.

A tentative outline of groups for the 1929 breeding season appears later, indicating the prominent place suggested for the domestic x bison cross, but providing for a continuation in a more limited way and for purposes of final comparison, of the bison x domestic combination.

EXPERIENCE WITH THE YAK IN DEVELOPING A HYBRIDIZATION PROGRAM

Reference to past reports on the work at Wainwright indicates that the yak has been used quite extensively (see Report 1927,—A Brief History of the Yak in Canada). Summarizing results briefly:—

1. The yak would seem to have no special characteristic which would render it desirable for introduction into Canada.

2. The yak was used in these experiments on the assumption that they would cross readily with either bison or domestic cattle. This has proved to be correct, as will be noted from this and previous reports. The yak consorts readily with either and no abnormalities are present at parturition, as is the case, for example, with the bison-domestic cross. The hybrids, three-quarter breds, and extractions representing the blood of all three are exceptionally rugged and hardy.

3. Hybrid yak-bison or yak-domestic females are fertile, mate, conceive, carry and deliver their offspring with little or no evidence of abnormality. The fertility of the hybrid males, however, has not been definitely proven. Much evidence to the contrary has been obtained and it would seem that while the hybrid male is occasionally fertile (see page 50, Report of 1928) little more reliance might be placed on them than on other hybrid males. The following considerations would throw further doubt on the wisdom of spending more time on a consideration of the yak in this experiment.

4. In point of hardiness, the yak does not compare generally with the bison. It has been noted that, as they increase in age, considerable suffering results in some cases, from the rigours of the Wainwright winters. Shelter is necessary.

5. From the standpoint of beef conformation, the yak is decidedly inferior to the approved market types of domestic cattle.

6. Finally, in the last analysis and in view of foregoing points, it will be seen that the main desirable characteristic of the yak was the more or less intermediary position theoretically occupied by them in relation to the bison and domestic cattle.

The introduction to this hybridizing project of the third factor as represented by the yak, has created decided complexities and has, to a certain extent, clouded the issue. While many most interesting yak crosses have been developed, a number of these being original, their numbers have helped materially to bring the animal population of the enclosure to the limit of expansion. The necessary multiplication of paddocks to accommodate the number of separate groups conceivable, has finally developed an impossible situation, when the vital factor of water for each enclosure is considered.

For these reasons, therefore, there is under consideration the matter of greatly curtailing the use of the yak during the summer of 1929. In submitting a tentative group outline for the coming summer, the following points are considered,—as changing the breeding policy presently followed.

1. To dispose of all males with yak blood and females of this origin also, except as per requirements next mentioned.

2. To retain a small number of yak x domestic and domestic x yak females which will be crossed further with bison and domestic sires, to note the dominance, or rate of disappearance of the yak characteristic in succeeding generations. This consideration has no direct relation with the major project.

3. To devote much more attention to the domestic-bison cross, at the same time retaining a group, limited in numbers, of the bison x domestic cross.

4. To closely study the breeding powers of bulls, second and succeeding generations, of domestic-bison and bison-domestic origin.

TENTATIVE GROUPING ARRANGEMENT FOR THE 1929 BREEDING SEASON

The tentative grouping arrangement to be followed during the 1929 breeding season is as follows:—

Group I	Domestic bull	8 bison cows. 1 yak-bison cow.
Group II	Domestic bull	6 yak-domestic cows. 1 domestic-yak cow. 3 bison-domestic cows. 2 75 per cent domestic, 25 per cent bison cows.
Group III	Second generation 75 per cent domestic, 25 per cent bison bull	5 domestic cows.
Group IV	Bison bull	5 domestic cows.

By adopting such an arrangement, difficulties of a practical nature, experienced in an increasing way of late, are avoided. Numbers are cut down materially, fewer groups require segregation, and watering facilities are conveniently at hand.

OTTAWA: Printed by F. A. ACLAND, Printer to the King's Most Excellent Majesty, 1930.