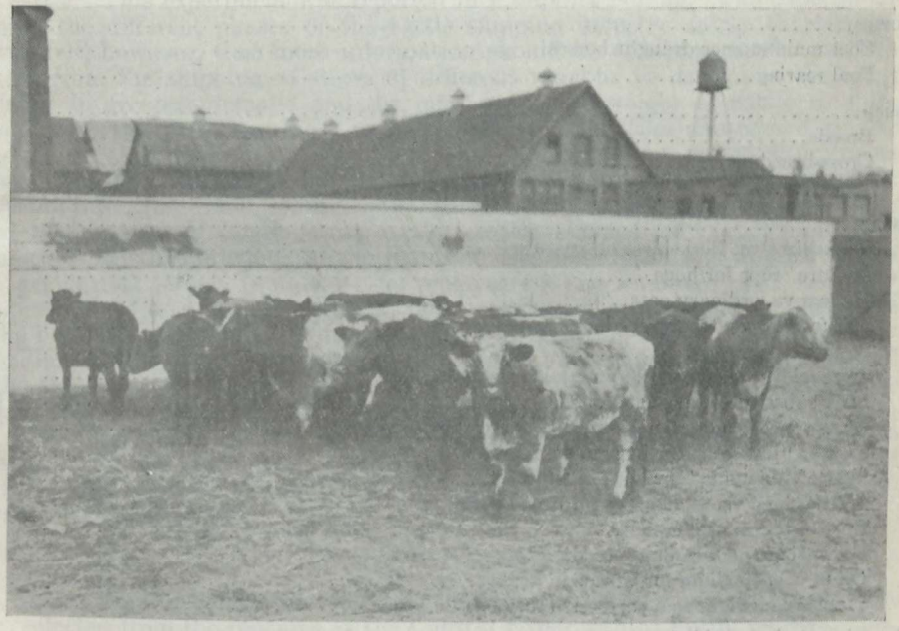
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

ANIMAL HUSBANDRY DIVISION

REPORT OF THE DOMINION ANIMAL HUSBANDMAN

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

FOR THE YEAR ENDING MARCH 31, 1924



Export Steers of the Right Kind—A Part of the October, 1923, Experimental Shipment.

Published by Direction of the Hon. W. R. Motherwell, Minister of Agriculture, Ottawa, 1925

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THE ANIMAL HUSBANDRY DIVISION

BEEF CATTLE

As in former years, no breeding beef cattle are maintained at the Central Experimental Farm, Ottawa, work with beef cattle being confined to steer feeding and experimental shipments to the British markets.

Experiments on relative gains of yearlings and two-year-olds on grass had to be discontinued owing to many of the steers in the various lots having been taken out in October, 1923, to make up an experimental shipment, thus breaking into the continuity of the experiment.

However, the experimental shipment of these steers then made gave some valuable data which it has been considered advisable to publish herein.

SECOND EXPERIMENTAL SHIPMENT OF STORE CATTLE TO GREAT BRITAIN

OBJECT OF EXPERIMENT

In the spring of 1923, an experimental shipment of beef cattle was made to Great Britain, a part of the shipment going as chilled beef and the remainder as live cattle. This experiment was reported in Pamphlet No. 39. The experiment covered the different phases of the cattle shipping industry fairly thoroughly. It was felt, however, that more information should be obtained on the relative returns from the shipping of steers of different weights, to determine the class of cattle in greatest demand and the most profitable weight of cattle to ship. In addition, the British authorities had passed a regulation subsequent to the removal of the embargo to the effect that all Canadian cattle shipped as "stores" must be classified immediately on arrival in port by a veterinary inspector into "fats" and "stores," all falling in the former class to be slaughtered at the port of landing similarly to cattle shipped as "fats" under the regulations existing previous to the lifting of the embargo. The application of this regulation largely nullified the removal of the embargo and seriously hampered the Canadian store cattle trade. Commission men and dealers were in the habit of advertising the date of arrival of a certain steamer with so many Canadian store cattle. Buyers came to the port only to find that a part or all of the shipment had been classed as fats, with the result that stores of the class desired were available only in limited numbers, if at all.

The main object of this second shipment was in the nature of a test to discover the working of the above-mentioned regulation and to determine, if possible, the type, weight and degree of finish in the cattle that the British farmer desired as stores.

PLAN OF EXPERIMENT

Sixty steers of good beef type, i.e., shortlegged, thick, well-fleshed animals, were selected from the pastures at the Central Experimental Farm, Ottawa, Ont. Here the animals were weighed individually and then grouped into three lots of twenty each, according to their weights. Photographs of each lot and of representative individuals of each lot were then taken. Each lot was then loaded separately and shipped to Montreal on through billing for export.

The following table gives the range in weights, average weight, shrinkage in transit to Montreal and recovery in weight while in Montreal:—

TABLE I.—WEIGHTS OF STEERS

—		Lot 1	Lot 2	Lot 3
Number of head	No.	20	20	20
Heaviest steer	lb.	1,140	1,210	1,360
Lightest steer	"	1,010	1,140	1,220
Average weight	"	1,095	1,169¾	1,273½
Average shrink in transit to Montreal	"	64	74¾	73½
Average gain while in stock yards	"	54	105	50

While in the Montreal stock yards, the cattle were ear tagged, roped and branded with the letter "C" by the fire brand method. The branding is a new regulation which went into force September 1, 1923, at the instance of the British Ministry of Agriculture. A further reference to this question of branding will be made later in this report.

The cattle were loaded on the boat at 12 o'clock noon, October 9, and reached the Birkenhead landing place at 8 a.m. on October 20, which constituted a fairly rapid trip. The weather was of the finest and the cattle shipped exceedingly well as a consequence. Feed shipped for the sixty cattle consisted of approximately 8½ tons hay, ½ ton of straw, and 54 bags of grain feed. In the opinion of the writer, when shipping store cattle the proportion of straw could be increased and the grain decreased, thus effecting quite an economy and still landing the cattle in good shape. This is particularly true if a good quality of hay is shipped. In the case of cattle fairly well forward in finish, which might possibly meet a market on which they would sell better as fat cattle than as stores, it would be advisable to feed all the grain that the cattle would consume to keep up as high a condition as possible. Conditions for the feeding of grain on board ship could, in many cases, be easily improved at little expense.

Immediately upon landing, the cattle were segregated in the reception lairs provided for them. They were then inspected and passed as regards freedom from diseases mentioned in the Act, after which their lairages were thrown open to the public.

The next inspection consisted in an examination of the lot to determine which ones, if any, should be allowed to go inland as stores and which ones should be classed as fats and be ordered slaughtered immediately. The inspection was held on the Monday morning following arrival, in the presence of the Chief Inspector of the British Ministry of Agriculture and of the Deputy Minister and the Commissioner of the Canadian Department of Agriculture. The inspectors classed the whole shipment as "fats" and they were held for slaughter at the port of entry.

This result was not unexpected, for the Canadian officials present had just previously seen a whole boat-load of cattle which had been classed as "fats", the majority of which were much inferior in finish to the sixty steers in this experimental lot, and many of which were simply frames which would require the putting on of up to 200 pounds of flesh and fat before they would be fit for killing.

As soon as the classification of the sixty steers had been determined, they were offered for sale by the firm of Chapman & Everett, of Fakenham, Norfolk, England. They met a dull market, due, first, to a recent dock strike settlement in Ireland with a consequent extra rush of Irish cattle to English ports; second, to the fact that the previous boat-load had all been classed as "fats"; and, lastly, to the presence on the market of large shipments of chilled and frozen beef.

The twenty heavy steers brought £26-15-0 per head and the remaining forty, £23 per head, this latter figure being on a basis of £24 per head for the 20 medium weight steers and £22 per head for the twenty lightest steers.

The following is a table of the values realized under the different methods of quoting and selling:—

Per Head		Equivalent price per pound in sink on basis of subsequent average dressed carcass weights	Price per pound for dressed carcass in Canadian currency
		d.	cts.
Twenty heavier	£26–15–0	9½	18.4
Twenty medium	24– 0–0	9	18.0
Twenty lights	22– 0–0	8¾	17.5

According to Live Stock Branch cables for that week, Canadian fat cattle at Birkenhead were bringing only 18 to 18½ cents per pound in sink. London quotations for the same period for Canadian dressed sides were 16-17 cents per pound, so that the cattle were fairly well sold.

The following tables gives a statement of expenses of shipping these sixty head of cattle to England:—

TABLE II.—STATEMENT OF COST OF SHIPPING WHOLE GROUP AND SEPARATE LOTS OF CATTLE TO ENGLAND

	Total (60 Steers)	Lot 1 (20 Steers)	Lot 2 (20 Steers)	Lot 3 (20 Steers)
	$	$	$	$
Freight to Montreal	126 35	39 14	41 61	45 60
Unloading Cars	3 00	1 00	1 00	1 00
Cleaning Cars	2 25	75	75	75
Feeding at yards (two days)	97 68	32 56	32 56	32 56
Reloading to wharf	3 00	1 00	1 00	1 00
Ocean feed	234 12	78 04	78 04	78 04
Wharfage at 15c. each	9 00	3 00	3 00	3 00
Ropes, pails, etc	17 95	5 98	5 98	5 99
Roping cattle at 7½c. each	4 50	1 50	1 50	1 50
Shipping cattlemen, two at $3	6 00	2 00	2 00	2 00
Handling at 50c. each; tagging at 5c. each	33 00	11 00	11 00	11 00
Insurance (Value $150 per steer at ⅝%)	56 25	18 75	18 75	18 75
Ocean freight at $20 each	1,200 00	400 00	400 00	400 00
Total cost	1,793 10	594 72	597 19	601 19
Average cost per steer	29 88	29 73	29 86	30 06

Table III, following, gives the expenses and receipts on the sixty head of store cattle when disposed of as fats on the Birkenhead market.

			£	s.	d.
To 20— (Lot 1) at £22 less 9d. each	£439/5/0	By Lairage at 3s. each	9	–	–
To 20— (Lot 2) at £24 less 9d. each	£479/5/0	" Droving at 2/6 each	7	10	–
To 20— (Lot 3) at £26/15/- less 9d. each	£534/5/0	" Inspection at 6d. each	1	10	–
		" Commission at 7/6 each	22	10	–
		" Dues at 9½d. each	2	7	6
		" Feed	4	10	–
		" Balance	1,405	7	6
	£1452/15/0		£1,452	15	0

Table IV, following, shows the gross return, net return and price per pound live weight realized on the steers in the different lots.

	Lot 1	Lot 2	Lot 3
Number head per lot	20	20	20
Gross return	£ 439/ 5/-	£ 479/ 5/-	£ 534/ 5/
Less overseas expenses	15/15/10	15/15/10	15/15/10
Net overseas' return	£ 423/ 9/ 2	£ 463/ 9/ 2	£ 518/ 9/ 2
At $4.60 to the £	$ 1,947 91	$ 2,131 91	$ 2,384 91
Less expenses to port of debarkation	594 72	597 19	601 19
Net return	$ 1,353 19	$ 1,534 72	$ 1,783 72
Average return per steer	67 66	76 74	89 19
Live weight at Montreal	20,625 lbs.	21,900 lbs.	24,000 lbs.
Price received per pound on basis Montreal live weights, all expenses paid	cts. 6·56	cts. 7·01	cts. 7·43
Advantage per pound over Lot 1 due to lower shipping and selling costs per pound live weight	cts.	cts. ·17	cts. ·42
Return per pound live weight with above-mentioned advantage eliminated	cts. 6·56	cts. 6·84	cts. 7·01
Dressing percentage	% 58·6	% 58·6	% 58·08

The fact that all of the cattle in this shipment were ordered slaughtered as " fats " at the port of landing made it impossible to carry out to a finish the objects of the experiment, namely—to determine the type, weight and degree of finish most desired in the cattle that the British farmers selected as stores. From comments which were passed on this shipment previous to slaughter, however, it was evident that cattle of this class would meet with ready sale in the cattle grazing districts, the preference being for the medium weight, blocky, well-fleshed steer.

From the foregoing tables, however, it will readily be seen that in so far as steers for immediate slaughter are concerned, the heavier steers were the most profitable shippers, the medium weight lot realizing .45 cents per pound more and the heavy lot .87 cents per pound more than the light-weight steers. Approximately 20 per cent of the increased return in the case of lot 2 and 23 per cent of the increased return in the case of lot 3 over lot 1 is to be accounted for by the advantage which the heavier steers had in shipping and selling costs, due to the fact that these costs are, with the exception of the railway freight in Canada, charged at so much per head rather than at so much per pound live weight. This advantage amounted to .17 cents per pound live weight for lot 2 and .42 cents per pound live weight for lot 3 over lot 1. The remainder of the increased return is due to the higher price obtained per pound live weight for the heavier steers. It will therefore be seen that the heavier steers in this shipment enjoyed two distinct advantages—a reduced shipping cost and an appreciable advance in sales price.

An exception to the above rule is that, in some cases, steers averaging under 1,000 pounds may be transported across the ocean on the basis of five head in the space of four, the freight charge for the lighter steers being only $18 per head. This means a considerable reduction in cost of shipment, but it has the disadvantage of a tendency to crowd the cattle on board, with the result that they do not ship as well. Furthermore, cattle of this weight must be of exceptionally good quality, even with this reduction in ocean freight, before they will realize a price sufficient to cover the remaining heavy charges against them.

Naturally an important factor in connection with this business is the prevailing rate of exchange. If a shipment happens to be marketed at a period when the value of the pound sterling has depreciated considerably, as was the case in this instance, what might have been a fair profit may be turned into a loss.

Quality of the Dressed Meat.—An opportunity was taken to examine the dressed carcasses as they hung on the rail. The quality was invariably good, but in spite of the fleshy appearance of the steers on the hoof, the carcasses did not show sufficient finish. This was particularly noticeable in the lack of internal fat, the kidney knobs being quite bare in many cases, the whole carcass assuming a reddish colour instead of the marbled white of that of an animal finished on English grass or in an English feed lot. From observation later, on carcasses of Canadian cattle finished in England, it was demonstrated that Canadian cattle would acquire the finish and marbled whiteness of carcass desired, if given an opportunity, and if steers of the quality of this shipment were the rule, the necessary finish would be acquired in a very few weeks. The quality of the dressed meat resulting from the shipment clearly demonstrated that such cattle were not fit for immediate slaughter and that consequently the slaughter of such cattle at the port of entry as "fats" was working an injustice to the animals and an injury to the reputation of Canadian cattle.

Condition of the Carcasses.—In so far as condition of the carcasses was concerned, nothing was left to be desired, as there was not a sign of a bruise on a carcass. This was rather a pleasing contrast, from a Canadian standpoint, to the condition of the dressed carcasses of Irish cattle, for the latter invariably included a number badly bruised. The good condition of these Canadian dressed carcasses was no doubt due, in part, to the fact that the steers were all dehorned animals and could not therefore damage one another. Also, the facilities for, and method of, handling, both in the Canadian stock yards and on board ship, are such that little, if any, damage is done to the carcasses.

Quality of the Hides.—The handling of the hides was observed and it was found that any hides having a fire brand that showed through on the inside on a valuable portion of the hide were classed as branded hides and received a cut in price sufficient to lower their value about $2 apiece. Even the newly applied "C" brand on the left hip, though only lightly given, was sufficient to cause the low classification of some hides.

Shipping Qualities of the Different Breeds and Types of Steers.—This shipment was made up of steers representing the three main beef-breeds, i.e., Shorthorns, Aberdeen Angus and Herefords. In the opinion of the writer, formed from careful observation during the trip, the Shorthorn makes the best shipper, being much more tractable and docile, soon accustoming itself to the unusual conditions and proving a good feeder. The Aberdeen Angus would qualify for second place in this regard with the Hereford running last, as they do not take kindly to confinement, consequently feed poorly and land in thin condition.

In every lot of steers there will usually be found a few that are nervous, irritable and even dangerous to handle. Such should be disposed of at the first opportunity on a Canadian market, for it does not pay to ship them. They invariably feed poorly on board ship and keep others from feeding as well. In addition, as soon as they are spotted on the other side, they are culled out and sent to the slaughter house and sold for what they will bring rather than have them continually inciting the remainder of the lot. Needless to say, any steer that shows any sign of being a poor doer should be eliminated, for the conditions of the trip are such that steers of this kind are just the ones to sicken and cause financial loss to the shipper and damage to the reputation of Canadian cattle.

Above all things, big, rough, ungainly animals should be cut out of all shipments. The above opinion was formed as a result of seeing one fairly high quality shipment which was spoiled by the inclusion of some half dozen big, rough, bony four or five-year-old steers that looked as though they might have seen service as oxen. So outstandingly crude was their appearance that one prospective buyer was led to inquire if by any chance they were "got" (sired) by buffalo. Such a remark would travel further and do the cattle trade more harm than ten shiploads of good cattle would do good.

Canadian and Irish Cattle Compared.—From what was observed, the Canadian cattle compared quite favourably with Irish cattle. It is just possible that the Irish cattle showed a little more breeding and finish, but this the Canadians made up for in their growthiness for their age. Given cattle of equal quality on the same market, very little, if any, difference was noticeable in the prices which they brought. Where the Irish trade excels over the Canadian is in its volume, Canadian shipments being more or less of "a drop in the bucket" compared to what comes out of Ireland. When one considers the vastness of Canadian territory compared to the limited area of Ireland, one wonders where the Irish cattle all come from. At the same time, it points to the possibilities in the development of the trade in this country.

The Effect of the Frozen Meat Trade on Canadian Live Cattle Trade.—Great Bitain consumes enormous quantities of imported chilled and frozen beef, annually, not from preference but from necessity, frozen and chilled beef selling for three to four pence per pound less than fresh-killed beef. Just as soon as this spread between fresh beef and frozen beef becomes less, more fresh beef will be consumed and less frozen beef imported. One of the effects of the placing of Canadian fresh beef on the market in Great Britain in fairly large quantities will be to lower the price of home-grown fresh meat to the detriment of the chilled beef trade and eventually to the benefit of the Canadian live cattle trade.

The Two Great Needs.—One is safe in saying that the two great needs of the cattle shipping industry at the present time are lower shipping rates, both rail and ocean, and better sires. When it is considered that out of the $122.88 received for each steer in the most profitable lot (lot 3) in this shipment, $33.69, or 27 per cent was deducted largely for transportation charges, it will be realized that lower shipping rates are imperative, for no industry can stand a transportation charge of 27 per cent on its finished product over and above its manufacturing cost. It is to be hoped that the shipping companies will find it to their interest to reduce carrying charges and to arrange for a more regular and adequate supply of ocean space.

Coming to the second great need—better sires—it may be said that, while the quality of the cattle being shipped overseas is, from our Canadian standpoint, fairly good, nevertheless there is great room for improvement. We need cattle showing more breediness and uniformity—short-legged, blocky, well-fleshed animals that can be got only, and most economically, by using high-quality, well-bred sires. The effect of such sires on the industry would be twofold. In the first place, they would reduce the cost of production, the better-bred steers being better doers, and, in the second place, they would increase the price received for the animals. This, cutting the cost on the one hand and increasing the return on the other without adding to the intermediate charge—transportation—would mean the increased margin of profit that would spell success for the industry.

DAIRY CATTLE

Dairy cattle breeding forms one of the main features of the live stock work at the Central Experimental Farm. At the close of the fiscal year, March 31, 1924, there were on hand 201 head of stock.

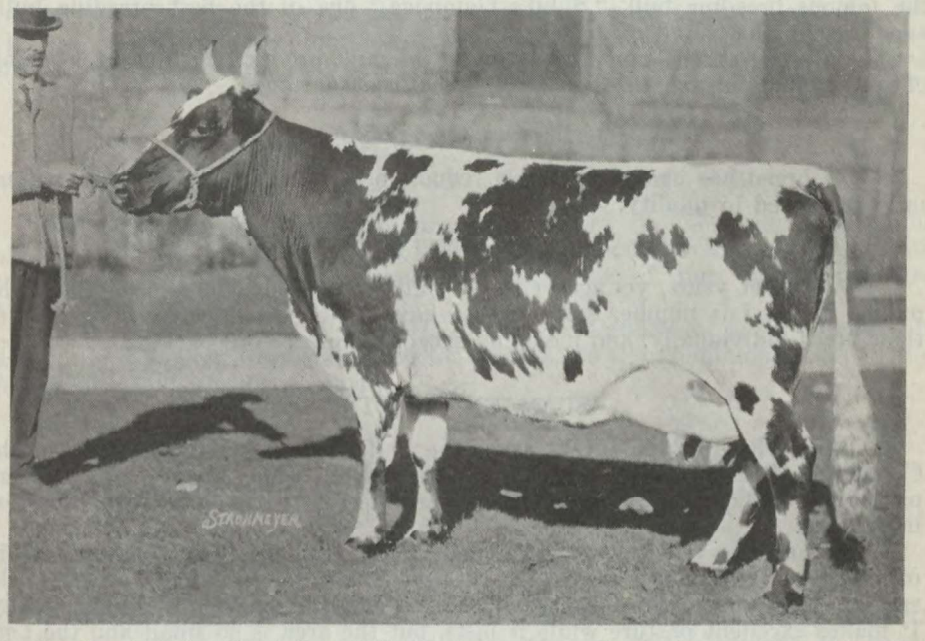
This number is made up as follows:—

							Total
Pure-bred breeding Cattle—							
Ayrshires	40	milch cows,	25	heifers,	23	bulls	88
Holsteins	40	"	22	"	19	"	81
Jerseys	10	"	6	"	1	"	17
French-Canadians	5	"	3	"	2	"	10
Grade Cows—							
Ayrshires—1 milch cow							1
Holsteins—3 milch cows, 1 heifer							4
Total							201

These herds are kept for breeding, experimental, demonstrational and cost of production work, ably filling all requirements in this regard.

Ayrshires

The Ayrshire herd again shows an increase in numbers, together with continued improvement in quality. This is probably best illustrated by the fact that at the Royal Winter Fair, 1923, the herd won six firsts, four seconds, two thirds, one fourth, beside three championships and a reserve. The get of Overton Lord Kyle (imp.) again stood up well, the first prize senior yearling bull and the first prize senior bull calf and junior champion as well as the second prize senior yearling heifer being by him.



Ayrshire Cow—Auchenbay Mina 5 (Imp.) 70080—Grand champion Ayrshire female Royal Winter Fair, 1923

Age	Milk Records		
	Days	Milk	Fat
3 years	365	9,522 lbs.	388 lbs.
4 "	365	16,243 "	677 "
6 "	305	13,117 "	479 "

A good combination of show type and milk production.

During the year six animals were imported from Scotland. These included one yearling bull, one aged cow; one two-year-old heifer and three yearling heifers. They are an exceptionally typey, well-grown lot of cattle, the bull being particularly outstanding, both in breeding and individuality. In the year's work, Ayrshires take second place in economy of milk production, fourth place in economy of fat production and second place in profit over feed consumed.

Holsteins

The Holstein herd is making steady progress both in increased numbers and in quality. Unfortunately the choice of sires in this breed has not been so happy as in the case of the Ayrshire herd, consequently there is hardly the quality evident in the younger animals in the herd that is found in the Ayr-

shires. Holsteins, however, take the first four places in the herd standing for the year, which is based on the butter produced, less feed cost. In addition, they produced the cheapest milk, and gave the greatest profit over feed consumed.

Jerseys

The Jersey herd has not increased in numbers, due to the loss of one cow and one heifer and to the sale of numerous bull calves. During the year, the senior herd sire, "Rower's Golden Maid's Prince" was transferred to the Lennoxville Station, and the imported bull, "Castlehill Sybil's Gamboge"—No. 12271, was purchased to take his place. This is a royally bred bull, being from the famous breeding bull, "Sybil's Gamboge," one of the best breeding bulls ever bred in the island of Jersey.

This breed stands fourth in economy of milk production, first in economy of fat production, and third in profit over feed consumed.

French-Canadians

This breed has again suffered a reduction in numbers and has not materially improved in quality.

Sales of Breeding Stock

As in other years, young, well-bred bulls have been offered for sale to the public, and a fair number sold. These have all been well grown, a credit to their breed individually, and have had excellent milk record backing.

SUMMER FEEDING

During the 1923 pasture season, the heifers were again pastured on the Connaught Rifle Ranges. The area being quite large, they had excellent pasture throughout the summer and were stabled in particularly good condition in the fall.

As usual, the milch cows in the main herd received a very limited amount of pasture. This consists of a small portion of the new meadow field, the seeding mixture for which consisted of alfalfa, alsike, red clover and timothy. It makes excellent pasture while it lasts, but the area is so small and the herd so large that it only acts as pasture for a month or six weeks, therefore the milch cows are only charged with one or two months' pasture, depending on how long they are on this ground. The dry cows have a separate pasture and are charged with what time they spend on it. Corn silage of the previous year's crop forms the bulk of the roughage for the milch cows. The remainder is made up of hay, soiling crops, etc. They are fed grain throughout the summer, consisting of bran, oats, brewers' or distillers' grains and cotton seed meal or oil cake meal. During the early and late seasons, the cows are turned out during the day, and in the heat of the summer and fly season they are turned out during the evenings only. They are sprayed regularly for protection from the flies.

WINTER FEEDING

The roughage ration for the winter season consists chiefly of those valuable home-grown feeds; corn silage, roots and clover hay. Other feeds, such as sunflower silage, oats, peas and vetch silage, sweet clover silage, etc. were fed at times experimentally, but these are not considered the main feeds. The results of experiments with these last-mentioned feeds are given further on in this report. The acreage devoted to grain growing on the Central Farm is not

sufficient to supply all the grain feed for the dairy cattle, consequently considerable concentrates must be purchased. The market for mill feeds was not as low in 1923 as it was in 1922, consequently the average cost of the meal ration per 100 pounds was considerably higher. Bran forms the basis of the ration, while other grains, such as brewers' grains, distillers' grains, ground oats, cotton seed meal and oil cake meal were used to balance up the mixture. One per cent each of bone meal, charcoal and salt is added to the mixture and these seem to have a very healthy influence on the cattle. The average rate of feeding the above grain mixture is one pound for every three and a half pounds of milk produced, the fresh cows getting slightly more and the cows well on in their lactation periods considerably less. Dry cows receive grain if needed to put them in good condition for calving. The dry two-year-olds and the yearling heifers are cheaply wintered on silage and range hay. This ration was sufficient to keep them in high condition so that they went to grass actually fat. Heifers twelve to fifteen months of age receive a light grain ration to keep them growing well while still young, when the cheapest growth can be obtained.

EXPERIMENTAL FEEDING

ALFALFA MEAL VS. BRAN

There being considerable inquiry with regard to the feeding value of alfalfa meal, it was decided to procure some and endeavour to ascertain its comparative feeding value. Accordingly, one ton of pure medium-ground alfalfa meal was procured.

As a preliminary to the test, this alfalfa meal and the bran with which it was to be compared were submitted for analysis to the Dominion Chemist, the following results being obtained:—

	Alfalfa Meal Per cent.	Bran Per cent.
Moisture	9·86	10·05
Crude protein	12·45	15·10
Crude fat	3·14	5·52
Carbohydrates	37·58	52·82
Fibre	30·94	10·89
Ash	6·03	5·62

From the above, it will be seen that, from an analytical standpoint, the alfalfa meal excels bran in only one point, that is, in the amount of ash or mineral matter that it contains.

A group of cows of about equal numbers of Ayrshires and Holsteins were used in this experiment. They were fed a standard ration of corn silage, clover hay and meal, which consisted of bran, three parts, ground oats, two parts, brewers' grains, two parts, oilcake meal, one part, and cottonseed meal, one part. The experiment was divided into three periods of two weeks each. During the first period, the regular meal mixture was fed; during the second period, alfalfa meal replaced the bran in the regular mixture; during the third period, the regular meal mixture was fed again. By averaging the results of periods one and three and comparing with period 2, a fair basis of comparison is obtained. Bran was valued at $25 per ton and alfalfa meal at $29 per ton. This brought the meal mixtures to $32.27 and $33.62 per ton, respectively. Table I following gives the data obtained.

TABLE I.—ALFALFA MEAL VS. BRAN—FIRST PERIOD

Experimental Station		Period 1	Period 2	Period 3	Average of Periods 1 and 3
		Regular Grain Mixture	Alfalfa Meal Replacing Bran	Regular Grain Mixture	Regular Grain Mixture
Number of cows in test	No.	17	17	17	17
Duration of test	days	7	7	7	7
Pounds of milk produced	lbs.	3,361·0	3,319·0	3,202·0	3,281·5
Average per cent fat in milk	%	3·46	3·5	3·7	3·58
Total pounds fat produced	lbs.	116·36	116·31	118·66	117·51
Total meal consumed	"	1,062·00	1,062·00	1,062·00	1,062·00
Total hay consumed	"	777·00	777·00	777·00	777·00
Total silage consumed	"	3,885·00	3,885·00	3,885·00	3,885·00
Meal mixture consumed per 100 pounds milk produced	"	31·60	32·00	33·10	32·35
Corn silage consumed per 100 pounds milk produced	"	115·50	117·00	121·33	118·41
Hay consumed per 100 pounds milk produced	"	23·11	23·41	24·26	23·63
Cost of regular meal mixture fed at $32.27 per ton	$	17·13	.....	17·13	17·13
Cost of alfalfa meal mixture fed at $33.62 per ton	$	.....	17·85	.....	.....
Value of corn silage fed at $3.15 per ton	$	6·12	6·12	6·12	6·12
Value of hay fed at $6.60 per ton	$	2·56	2·56	2·56	2·56
Total cost of feed	$	25·81	26·53	25·81	25·81
Feed cost to produce 100 pounds fat	$	22·15	22·80	21·75	21·95
Feed cost to produce 100 pounds milk	$	0·77	0·80	0·81	0·79

From the above, it will be seen that the ration containing alfalfa meal produced slightly more milk and slightly less fat than the ration containing bran. The feed cost of milk production was practically the same with both feeds, while the feed cost of fat production was higher with alfalfa than with bran. Theoretically, 354 pounds of alfalfa meal proved equal to 43 pounds of silage, 9 pounds of hay, 8 pounds of meal and 358 pounds of bran, giving alfalfa meal a valuation of $26.58 per ton in this ration with other feeds at prices quoted. Reversing the calculation and allowing the cost price as a fair valuation for alfalfa meal, gives bran a valuation of $27.40 per ton in this ration with other feeds at prices quoted.

After rearranging the cows and changing the nature and amount of the grain ration being fed, another four periods were run through, thus allowing of two more comparisons. It will be noticed that the changes in the grain ration altered the price of the latter slightly, but the prices of the bran and alfalfa meal remained the same. These additional or check periods were conducted in exactly the same way, and the data collected are given herewith:—

TABLE IIA.—ALFALFA MEAL VS. BRAN—SECOND PERIOD

Experimental Station		Period 4	Period 5	Period 6	Average of Periods 4 and 6
		Regular Meal Mixture	Alfalfa Meal Replacing Bran	Regular Meal Mixture	Regular Meal Mixture
Number of cows in test	No.	18	18	18	18
Duration of test	days	7	7	7	7
Pounds of milk produced	lbs.	3,247	3,091	2,934·5	3,090·8
Average per cent fat in milk	%	3·53	3·33	3·48	3·51
Total pounds fat produced	lbs.	114·48	103·15	102·13	108·31
Total meal consumed	"	1,029·00	1,029 00	1,029·00	1,029·00
Total hay consumed	"	819·00	819·00	819·00	819·00
Total silage consumed	"	4,095·00	4,095·00	4,095·00	4,095·00
Meal mixture consumed per 100 pounds milk produced	"	31·69	33·29	35·07	33·38
Corn silage consumed per 100 pounds milk produced	"	126·12	132·48	139·55	132·84
Hay consumed per 100 pounds milk produced	"	25·22	26·50	27·91	26·57
Cost of regular meal mixture fed at $31.16 per ton	$	16·03	.....	16·03	16·03
Cost of alfalfa meal mixture fed at $32.96 per ton	$	.....	16·96	.....	.....
Value of corn silage fed at $3.15 per ton	$	6·45	6·45	6·45	6·45
Value of hay fed at $6.60 per ton	$	2·70	2·70	2·70	2·70
Total cost of feed	$	25·18	26·11	25·18	25·18
Feed cost to produce 100 pounds fat	$	22·00	25·31	24·65	23·32
Feed cost to produce 100 pounds milk	$	0·77	0·84	0·86	0·82

TABLE IIB.—ALFALFA MEAL VS. BRAN—THIRD PERIOD

Experimental Station		Period 5	Period 6	Period 7	Average of Periods 5 and 7
		Alfalfa Meal Replacing Bran	Regular Meal Mixture	Alfalfa Meal Replacing Bran	Alfalfa Meal Replacing Bran
Number of cows in test	No.	18	18	18	18
Duration of test	days	7	7	7	7
Pounds of milk produced	lbs.	3,091	2,934·5	2,614·5	2,852·8
Average percent fat in milk	%	3·33	3·48	3·11	3·22
Total pounds fat produced	lbs.	103·15	102·13	81·56	92·36
Total meal consumed	"	1,029·00	1,029·00	1,029·00	1,029·00
Total hay consumed	"	819·00	819·00	819·00	819·00
Total silage consumed	"	4,095·00	4,095·00	3,717·00	3,906·00
Meal mixture consumed per 100 pounds milk produced	"	33·29	35·07	39·36	36·33
Corn silage consumed per 100 pounds milk produced	"	132·48	139·55	142·17	137·33
Hay consumed per 100 pounds milk produced	"	26·50	27·91	31·33	28·92
Cost of regular meal mixture fed at $31.16 per ton	$	.....	16·03	.....	.....
Cost of alfalfa meal mixture fed at $32.96 per ton	"	16·96	.....	16·96	16·96
Value of corn silage fed at $3.15 per ton	"	6·45	6·45	5·85	6·15
Value of hay fed at $6.60 per ton	"	2·70	2·70	2·70	2·70
Total cost of feed	"	26·11	25·18	25·51	25·81
Feed cost to produce 100 pounds fat	"	25·31	24·65	31·28	28·30
Feed cost to produce 100 pounds milk	"	0·84	0·86	1·02	0·93

From table IIA it will be noticed that the milk production on alfalfa meal and bran was practically the same, but that the fat production was slightly greater when the bran was fed. The cost of milk and fat production did not differ materially with the two feeds, any advantage lying with the bran ration.

In table IIB it will be seen that the bran ration produced the most milk and the most fat and also the cheapest milk and the cheapest fat.

Taking the average of the results in tables IIA and IIB, it will be found that 617.4 pounds of bran and 80 pounds of silage proved equal to 625.8 pounds of alfalfa meal, 22 pounds of hay and 19.4 pounds of meal, giving alfalfa meal a valuation of $23.76 per ton in this ration with other feeds at prices charged. Reversing the calculation and allowing the cost price of $29 for alfalfa meal as a fair measure of its value gives bran a valuation of $31.20 per ton. In other words, according to the above reasoning, if alfalfa meal is worth $29, bran is worth $31.20 per ton, or if bran is worth $25 per ton, then alfalfa meal is only worth $23.76 per ton. It will be noted that while these figures are not in exact agreement with those of the preliminary experiment, yet the two feeds hold the same relative standing.

Conclusions.—Alfalfa meal of the quality used in this experiment, while a good feed for dairy cows, is not as valuable for this purpose as is bran. Provided, however, that it can be bought at a price some ten per cent to fifteen per cent lower than that of bran, it may prove equally or even more economical.

CORN SILAGE VS. ROOTS (MANGELS) FOR DAIRY COWS

This experiment constitutes a repetition of a similar experiment conducted during the previous winter. A group of seventeen cows, including seven Holsteins and ten Ayrshires, was used for this work. The experiment was divided into five two-week periods during which the following average daily experimental rations were fed:—

Period 1—Corn silage, 22 pounds; roots, 37 pounds.

Period 2—Corn silage, 32 pounds.

Period 3—Corn silage, 22 pounds; roots, 37 pounds.

Period 4—Roots, 85 pounds.

Period 5—Corn silage, 22 pounds; roots, 37 pounds.

As will be noted, the rations were changed to make two comparisons possible, i.e., replacing one-half the silage with roots and replacing all the silage with roots. The grain ration remained constant throughout the whole experiment. The hay ration was increased slightly during period 4, when roots alone were being fed.

Data were taken during the final week of each period, the first week in each period being considered as one of transition. By averaging data from periods 1 and 3 and comparing with period 2, the relative value of corn silage and corn silage and roots is obtained. Similarly an average of periods 3 and 5 compared with period 4 brings out the relative value of corn silage and roots vs. roots alone for dairy cows.

The following tables give the data for this experiment:—

TABLE I.—CORN SILAGE VS. MANGELS

Experimental Station		Period 1	Period 2	Period 3	Average of Periods 1 and 3
		Corn Silage and Roots	Corn Silage Only	Corn Silage and Roots	Corn Silage and Roots
Number of cows in test	No.	17	17	17	17
Pounds milk produced by 17 cows	lbs.	3,696·00	3,227·00	3,267·5	3,481·75
Average milk per cow per day	"	31·00	27·10	27·6	29·26
Average per cent fat in milk	%	3·76	3·78	3·73	3·75
Total pounds fat produced by 17 cows	lbs.	138·96	122·05	121·00	129·98
Average pounds fat per cow per day	"	1·17	1·03	1·02	1·09
Total meal consumed	"	1,232·00	1,232·00	1,232·00	1,232·00
Total hay consumed	"	833·00	882·00	833·00	833·00
Total corn silage consumed	"	2,625·00	3,815·00	2,625·00	2,625·00
Total roots (mangels) consumed	"	4,410·00	.....	4,410·00	4,410 00
Findings from Experiment					
Silage consumed per 100 pounds milk produced	lbs.	71·00	118·22	80·00	75·50
Silage consumed per 100 pounds fa' produced	"	1,889·00	3,125·76	2,169·42	2,029·21
Roots consumed per 100 pounds milk produced	"	119·30	.....	134·96	127·13
Roots consumed per 100 pounds fat produced	"	3,173·50	.....	3,644·62	3,409·06
Hay consumed per 100 pounds milk produced	"	22·54	27·33	25·49	24·01
Hay consumed per 100 pounds fat produced	"	599·45	722·65	688·43	643·94
Cost of meal fed at $32 per ton	$	19·71	19·71	19·71	19·71
Value of silage fed at $3.15 per ton	$	4·13	6·00	4·13	4·13
Value of roots fed at $3.35 per ton	$	7·39	.....	7·39	7·39
Value of hay fed at $6.60 per ton	$	2·75	2·91	2·75	2·75
Total cost of feed	$	33·98	28·62	33·98	33·98
Feed cost to produce 100 pounds milk	$	0·92	0·89	1·04	0·98
Feed cost to produce 100 pounds fat	$	24·45	23·45	28·08	26·26

TABLE II.—CORN SILAGE VS. MANGELS

Experimental Station		Period 3	Period 4	Period 5	Average of Periods 3 and 4
		Corn Silage and Roots	Roots	Corn Silage and Roots	Corn Silage and Roots
Number of cows in test	No.	17	17	17	17
Pounds milk produced by 17 cows	lbs.	3,216·00	3,012 00	2,500·50	2,858·25
Average milk per cow per day	"	27·05	25·31	21·01	24·03
Average per cent fat in milk	%	3·70	3·55	3·92	3·80
Total pounds fat produced by 17 cows	lbs.	118·94	106·85	98·21	108·57
Average pounds fat per cow per day	"	0·98	0·90	0·82	0·90
Total meal consumed	"	1,190·00	1,190·00	1,190 00	1,190·00
Total hay consumed	"	833·00	917·00	833·00	833·00
Total corn silage consumed	"	2,625·00	.....	2,625·00	2,625·00
Total roots (mangels) consumed	"	4,410·00	10,115·00	4,410·00	4,410·00
Findings from Experiment					
Silage consumed per 100 pounds milk produced	lbs.	81·60	.....	140·98	93·2
Silage consumed per 100 pounds fat produced	"	2,207·00	.....	2,673·00	2,440·00
Roots consumed per 100 pounds milk produced	"	137·10	335·82	176·00	156·50
Roots consumed per 100 pounds fat produced	"	3,707·00	9,466·70	4,490·00	4,098·50
Hay consumed per 100 pounds milk produced	"	25·90	30·44	33·31	29·60
Hay consumed per 100 pounds fat produced	"	700·00	771·00	848·00	774·00
Cost of meal fed at $32 per ton	$	19·04	19·04	19·04	19·04
Value of silage fed at $3.15 per ton	$	4·13	.....	4·13	4·13
Value of roots fed at $3.35 per ton	$	7·39	16·94	7·39	7·39
Value of hay fed at $6.60 per ton	$	2·75	3·03	2·75	2·75
Total cost of feed	$	33·31	39·01	33·31	33·31
Feed cost to produce 100 pounds milk	$	1·04	1·29	1·33	1·18
Feed cost to produce 100 pounds fat	$	28·00	36·60	33·92	30·96

From table I it will be observed that the corn silage and roots ration produced 254·75 pounds, or 7 per cent more milk and 7·93 pounds or 6·5 per cent more fat than the straight silage ration. This increased milk production was, however, at an increased cost of 9 cents per 100 pounds of milk or 10 per cent. The 4,410 pounds of roots fed proved equal to 98 pounds of meal, 119 pounds of hay and 1,495 pounds of silage, giving roots a valuation of $1.96 per ton in this ration, with other feeds at prices charged. Reversing the calculation and using the cost of production figure of $3.35 per ton for roots (mangels), gives corn silage a valuation of $7.26 per ton in this ration, with other feeds at prices charged.

From table II it will be noted that the straight root ration produced 153·75 pounds or 5·38 per cent more milk and 1·72 pounds or 1·6 per cent less fat than the silage and roots ration. The increased milk production was at an increased cost of 11 cents per 100 pounds of milk or 9·3 per cent. Sixty-four pounds of meal and 2,767 pounds of silage proved equal to 39 pounds of hay and 5,467 pounds of roots, giving roots a valuation of only $1.55 per ton in this ration, with other feeds at prices charged. Reversing the calculation and using the cost of production figure of $3.35 per ton for roots gives corn silage a valuation of $5.96 per ton, with other feeds at prices charged.

Conclusions.—The result of this experiment would go to show that roots, while capable of bringing about as heavy milk production as silage, nevertheless do not produce as economically as does corn silage. Consequently, they cannot be recommended as the sole succulent feed for dairy cattle under commercial conditions. They may, however, be used to advantage on occasions, such as with cows on test, when it is desirable to get the highest possible production, even if at slightly higher cost.

CORN SILAGE VS. OATS, PEAS AND VETCH SILAGE

This experiment also constitutes a repetition of a similar experiment conducted during the previous winter, with the exception that while the latter was conducted on cows of various ages, this year's work was conducted on two-year-old heifers only. These heifers were of Holstein, Ayrshire, Jersey, and French-Canadian breeding. The experiment was divided into four periods of three weeks each, during which the following average daily experimental rations were fed:—

Period 1—O.P.V. silage, 30·8 pounds.
Period 2—Corn silage, 28·7 pounds.
Period 3—O.P.V. silage, 30·4 pounds.
Period 4—Corn silage, 28·7 pounds.

During this experiment, the hay and meal fed remained constant in both quality and quantity.

Data were taken during the last week of each period only, the first two weeks in each period being considered as one of transition. By averaging the data from periods 1 and 3 and comparing with data from period 2, one comparison is obtained. Similarly, the average of periods 2 and 4 compared with period 3 gives another, or check, comparison.

The data covering both phases of this experiment are to be found in tables III and IV following.

TABLE III.—CORN SILAGE VS. OATS, PEAS AND VETCH SILAGE

Experimental Ration		Period 1	Period 2	Period 3	Average of Periods 1 and 3
		O.P.V. Silage	Corn Silage	O.P.V. Silage	O.P.V. Silage
Number of cows in test	No.	17	17	17	17
Duration of test	days	7	7	7	7
Pounds of milk produced	lbs.	3,017	2,923·5	2,638·5	2,827·75
Average per cent fat in milk	%	4	3·81	4·36	4·23
Total pounds fat produced	lbs.	124·13	111·33	115·11	119·62
Total meal consumed	"	1,057·00	1,057 00	1,057 00	1,057·00
Total hay consumed	"	1,274·00	1,274·00	1,274·00	1,274·00
Total silage consumed	"	3,654·00	3,416·00	3,626·00	3,640·00
Corn silage consumed per 100 pounds milk produced	"	.....	116·84	.....	.....
O.P.V. silage consumed per 100 pounds milk produced	"	121·77	.....	138·18	129·97
Cost of meal mixture fed at $32 per ton	$	16·91	16·91	16·91	16·91
Value of O.P.V. silage fed at $4.35 per ton	$	7·95	.....	7·89	7·92
Value of corn silage fed at $3.15 per ton	$	.....	5·38	.....	.....
Value of hay fed at $6.60 per ton	$	4·20	4·20	4·20	4·20
Total cost of feed	$	29·06	26·49	29·00	29·03
Feed cost to produce 100 pounds fat	$	23·41	23·79	25·19	24·30
Feed cost to produce 100 pouhds milk	$	0·96	0·90	1·10	1·03

TABLE IV.—CORN SILAGE VS. OATS, PEAS AND VETCH SILAGE

Experimental Ration		Period 2	Period 3	Period 4	Average of Periods 2 and 4
		Corn Silage	O.P.V. Silage	Corn Silage	Corn Silage
Number of cows in test	No.	17	17	17	17
Duration of test	days	7	7	7	7
Pounds of milk produced	lbs.	2,976	2,682·5	2,447·0	2,711·5
Average per cent fat in milk	%	3·79	4·41	3·84	3·81
Total pounds fat produced	lbs.	112·65	118·32	93·99	103·32
Total meal consumed	"	1,085·00	1,085·00	1,085·00	1,085·00
Total hay consumed	"	1,274·00	1,274·00	1,274·00	1,274·00
Total silage consumed	"	3,416·00	3,626·00	3,416·00	3,416·00
Corn silage consumed per 100 pounds milk produced	"	114·78	.....	139·60	122·19
O.P.S. silage consumed per 100 pounds milk produced	"	.....	131·44	.....	.....
Cost of meal mixture fed at $32 per ton	$	18·86	18·86	18·86	18·86
Value of O.P.V. silage fed at $4.35 per ton	$	.....	7·89	.....	.....
Value of corn silage fed at $3.15 per ton	$	5·38	.....	5·38	5·38
Value of hay fed at $6.60 per ton	$	4·20	4·20	4·20	4·20
Total cost of feed	$	28·44	30·95	28·44	28·44
Feed cost ot produce 100 pounds fat	$	26·42	26·16	30·26	28·34
Feed cost ot produce 100 pounds milk	$	0·96	1·15	1·12	1·04

From table III it will be noted that the corn silage ration produced 95.78 pounds more milk but 8.29 pounds less fat than the O.P.V. silage ration. An increase in fat secretion was apparently due to the feeding of O.P.V. silage.

From table IV it will be observed that the same results were obtained, corn silage producing the more milk but O.P.V. silage the more fat. In the first case, however, corn silage produced the cheaper milk and fat, while in the second case, corn silage produced the cheaper milk, but O.P.V. silage the cheaper fat.

Averaging the results of the two separate or check experiments, it is found that it required 48 pounds meal, 58 pounds of hay and 7,430 pounds of O.P.V. silage to equal 6,832 pounds of corn silage. This gives O.P.V. silage a valuation of $2.65 per ton for milk production in this ration, with the other feeds at prices charged.

The outstanding feature of this experiment is the increase in per cent fat in the milk when O.P.V. silage was fed, this being quite pronounced in both sections of the experiment, and bearing out results obtained in a similar experiment reported the previous year.

Had the values been figured from the amount of fat produced rather than from the amount of milk produced, O.P.V. silage would have shown a considerably higher valuation. However, as it is unusual for any feed to affect the fat percentage in the milk to any great extent, it was felt that too much stress should not be laid on this point until further work was done with this feed.

Conclusions.—From the foregoing and previously reported experiments, it may be concluded that O.P.V. silage, while not the equal of corn silage, is, nevertheless, a close competitor. It is not, however, as economical a crop to grow, the comparatively low tonnage obtained running the cost per ton up rather high in spite of the fact that it does not require any cultivation.

CORN SILAGE VS. SWEET CLOVER SILAGE

This experiment was similar to the previous one, except that in this case it was the first experimental feeding work undertaken with sweet clover silage. This phase of the experiment is covered in six periods, Nos. 4-9, inclusive, of three weeks each. This allows of four comparisons of the two silages. During these six periods, the following average daily experimental rations were fed:—

Period 4—Corn silage.. .. .. 28.5 pounds.
" 5—Sweet clover silage.. .. .. 30.3 "
" 6—Corn silage.. .. .. 30.5 "
" 7—Sweet clover silage.. .. .. 28.5 "
" 8—Corn silage.. .. .. 30.6 "
" 9—Sweet clover silage.. .. .. 27.5 "

The following are the data obtained, four separate comparisons being given:—

TABLE V.—CORN SILAGE VS. SWEET CLOVER SILAGE

Experimental Ration		Period 4	Period 5	Period 6	Average of Periods 4 and 6
		Corn Silage	Sweet Clover Silage	Corn Silage	Corn Silage
Number of cows in test	No.	21	21	21	21
Duration of test	dys.	7	7	7	7
Pounds of milk produced	lbs.	3,044	2,775	2,898	2,971
Average per cent fat in milk	%	3·93	4·02	3·83	3·90
Total pounds fat produced	lbs.	119·52	111·62	111·91	115·71
Total meal consumed	"	1,330·00	1,330·00	1,330·00	1,330·00
Total hay consumed	"	1,554·00	1,554·00	1,554·00	1,554·00
Total silage consumed	"	4,200·00	4,452·00	4,494·00	4,347·00
Corn silage consumed per 100 pounds milk produced	"	138·00	.....	155·00	146·50
Sweet clover silage consumed per 100 pounds milk produced	"	.....	160·00	.....	.....
Cost of meal mixture fed at $32 per ton	$	21·28	21·28	21·28	21·28
Value of sweet clover silage fed at $3 per ton	$	.....	6·68	.....	.....
Value of corn silage fed at $3.15 per ton	$	6·62	.....	7·08	6·85
Value of hay fed	$	5·13	5·13	5·13	5·13
Total cost of feed	$	33·03	33·09	33·49	33·26
Feed cost to produce 100 pounds fat	$	27·64	29·65	30·00	28·82
Feed cost to produce 100 pounds milk	$	1·09	1·19	1·15	1·12

TABLE VI.—CORN SILAGE VS. SWEET CLOVER SILAGE

Experimental Ration		Period 5	Period 6	Period 7	Average of Periods 5 and 7
		Sweet Clover Silage	Corn Silage	Sweet Clover Silage	Sweet Clover Silage
Number of cows in test	No.	21	21	21	21
Duration of test	dys.	7	7	7	7
Pounds of milk produced	lbs.	2,775	2,898	2,670	2,722·5
Average per cent fat in milk	%	4·02	3·83	3·91	3·97
Total pounds fat produced	lbs.	111·62	111·91	104·41	108·01
Total meal consumed	"	1,330·00	1,330·00	1,330·00	1,330·00
Total hay consumed	"	1,554·00	1,554·00	1,554·00	1,554·00
Total silage consumed	"	4,452·00	4,494·00	4,200·00	4,376·00
Corn silage consumed per 100 pounds milk produced	"	.....	155·00	.....	.....
Sweet clover silage consumed per 100 pounds milk produced	"	160·00	.....	157·00	158·50
Cost of meal mixture fed at $32 per ton	$	21·28	21·28	21·28	21·28
Value of sweet clover silage fed at $3 per ton	$	6·68	.....	6·30	6·49
Value of corn silage fed at $3.15 per ton	$	.....	7·08	.....	.....
Value of hay fed	$	5·13	5·13	5·13	5·13
Total cost of feed	$	33·09	33·49	32·71	32·90
Feed cost to produce 100 pounds fat	$	29·65	29·92	31·32	30·48
Feed cost to produce 100 pounds milk	$	1·19	1·15	1·22	1·20

TABLE VII.—CORN SILAGE VS. SWEET CLOVER SILAGE

Experimental Ration		Period 6	Period 7	Period 8	Average of Periods 6 and 8
		Corn Silage	Sweet Clover Silage	Corn Silage	Corn Silage
Number of cows in test	No.	22	22	22	22
Duration of test	dys.	7	7	7	7
Pounds of milk produced	lbs.	3,048	2,966	2,855	2,951·5
Average per cent fat in milk	%	3·89	3·92	3·48	3·69
Total pounds fat produced	lbs.	118·51	116·37	99·33	108·92
Total meal consumed	"	1,393·00	1,393·00	1,393·00	1,393·00
Total hay consumed	"	1,330·00	1,330·00	1,330·00	1,330·00
Total silage consumed	"	4,718·00	4,410·00	4,718·00	4,718·00
Corn silage consumed per 100 pounds milk produced	"	154·79	.....	165·25	160·02
Sweet clover silage consumed per 100 pounds milk produced	"	.....	148·68	.....	.....
Cost of meal mixture fed at $32 per ton	$	22·29	22·29	22·29	22·29
Value of sweet clover silage fed at $3 per ton	$	.....	6·62	.....	.....
Value of corn silage fed at $3.15 per ton	$	7·43	.....	7·43	7·43
Value of hay fed at $6.60 per ton	$	4·39	4·39	4·39	4·39
Total cost of feed	$	34·11	33·30	34·11	34·11
Feed cost to produce 100 pounds fat	$	28·78	28·62	34·34	31·56
Feed cost to produce 100 pounds milk	$	1·12	1·12	1·20	1·16

TABLE VIII.—CORN SILAGE VS. SWEET CLOVER SILAGE

Experimental Ration		Period 6	Period 7	Period 8	Average of Periods 6 and 8
		Sweet Clover Silage	Corn Silage	Sweet Clover Silage	Sweet Clover Silage
Number of cows in test	No.	22	22	22	22
Duration of test	dys.	7	7	7	7
Pounds of milk produced	lbs.	2,966	2,855	2,607	2,786·5
Average per cent fat in milk	%	3·92	3·48	3·88	3·90
Total pounds fat produced	lbs.	116·37	99·33	101·26	108·82
Total meal consumed	"	1,393·00	1,393·00	1,393·00	1,393·00
Total hay consumed	"	1,330·00	1,330·00	1,330·00	1,330·00
Total silage consumed	"	4,410·00	4,718·00	4,228·00	4,319·00
Corn silage consumed per 100 pounds milk produced	"	.....	165·25	.....	.....
Sweet clover silage consumed per 100 pounds milk produced	"	148·68	.....	162·18	155·43
Cost of meal mixture fed at $32 per ton	$	22·29	22·29	22·29	22·29
Value of sweet clover silage fed at $3 per ton	$	6·62	.....	6·34	6·48
Value of corn silage fed at $3.15 per ton	$	.....	7·43	.....	.....
Value of hay fed at $6.60 per ton	$	4·39	4·39	4·39	4·39
Total cost of feed	$	33·30	34·11	33·02	33·16
Feed cost to produce 100 pounds fat	$	28·62	34·34	32·61	30·62
Feed cost to produce 100 pounds milk	$	1·12	1·20	1·27	1·20

From table V it will be noted that the corn silage ration produced 196 pounds more milk and 4.09 pounds more fat than the sweet clover silage ration. There was a slight increase in the per cent fat in the milk when sweet clover silage was being fed, but this was more than offset by the decrease in milk flow. Milk from sweet clover silage cost $1.19 per cwt., while milk from corn silage cost only $1.12 per cwt.

In table VI it will be seen that the corn silage ration again produced more milk and fat, i.e., 175 pounds and 3.9 pounds, respectively. Again there was a slight increase in the per cent of fat in the milk when sweet clover silage was fed, but not sufficient to offset the decrease in milk flow. Milk from sweet clover silage cost $1.20 per cwt., while milk from corn silage cost only $1.15 per cwt.

Table VII shows a slight reversal of form, in that sweet clover silage produced 14.5 pounds more milk and 7.45 pounds more fat than the corn silage ration. Here again the sweet clover silage gave the highest per cent fat in the milk, and, with the increased production of milk, the highest production of fat.

In table VIII, corn silage again takes the lead in milk production, but sweet clover silage leads in fat production. The latter produced milk at the same feed cost and fat at a considerably lower feed cost than corn silage did.

Averaging the results obtained from these four separate or check experiments, it is found that it required 18,220 pounds of sweet clover silage, 206 pounds of meal and 218 pounds of hay to replace 18,277 pounds of corn silage. This gives sweet clover silage a valuation of $2.73 per ton for milk production in this ration, with other feeds at prices charged.

Conclusions.—From the foregoing, it may be fairly safely stated that from a milk production standpoint, sweet clover silage is not the equal of corn silage. An outstanding feature of these experiments, however, is that the sweet clover silage invariably produced appreciably more fat from the same or smaller quantities of milk than did corn silage, indicating that the former had an effect on the secretion of fat in the milk. Had the relative value of the two silages been figured on the fat production alone, sweet clover silage would possibly have shown a higher valuation than corn silage. While not the equal of corn silage, sweet clover silage may prove a good substitute where the climatic

cultural or rotation conditions warrant its use in preference to corn. The 1923 crop yielded over eight tons per acre, which was quite a heavy cutting, higher than the average, which in turn was responsible for the comparatively low cost of production of $3 per ton. This figure would hardly hold good over a period of years.

HULLESS OATS AND MINERALS IN CALF FEEDING

A calf-feeding experiment was started on December 1, 1923, with eighteen calves divided into six different lots of three each.

The objects of the experiment were: (1) To ascertain the value, if any, of hulless oats (a variety of oats without hulls originated at this Farm) when fed in the meal mixture mixed with skim-milk, for the feeding of dairy calves, the method of procedure with the respective lots being to replace (*a*) the total ground oats, (*b*) one-half the ground oats and (*c*) to replace the total corn in the meal mixture; (2) To ascertain the value of feeding organic supplements and minerals to calves, either in the form of blood meal or a mineral mixture.

The practice of feeding calves at the Central Experimental Farm, is to give them whole milk until between four and five weeks of age, after which skim-milk is fed. The butter-fat in the milk is replaced by a meal mixture which is prepared by scalding. This meal is then of a jelly-like consistency. The regular meal mixture consists of 2 parts of ground oats, 2 parts of ground corn, and 1 part of ground flaxseed meal.

As stated above, hulless oats were used in the meal mixture to replace a part or all of the oats or corn in this experiment and also blood meal and a home-made mineral mixture were supplied. The following mixtures were used for the different lots:—

Lot 1—Check lot—Ground oats 2 parts, ground corn, 2 parts, ground flaxseed 1 part.

Lot 2—Hulless oats 2 parts, ground corn 2 parts, ground flaxseed 1 part.

Lot 3—Ground oats 1 part, hulless oats, 1 part, corn, 2 parts, ground flaxseed, 1 part.

Lot 4—Ground oats, 2 parts, hulless oats, 2 parts, ground flaxseed, 1 part.

Lot 5—Ground oats, 2 parts, corn, 2 parts, ground flaxseed, 1 part, blood meal, 5 per cent.

Lot 6—Ground oats, 2 parts, ground corn, 2 parts, ground flaxseed, 1 part, mineral mixture 2½ per cent.

Following is a chemical analysis of the various mixtures fed to the different lots during the experiment. As will be seen, the addition of hulless oats to the mixture increased the fat and protein and reduced the fibre content.

CHEMICAL ANALYSES OF MEAL MIXTURES

Lots	Ingredients	Moisture	Protein	Fat	Carbo-hydrates	Fibre	Ash
		Per cent	Per cent	Per cent	Per cent	Per cent	Per cent
1	Corn, 2 parts; oats, 2 parts; linseed, 1 part	9·31	13·02	11·00	58·02	5·74	2·91
2	Corn, 2 parts; hulless oats, 2 parts; linseed, 1 part	8·79	13·85	12·63	59·40	2·93	2·40
3	Corn, 2 parts; hulless oats, 1 part; oats, 1 part; linseed, 1 part	8·13	14·22	11·58	59·50	4·21	2·36
4	Oats, 2 parts; hulless oats, 2 parts; linseed, 1 part	7·10	15·31	13·36	55·73	5·61	2·89
5	Corn, 2 parts; oats, 2 parts; linseed, 1 part; 5 per cent blood meal	8·88	16·37	10·27	56·08	5·67	2·73
6	Corn, 2 parts; linseed, 1 part; oats, 2 parts; mineral mixture, 2½ parts	8·61	12·97	11·70	56·34	5·59	4·79

The mineral mixture contained the following ingredients in these proportions:—

	lbs.
Calcium phosphate	20
Sodium phosphate	20
Epsom salts	12
Glauber's salts	8
Sulphur	4
Common salt	70
Total	134

At the beginning of the experiment, approximately 5 per cent or 5 pounds of this mineral mixture was added to every 100 pounds of meal, but, after some 60 days of feeding, the calves gave evidence of trouble due probably to an excess of minerals which their systems could not absorb and had therefore to be excreted in the urine. From then until the end of the experiment the percentage of minerals was reduced to 2½ and no injurious effects were noticed from the feeding of the minerals in that proportion.

METHOD OF FEEDING

This meal mixture was prepared by scalding with boiling water and the jelly so formed was mixed with the milk in the proportion of ½ a cup twice daily, then increased gradually so that at the end of the experiment they were getting a cup full twice a day with an allowance of 15 pounds of milk per day during the whole experiment.

The dry meal was composed of a mixture of ground oats, bran, distiller's grain and oil meal. Good second cut alfalfa hay was used.

CALF FEEDING EXPERIMENT

Meal Mixture	Lot I	Lot II	Lot III	Lot IV	Lot V	Lot VI
	Corn, 2 parts; oats, 2 parts; linseed, 1 part	Corn, 2 parts; hulless oats, 2 parts; linseed, 1 part	Corn, 2 parts; oats, 1 part; hulless oats, 1 part; linseed, 1 part	Oats, 2 parts; hulless oats, 2 parts; linseed, 1 part	Corn, 2 parts; oats, 2 parts; linseed, 1 part; blood meal, 5%	Corn, 2 parts; oats, 2 parts; linseed, 1 part; mineral, 2½%
Number of calves..... No.	3	3	3	3	3	3
Length of feeding period..... dys.	152	152	152	152	152	152
Gross initial weight... lbs.	327	439	422	410	408	375
Average initial weight. "	109	146·3	140·8	136·6	136	125
Gross finished weight. "	1,088	1,249	1,177	1,282	1,126	1,061
Average finished weight "	362·6	416·3	392·3	427·3	375·3	353·6
Total gain per group for period..... "	761	810	755	872	718	686
Average gain per calf for period..... "	253·6	270	251·6	290·6	239·3	228·6
Average daily gain per calf..... "	1·67	1·77	1·65	1·91	1·57	1·50
Amount of skim-milk fed per group..... "	6,840	6,840	6,840	6,840	6,840	6,840
Amount of skim-milk fed per calf..... "	2,280	2,280	2,280	2,280	2,280	2,280
Amount dry meal fed per lot..... "	416	416	416	416	416	416
Amount dry meal fed per calf..... "	138	138	138	138	138	138
Amount meal in milk per lot..... "	252	252	252	252	252	252
Amount meal in milk per calf..... "	84	84	84	84	84	84
Amount hay per lot... "	1,425	1,425	1,425	1,425	1,425	1,425
Amount hay per calf... "	475	475	475	475	475	475
Total cost of feed per lot..... $	29·28	29·53	29·40	29·02	29·83	30·16
Cost of feed per calf... $	9·76	9·84	9·80	9·67	9·94	10·05
Cost of feed per pound of gain..... cts.	3·84	3·64	3·89	3·32	4·15	4·39

PRICES OF FEEDS

Skim-milk	0·20 per cwt.
Dry meal mixture	1·50 "
Meal mixture in milk.—	
Lot I	1·85 "
Lot II	1·95 "
Lot III	1·90 "
Lot IV	1·75 "
Lot V	2·05 "
Lot VI	2·20 "
Hay, at cost of production	6·60 per ton

From the preceding table the cost of raising a calf from birth until twenty-seven weeks or a little over six months of age was computed from the average cost of raising these eighteen calves.

These calves received whole milk during the first four or five weeks according to their size, the stronger calves being started on skim-milk at four weeks and the others at five weeks of age.

Following is the average amount of feed and the average cost of feeding a single calf from birth to twenty-seven weeks or to six months and one week.

COST OF RAISING A CALF TO SIX MONTHS

	Amount of feed	Cost of feed
Whole milk at $2 per cwt	329	$6 58
Skim-milk at $0.20 per cwt	2,336	4 67
Dry meal at $1.50 per cwt	138	2 07
Meal in milk at $1.81 per cwt	84	1 52
Hay at $6.60 per ton	475	1 56
Total cost		$16 40

At the end of the feeding period the average age of these calves was 189 days or 6 months and one week and the average weight was 388 pounds.

Deductions.—Hulless oats is an excellent feed for growing calves. Being rich in fat it is especialy suitable for feeding in a meal mixture with skim-milk to replace the butter-fat.

The lot fed the No. 4 mixture (hulless oats, 2 parts; ground oats, 2 parts, and linseed meal, 1 part) made the highest as well as the cheapest gains.

The addition of minerals in the form of blood meal or a fairly complete mineral mixture did not increase the gains. More detailed results will be obtained later, since the calves in these lots are heifers and it is the intention to continue this experiment.

Satisfactory gains were made during this experiment with these calves, the highest being almost 2 pounds per day while the lowest were 1.5 pounds per day, and these gains were made at a cost of about 4 cents per pound.

It was found that the cost of rearing a calf to six months was about $17.

This low cost might be due to the fact that it is not the practice to feed whole milk heavily, the calves being started at 6 to 8 pounds per day and very seldom will they get at any time more than 10 or 12 pounds per day. After the whole milk period, the calves are fed liberally enough to keep them in a good, thrifty condition at all times and never to have them over-fat.

This experiment will be repeated until more definite deductions may be drawn from the average results.

TUBERCULOSIS ERADICATION

During the year, one reactor and two suspects were removed from the herd. The reactor was a valuable imported animal, which was kept in the Bang herd, but the others were young bulls of medium value. When these latter were slaughtered, it was found that the disease had not developed sufficiently to be visible to the naked eye.

THE BANG HERD

The percentage of calves born and raised has been excellent, many of the best of the calves raised during the year being from the Bang herd. The health of the Bang herd has been extremely good throughout the year. From a milk production standpoint, the herd has excelled itself, a number of excellent records being made, as will be noted by referring to the official records reported elsewhere in this report.

DAIRY HERD RECORDS

The tables on the following pages gives the individual milk records for all the cows and heifers which finished a lactation period during the year ending March 31, 1924, also a statement of the average production of the five best cows in each breed for the same period.

In the case of heifers with their first calves, charges for feed include the consumption from a date two months prior to parturition to the time of being dried off preparatory to their second calving. In the case of heifers and cows three years old or over, charges for feed include the period in which they were dry prior to the lactation period herein reported.

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

Pasture per month	$ 2.00
Meal mixture	30.00 per ton
Hay	6.60 "
Roots	3.35 "
Silage (corn)	3.15 "
Silage (O.P.V.)	4.35 "
Silage (sweet clover)	2.80 "
Green feed	3.90 "
Oats	.345 per bush.

These values represent the cost of raising in the case of feeds which are or can be home-grown and the actual cost price in the case of mill feeds, factory by-products, etc., that are purchased.

In calculating the value of products, the actual cash values were used, which amounted to 43 cents per pound for butter and 30 cents per hundredweight for skim-milk.

The labour cost of caring for the cattle, the manufacture of the butter, etc., have not been accounted for. On the other hand, the value of the manure made and the value of the calves at birth will effectually counterbalance the above-mentioned items, though not sufficiently to cover other overhead charges, such as interest, depreciation, etc.

Name and Breed of Cow	Age at beginning of lactation period.	Date of dropping calf	Number of days in the lactation period.	Total pounds of milk for period	Daily average yield of milk	Average p.c. fat in milk	Pounds of butter produced in period	Value of butter at 43c. per pound	Value of skim milk at 30c. per cwt.
				lbs.	lbs.	p.c.	lbs.	$ cts.	$ cts.
Ottawa Woodcrest Lyn.....H.	5	June 26, 1922	531	24,190	45·55	3·61	1,027·36	441 76	69 95
Lyon Segis Butter Girl.....H.	2	Mar. 31, 1922	395	18,523[5]	46·89	3·62	788·88	339 22	53 56
Canaan Beauty 2nd.....H.	10	Sept. 16, 1922	380	19,380	51·00	3·45	786·6	338 23	56 13
Johanna Helena Keyes.....H.	2	Sept. 22, 1922	410	17,132[5]	41·79	3·75	755·85	325 02	49 47
Starlight of Fredericton.....A.	6	Dec. 26, 1922	367	14,365	39·14	4·23	714·82	307 37	41 27
Korndyke Canary ButterMaid.H.	4	Nov. 14, 1921	704	19,088	27·1	3·54	794·95	341 83	55 24
Lyons Segis Helena Keyes.....H.	3	Oct. 23, 1922	374	18,591[5]	49·71	3·33	728·34	313 19	53 92
Helena Keyes Posch.....H.	10	Mar. 31, 1923	262	16,422[5]	62·68	3·41	658·9	283 33	47 59
Grace Allen Ormsby.....H.	11	April 25, 1923	360	18,292	50·81	3·04	654·2	281 31	53 21
Grace Fayne Aaggie.....H.	7	Dec. 27, 1922	309	14,320	46·34	3·81	641·87	276 00	41 32
Old Hall Maggie 9th.....A.	10	Oct. 21, 1922	375	12,323	32·86	4·1	594·4	255 59	35 45
Brampton Vinnie Beth.....J.	5	Nov. 29, 1922	358	7,390	20·64	6·26	544·25	234 03	20 78
Francy Canaan Beauty.....H.	2	Sept. 29, 1922	371	12,882	34·72	3·54	536·49	230 69	37 28
Hardcroft Dewdrop 3rd.....A.	7	Oct. 23, 1922	341	11,359[5]	33·31	4·24	566·66	243 66	32 63
Helena Keyes Plus.....H.	6	Sept. 19, 1922	376	11,976[5]	31·85	3·9	549·5	236 29	34 53
Bess Henergoeld.....H.	4	Dec. 1, 1922	335	12,694[5]	37·89	3·75	560·05	240 82	36 66
Lulu Posch Regina.....H.	5	Dec. 30, 1922	458	15,737	34·36	3·24	599·85	257 94	45 68
Allancroft Betsy 2nd.....A.	5	Nov. 11, 1922	396	12,137[5]	30·65	3·95	564·04	242 54	34 97
Zorra Hengerveld.....H.	2	Sept. 17, 1922	348	11,412[5]	32·79	4·0	537·05	230 93	32 87
Spottie.....A.	3	Aug. 23, 1922	365	10,362[5]	28·39	4·28	523·00	224 89	29 75
Maude of Fernbrook 5th.....A.	7	Oct. 20, 1922	367	13,179[5]	35·99	3·47	538·02	231 35	38 17
Ottawa March Posch.....H.	4	Nov. 5, 1922	379	14,994	39·56	3·14	553·89	238 17	43 57
Zaza Fille 5th.....Fr. Can.	3	Nov. 10, 1922	351	7,648[5]	21·79	5·18	466·11	200 43	21 76
Diamond A-2.....Gr. H.	3	July 20, 1922	408	11,779[5]	28·87	3·38	468·41	201 42	34 14
Susan Mercena Sylvia.....H.	2	Oct. 14, 1922	381	12,470	32·73	3·26	478·26	205 65	36 19
Ottawa Fancy Bos De Kol.....H.	2	Sept. 24, 1922	403	10,568[5]	26·22	3·89	483·66	207 97	30 47
Milly of Wishtonivish.....J.	5	Jan. 14, 1923	337	7,300	21·66	5·4	463·76	199 42	20 72
Flavia 8th of Ottawa.....A.	3	Oct. 11, 1922	324	8,533	26·34	4·47	448·73	192 95	24 45
Lyons Segis Bessie Ann.....H.	3	Oct. 20, 1922	299	11,272[5]	37·7	3·36	445·6	191 61	32 68
Ottawa Burma Lady 2nd.....J.	3	Oct. 13, 1922	352	7,238[5]	20·56	5·11	435·28	187 17	20 61
Jessie of Oaklawn.....A.	8	Nov. 2, 1922	333	9,346	28·07	4·41	484·82	208 47	26 80
Korndyke Posch Canary.....H.	2	Feb. 3, 1923	287	9,289[5]	32·37	3·8	415·29	178 57	26 81
La Belle Delphine 2nd...Fr. Can.	3	Sept. 5, 1922	415	7,315[5]	17·63	5·03	432·9	186 15	20 84
Lyons Segis Keyes Lass.....H.	3	Sept. 2, 1922	374	8,559[5]	22·89	4·32	435·02	187 06	24 57
Auchlochan Emerald.....A.	10	Nov. 28, 1922	465	10,773[5]	23·17	4·19	531·07	228 36	30 97
Allancroft Ada.....A.	7	Nov. 15, 1922	339	8,723[5]	25·73	4·33	444·37	191 08	25 04
Ottawa Folly.....A.	2	Sept. 19, 1922	370	7,903	21·36	4·19	389·56	167 51	22 72
Belle of Oban.....A.	11	Nov. 7, 1922	330	9,925	30·07	3·73	435·53	187 28	28 66
Brampton Triumph 2nd.....J.	4	Dec. 3, 1922	354	6,052[5]	17·09	5·7	405·87	174 52	17 12
St. Valentine's Pet.....A.	9	Sept. 24, 1922	341	8,034	23·56	4·15	392·24	168 66	23 10
Biddy D.....Gr. H.	2	Sept. 19, 1922	346	9,710[5]	28·06	3·49	398·71	171 45	28 11
Francy Oliva De Kol.....H.	2	May 4, 1923	301	9,167	30·46	3·34	360·2	154 89	26 58
Biddy C.....Gr. H.	3	Sept. 28, 1922	337	9,024	26·78	3·67	389·62	167 54	26 08
Johanna Butter Maid.....H.	2	Feb. 2, 1923	263	8,305[5]	31·7	3·58	349·81	150 42	24 02
Ottawa Dignity Dot.....A.	2	Nov. 19, 1922	315	6,795[5]	21·57	4·21	336·58	144 73	19 53
White Bess of Ottawa 2nd.....A.	3	Feb. 27, 1923	256	6,517[5]	25·46	4·57	350·41	150 68	18 66
Merry Christmas.....A.	7	June 7, 1922	385	8,446	21·93	3·69	366·65	157 66	24 40
Inoquette 9th.....Fr.Can.	2	Oct. 19, 1922	372	5,745[5]	15·44	5·14	347·43	149 39	16 35
Fairy's Fern.....J.	4	Jan. 27, 1923	246	5,557	22·59	5·3	346·49	148 99	15 79
Daisy A-1.....Gr. A.	2	Sept. 9, 1922	333	6,608[5]	19·78	4·19	325·48	139 96	18 99
Catlinn's Barbara.....A.	8	Sept. 14, 1922	381	9,206[5]	24·16	3·49	378·01	162 54	26 66
Ottawa Blossom.....A.	2	Oct. 8, 1922	357	6,497	18·2	3·81	291·21	125 22	18 75
Ottawa Beauty Maid 2nd.....J.	2	Feb. 25, 1923	264	5,443[5]	20·62	4·41	282·42	121 44	15 61
Lady FrancyMay.....H.	2	Nov. 22, 1922	313	6,537[5]	20·89	3·71	285·34	122 69	18 88
Ottawa Elsie.....J.	3	Oct. 12, 1922	293	4,220[5]	14·4	5·35	265·65	114 23	11 98
Ottawa Fanny.....J.	3	Sept. 14, 1922	319	4,634[5]	14·53	5·0	272·62	117 23	13 21
Fanny of Oban.....A.	3	Aug. 20, 1922	311	4,671[5]	15·02	4·09	224·78	96 65	13 44
Hobsland Betty 7th.....A.	4	Jan. 15, 1923	258	4,180	16·2	4·33	212·93	91 56	12 00
Trilby.....A.	8	May 29, 1922	390	5,729[5]	14·69	3·52	237·27	102 03	16 58
Marjorie of Ottawa 10th.....A.	3	Nov. 16, 1922	255	3,046	11·95	4·86	174·15	74 88	8 69
Lillian of Oban.....A.	4	April 10, 1923	244	3,631[5]	14·88	4·1	175·16	75 32	10 45
La Belle Denise 2nd.....Fr. Can.	3	Oct. 18, 1922	211	2,359	11·18	5·2	144·32	62 06	6 71
Ottawa Lady 2nd.....A.	3	Aug. 7, 1922	300	3,258	10·86	3·95	151·4	65 10	9 39
Total for herd (63 cows).....	280	.....	22,074	628,778[5]	.....	.....	28,942·09	12,445 10	1,812 51
Average for herd (63 cows)....	4·44	.....	350·38	9,980·6	28·48	3·68	459·4	197 54	28 77

DURING THE YEAR

Total value of product	Amount of meal eaten at 1½c. per pound	Amount of roots at $3.35 per ton and ensilage at $3.15 per ton	Amount of hay eaten at $6.60 per ton	Amount of green feed eaten at $3.90 per ton	Amount of beet pulp eaten at $30.00 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
$ cts.	lbs.	lbs.	lbs.	lbs.	lbs.		$ cts.	$ cts.	cts.	cts.	$ cts.
511 71	7,866	21,630	4,844	.....	484	2	179 31	0·74	17·4	25·6	332 40
392 78	5,824	18,090	1,567	4,880	.....	1	132 98	0·72	16·9	26·1	259 80
394 36	5,960	16,130	3,288	.....	484	2	136 41	0·70	17·3	25·7	257 95
374 49	5,572	15,745	3,218	.....	484	1	128 26	0·75	16·9	26·1	246 23
348 64	4,540	12,780	3,106	.....	380	1	106 18	0·74	14·8	28·2	242 46
397 07	6,173	25,055	5,396	.....	484	2	161 12	0·84	20·3	22·7	235 95
367 11	5,882	15,690	3,656	.....	484	1	134 26	0·71	18·4	24·6	232 85
330 92	5,128	12,775	2,920	.....	176	1	111 78	0·69	16·9	26·1	219 14
334 52	5,421	19,575	2,510	5,060	.....	1	132 72	0·73	20·3	22·7	201 80
317 32	4,476	17,695	1,218	5,066	484	1	118 85	0·83	18·5	24·5	198 47
291 04	4,233	13,710	3,170	.....	484	1	104 80	0·85	17·6	25·4	186 24
254 81	2,661	10,370	2,136	720	484	1	73 95	1·00	13·6	29·4	180 86
267 97	3,604	14,600	2,028	450	.....	2	88 99	0·69	16·6	26·4	178 98
276 29	3,443	16,770	2,004	720	484	2	97 89	0·86	17·3	25·7	178 40
270 82	3,669	18,340	2,166	.....	.....	1	93 02	0·78	16·9	26·1	177 80
277 48	3,890	16,665	2,010	720	484	1	102 36	0·81	18·3	24·7	175 12
303 62	5,447	17,045	3,896	.....	484	1	130 67	0·82	21·8	21·2	172 95
277 51	3,741	18,730	2,439	720	484	1	104 77	0·86	18·6	24·4	172 74
263 80	3,408	14,665	1,824	450	484	3	94 79	0·83	17·6	25·4	169 01
254 64	3,560	13,830	1,872	720	.....	2·75	88 59	0·85	16·9	26·1	166 05
269 52	4,216	13,440	3,098	.....	484	1	103 89	0·79	19·3	23·7	165 63
281 74	5,134	15,225	3,480	.....	484	1	121 73	0·81	22·0	21·0	160 01
222 19	2,393	12,370	1,980	720	.....	1	65 45	0·86	14·0	29·0	156 74
235 56	3,036	12,540	2,010	560	484	1	82 27	0·70	17·6	25·4	153 29
241 84	3,656	15,135	2,010	450	.....	3	92 57	0·75	19·4	23·6	149 27
238 44	3,540	17,095	2,190	720	.....	2	93 07	0·89	19·2	23·8	145 37
220 14	2,535	9,715	1,944	720	484	1	76 20	1·04	16·4	26·6	143 94
217 40	2,799	10,330	1,734	720	484	1	74 63	0·87	16·6	26·4	142 77
224 29	3,234	15,125	1,632	720	.....	1	81 56	0·72	18·3	24·7	142 73
207 78	2,252	9,135	1,902	720	484	1	65 11	0·90	14·9	28·1	142 67
235 27	3,150	16,630	2,004	720	484	3	95 26	1·02	19·6	23·4	140 01
205 38	2,544	10,260	1,734	720	236	1	66 98	0·72	16·1	26·9	138 40
206 99	2,522	12,785	2,160	720	.....	3	73 77	1·01	17·0	26·0	133 22
211 63	2,844	13,240	1,994	720	484	1	80 75	0·94	18·5	24·5	130 88
259 33	3,828	22,470	2,922	.....	1,534	2	130 13	1·21	24·5	18·5	129 20
216 12	3,065	16,680	2,124	720	484	1	90 40	1·04	20·3	22·7	125 72
190 23	1,974	10,435	2,024	270	484	3	66 61	0·85	17·0	26·0	123 62
215 94	3,292	17,005	2,001	720	484	1	93 92	0·95	21·6	21·4	122 02
191 64	2,275	12,130	2,136	720	484	1	71 16	1·17	17·5	25·5	120 48
191 76	2,514	12,160	2,010	720	484	1	74 24	0·92	18·9	24·1	117 52
199 56	2,972	12,315	1,824	720	484	3	84 84	0·87	21·3	21·7	114 72
181 47	2,912	9,430	1,826	720	.....	1	67 86	0·74	18·8	24·2	113 61
193 62	3,059	13,580	2,169	270	484	1	84 41	0·94	22·7	20·3	109 21
174 44	2,394	11,145	1,596	720	246	1	66 03	0·79	18·9	24·1	108 41
164 26	1,985	8,540	1,458	.....	484	1	57 32	0·84	17·0	26·0	106 94
169 34	2,074	10,330	1,724	720	484	1	63 73	0·98	18·2	24·8	105 61
182 06	2,602	13,860	2,283	750	484	1	79 11	0·94	21·6	21·4	102 95
165 74	2,024	11,880	1,974	720	.....	3	63 15	1·10	18·2	24·8	102 59
164 78	2,264	8,900	1,692	720	484	1	64 27	1·16	18·5	24·5	100 51
158 95	1,972	9,422	1,680	549	484	3	64 25	0·97	19·7	23·3	94 70
189 20	3,457	13,710	3,108	.....	484	2	94 96	1·03	25·1	17·9	94 24
143 97	1,977	10,085	2,004	.....	484	2	63 51	0·97	21·8	21·2	80 46
137 05	2,197	7,920	1,495	720	236	1	57 29	1·05	20·0	23·0	79 76
141 57	2,090	10,155	1,788	720	484	1	63 90	0·98	22·4	20·6	77 67
126 21	1,465	7,710	1,560	720	484	1	49 92	1·18	19·0	24·0	76 29
130 44	1,604	9,423	1,824	1,273	484	1	56 66	1·22	20·7	22·3	73 78
110 09	1,604	8,055	1,704	270	484	1	52 15	1·12	23·2	19·8	57 94
103 56	1,454	11,780	1,638	720	300	1	53 92	1·29	25·3	17·7	49 64
118 61	2,208	14,900	2,817	1,020	484	1	76 82	1·34	32·4	10·6	41 79
83 57	1,174	7,240	1,458	270	484	1	43 64	1·43	25·0	18·0	39 93
85 77	1,515	9,700	1,698	720	.....	1	46 99	1·29	26·8	16·2	38 78
68 77	880	8,090	1,458	.....	.....	2	34 91	1·48	24·2	18·8	33 86
74 49	1,356	9,450	1,770	270	484	1	50 85	1·56	33·6	9·4	23 64
14,257·61	202,540	841,415	140,905	43,458	23,436	90·75	5,461·89	.....	.....	.....	8,795 72
226·31	3,214·92	13,355·79	2,236·58	689·8	372	1·44	86 69	0·87	18·9	24·1	139 62

TOTAL AND AVERAGE PRODUCTION OF FIVE

HOL

Ottawa Wooderest Lyn.....H.	5	June 26, 1922	531	24,190	45·55	3·61	1,027·36	441 76	69 95
Lyon Segis Butter Girl.....H.	2	Mar. 31, 1922	395	18,523[5]	46·89	3·62	788·88	339 22	53 56
Canaan Beauty 2nd.....H.	10	Sept. 16, 1922	380	19,380	51·00	3·45	786·6	338 23	56 13
Johanna Helena Keyes.....H.	2	Sept. 22, 1922	410	17,132[5]	41·79	3·75	755·85	325 02	49 47
Korndyke Canary Butter Maid H.	4	Nov. 14, 1921	704	19,088	27·1	3·54	794·95	341 83	55 24
Average of best 5 cows.....	4·6	.....	484	19,662[5]	40·63	3·59	830·73	357 21	56 87
Average of herd (23 cows).....	4·1	.....	374·47	13,991·58	37·36	3·55	583·78	251 03	40 48

AYR

Starlight of Fredericton.....	6	Dec. 26, 1922	367	14,365	39·14	4·23	714·82	307 37	41 27
Old Hall Maggie 9th.....	10	Oct. 21, 1922	375	12,323	32·86	4·1	594·4	255 59	35 45
Hardcroft Dewdrop 3rd.....	7	Oct. 23, 1922	341	11,359[3]	33·31	4·24	566·66	243 66	32 63
Allancroft Betsy 2nd.....	5	Nov. 11, 1922	396	12,137[5]	30·65	3·95	564·04	242 54	34 97
Spottie.....	3	Aug. 23, 1922	365	10,362[5]	28·39	4·28	523	224 89	29 75
Average of best 5 cows.....	6·2	.....	368[3]	12,109[5]	32·83	4·16	592·58	254 81	34 81
Average of herd (22 cows).....	5·31	.....	332·68	8,134·74	24·45	4·09	391·67	168 42	23 40

JER

Brampton Vinnie Beth.....	5	Nov. 29, 1922	358	7,390	20·64	6·26	544·25	234 03	20 78
Milly of Wishtonivish.....	5	Jan. 14, 1923	337	7,300	21·66	5·4	463·76	199 42	20 72
Ottawa Burma Lady 2nd.....	3	Oct. 13, 1922	352	7,238[5]	20·56	5·11	435·28	187 17	20 61
Brampton Triumph 2nd.....	4	Dec. 3, 1922	354	6,052[5]	17·09	5·7	405·87	174 52	17 12
Fairy's Fern.....	4	Jan. 27, 1923	246	5,557	22·59	5·3	346·49	148 99	15 79
Average of best 5 cows.....	4·2	.....	329·4	6,707[6]	20·36	5·56	439·13	188 83	19 00
Average of herd (8 cows).....	3·62	.....	315·37	5,979·56	18·96	5·35	377·04	162 13	16 98

FRENCH

Zaza Fille 5th.....	3	Nov. 10, 1922	351	7,648[5]	21·79	5·18	466·11	200 43	21 76
La Belle Delphine 2nd.....	3	Sept. 5, 1922	415	7,315[5]	17·63	5·03	432·9	186 15	20 84
Inoquette 9th.....	2	Oct. 19, 1922	372	5,745[6]	15·44	5·14	347·43	149 39	16 35
La Belle Denise 2nd.....	3	Oct. 18, 1922	211	2,359	11·18	5·2	144·32	62 06	6 71
Average of herd (4 cows).....	2·7	.....	337	5,767[1]	17·11	5·12	347·69	149 51	16 41

BEST COWS IN EACH BREED

STEINS

511 71	7,866	21,630	4,844	.....	484	2	179 31	0·74	17·4	25·6	332 40
392 78	5.824	18,090	1,567	4,880	.....	1	132 98	0·72	16·9	26·1	259 80
394 36	5.960	16,130	3,288	.....	484	2	136 41	0·70	17·3	25·7	257 95
374 49	5.572	15.745	3,218	.....	484	1	128 26	0·75	16·9	26·1	246 23
397 07	6.173	25,055	5,396	.....	484	2	161 12	0·84	20·3	22·7	235 95
414 08	6.279	18,330	3,662·7	976	3,872	1·6	147 62	0·75	17·8	25·2	266 46
291 51	4.377	15,674·34	2,556	961·57	281·13	1·39	107 82	0·77	18·5	24·5	183 69

SHIRES

348 64	4,540	12,780	3,106	.....	380	1	106 18	0·74	14·8	28·2	242 46
291 04	4.233	13,710	3,170	.....	484	1	104 80	0·85	17·6	25·4	186 24
276 29	3.443	16,770	2.004	720	484	2	97 89	0·86	17·3	25·7	178 40
277 51	3.741	18,730	2,439	720	484	1	104 77	0·86	18·6	24·4	172 74
254 64	3.560	13,830	1,872	720	.....	2·75	88 59	0·85	16·9	26·1	166 05
289 62	3,903·4	15,164	2,518	432	366·4	1·55	100 45	0·83	16·9	26·1	189 17
191 82	2,658	12,110·9	2,096·8	489·54	426·91	1·35	76 78	0·94	19·6	23·4	115 04

SEYS

254·81	2.661	10.370	2.136	720	484	1	73 95	1·00	13·6	29·4	180 86
220 14	2.535	9,715	1,944	720	484	1	76 20	1·04	16·4	26·6	143 94
207 78	2,252	9,135	1,902	720	484	1	65 11	0·90	14·9	28·1	142 67
191 64	2,275	12,130	2,136	720	484	1	71 16	1·17	17·5	25·5	120 48
164 78	2.264	8,900	1,692	720	484	1	64 27	1·16	18·5	24·5	100 51
207 83	2,397·4	10.050	1,962	720	484	1	70 14	1·05	15·9	27·1	137 69
179 11	2,156·6	9,412·8	1,836·1	789·12	453	1	64 32	1·08	17·1	25·9	114 79

CANADIANS

222 19	2.393	12,370	1,980	720	.....	1	65 45	0·86	14·0	29·0	156 74
206 99	2.522	12,785	2,160	720	.....	3	73 77	1·01	17·0	26·0	133 22
165 74	2.024	11,880	1,974	720	.....	3	63 15	1·10	18·2	24·8	102 59
68·77	880	8.070	1,458	.....	.....	2	34 91	1·48	24·2	18·8	33 86
165 92	1.954·7	11.281	1,893	540	.....	2·25	59 32	1·03	17·1	25·9	106 60

As usual, all normal milking cows and heifers that had not previously been tested or looked like bettering previous records were entered in the Canadian Record of Performance for pure-bred dairy cattle conducted by the Live Stock Branch of the Department of Agriculture. Also, many of the Holstein cows and heifers have been entered in the Record of Merit test conducted by the Holstein Friesian Association.

The following tables give the lists of cows qualifying under each of these tests during the year, those marked "Bang" being from the Bang herd:—

HOLSTEIN RECORD OF MERIT TESTS ON CENTRAL EXPERIMENTAL FARM, APRIL 1, 1923 TO MARCH 31, 1924

Name and Number of Cow	Age at Commencement of Test			Number of Days on Test	Pounds Milk	Pounds Fat	Pounds 80% Butter
	Years	Months	Days				
Lady Segis Jewel No. 51243 (Bang)	7	2	27	7	713·3	20·761	25·95
	7	2	27	30	3,091·6	86·344	107·93
	7	2	27	60	6,002·3	168·35	210·44
Sarah Ann Pontiac No. 58345 (Bang)	6	1	18	7	707·9	20·72	25·91
	6	1	18	30	2,834·7	85·62	107·03
Ottawa Francy Bos De Kol No. 75342	3	10	18	7	649·5	24·898	31·12
	3	10	18	30	2,642·5	100·284	126·03
Grace Fayne Aaggie No. 48612	8	4	14	7	607·0	23·929	29·91
	8	4	14	30	2,465·0	99·618	124·52
	8	4	14	60	4,831·0	188·36	235·46
Korndyke Posch Canary No. 77745	3	10	3	7	539·5	19·55	24·45
	3	10	3	30	2,237·5	79·91	99·90
Lyons Segis Butter Girl No. 68058	4	10	15	7	537·55	21·32	26·66
	4	10	15	30	2,270·5	87·05	108·81
Korndyke Canary Butter Maid No. 49648 (Bang)	7	0	2	7	528·8	19·87	24·84
	7	0	2	30	2,130·5	83·18	103·98
Franey Canaan Beauty No. 71719	3	11	17	7	487·5	15·296	19·12
	3	11	17	30	2,076·5	64·456	80·57
Midnight Jewel De Kol No. 46558 (Bang)	7	11	23	7	481·8	24·38	30·49
	7	11	23	30	2,121·3	100·68	125·86
Ottawa Woodcrest Lyn No. 44975 (Bang)	7	3	13	7	452·1	23·17	28·96
Johanna Helena Keyes No. 76334 (Bang)	3	10	22	7	392·4	19·74	24·68
	3	10	22	30	1,943·8	81·50	101·88
Francy Oliva De Kol No. 90066	2	1	11	7	356·0	11·15	13·94

CANADIAN RECORD OF PERFORMANCE TESTS ON CENTRAL FARM, APRIL 1, 1923 TO MARCH 31, 1924

Name and Number of Cow	Breed	Age at Commencement of Test	Number of Days Milking	Pounds of Milk Produced	Pounds of Fat Produced	Average per cent Fat
Ottawa Woodcrest Lyn No. 44975 (Bang)	Holstein..	5	365	20,212	700	3·46
Lyons Segis Helena Keyes No. 64327 (Bang)	" ..	3	365	18,368	628	3·42
Johanna Helena Keyes No. 76334 (Bang)	" ..	2	365	16,495	616	3·73
Grace Allen Ormsby No. 22333	" ..	11	365	18,312	596	3·25
Grace Fayne Aaggie No. 48612	" ..	7	305	14,313	572	4·00
Ottawa March Posch No. 60982 (Bang)	" ..	4	365	14,891	556	3·73
Helena Keyes Plus No. 44067	" ..	7	365	12,036	468	3·89
Zorra Hengerveld No. 77746	" ..	2	305	10,535	426	4·04
		2	349	11,413	461	4·04
Francy Canaan Beauty No. 71719	" ..	2	305	11,738	418	3·56
		2	365	12,798	455	3·56
Leila Posch Mechthilde No. 39673	" ..	6	305	12,119	455	3·75
Bess Hengerveld No. 63936	" ..	4	305	12,539	445	3·86
Lula Posch Regina No. 50458 (Bang)	" ..	5	365	13,487	434	3·22
Susan Mercena Sylvia No. 77744	" ..	2	365	12,120	412	3·40
Ottawa Francy Bos De Kol No. 75342	" ..	2	365	10,120	399	3·94
Lyons Segis Bessie Ann No. 64286	" ..	3	299	11,273	372	3·30
Korndyke Posch Canary No. 77745	" ..	2	287	9,290	348	3·75
Francy Oliva De Kol No. 90066	" ..	2	302	9,167	318	3·47
Johanna Butter Maid No. 80456	" ..	2	263	8,295	301	3·63
Starlight of Fredericton No. 53712 (Bang)	Ayrshire..	6	365	14,362	611	4·25
Maud of Fernbrook No. 38933	" ..	11	365	14,157	517	3·65
Harderoft Dewdrop 3rd No. 70084	" ..	7	341	11,358	514	4·52
Oldhall Maggie 9th No. 70088 (Bang)	" ..	10	365	12,290	512	4·17
Maud of Fernbrook 5th No. 52770 (Bang)	" ..	7	365	13,177	493	3·74
Dolly Dimple No. 69877	" ..	3	365	10,474	485	4·62
Allaneroft Betsy 2nd No. 57914	" ..	5	365	12,077	484	4·01
Auchlochan Emerald No. 70083	" ..	10	365	10,010	427	4·27
Flavia 8th of Ottawa No. 63210	" ..	3	305	8,454	376	4·45
Belle of Oban No. 46711	" ..	11	305	9,726	372	3·82
Dunlop Stellite No. 83932	" ..	2	305	9,152	332	3·63
Ottawa Burma Lady 2nd No. 11398	Jersey....	3	305	7,048	369	5·24

CO-OPERATIVE MILK RECORDS

The demand for milk and feed record forms, which are distributed free of charge upon application to this division, has been on a par with that of previous years, showing that the practice of recording the milk production of individual cows is being well kept up. It is possible, however, that many farmers are not aware of the fact that these milk record forms can be had free upon application. The following is a list of the forms available:—

Month-long daily milk record forms suitable for herds numbering up to twenty-two cows. (Blue-prints of case for holding these forms may also be had on application.)

Week-long daily milk record forms suitable for herds numbering up to sixteen cows.

Week-long daily record forms suitable for herds numbering up to twenty-four cows.

Monthly summary forms.

Yearly summary forms.

Feed record forms.

As stated in previous reports, the object of this free distribution is not in any way to overlap the work of Cow Testing Associations of the Dairy and Cold Storage Branch of the Department of Agriculture, but rather to encourage individual farmers, in outlying districts that have not cow testing associations, to start a good work.

THE DAIRY

The gross revenue return from the sale of dairy products has amounted to $13,487.16, as compared with $13,384.12 for 1922-23, this in spite of decreased prices, and accounted for by increased production of the herds. The routine or commercial work—care and distribution of milk, manufacture of butter, cheese of various kinds, handling of by-products—has increased.

MILK TESTING

Besides the regular testing of milk and cream as necessitated by regular monthly tests of the herds, tests required in connection with experimental work, and those in connection with the R.O.M. official tests—a very greatly increased number of samples have been received from farmers and dairymen. The fact that many dairymen in the district are taking steps toward weeding out low testing cows is undoubtedly responsible.

EXPERIMENTAL WORK

Experimental and test work has this year been limited to the improvement or standardization of three products as previously manufactured, and two of which originated in this dairy.

1. Improvement has resulted in the quality of the 10-pound Cheddar, due to better curing quarters and slight change in detail of manufacture.

2. With the manufacture of Meilleur cheese (see Report Dominion Animal Husbandman 1921-22, and also Pamphlet No. 27—New Series), interesting results have been shown in comparing the use of pasteurized vs. unpasteurized milk. The use of milk subjected to a pasteurizing temperature of 150 degrees for 20 minutes has resulted in a product of less pronounced odour, a sweeter and nuttier flavour, and generally, a product more readily acceptable to the ordinary user of cheese where a high flavour and odour is rather repulsive, at least during the period of acquiring a liking. In order that the curdling of the milk may take place during the optimum period—30 minutes, a starter is usually required where pasteurization has taken place. One ounce of high quality buttermilk per 100 pounds of milk has been found satisfactory, although even better results have been secured through the use of a special starter made by the Dominion Bacteriologist in the Dairy Laboratory. Considerable difficulty has been experienced in the manufacture of Meilleur cheese of a uniform quality during the past summer months, this due to high cellar temperature resulting in loss of texture and poor flavour. Required moisture conditions have been uniformly secured by the use of a humidifier. A heavily saturated atmosphere with a temperature range of 50 to 60 degrees F. and an optimum temperature of 55 degrees is required.

Although manufactured in a necessarily limited and more of an experimental way, this product is now shipped in small quantities to consumers at a distance, is claimed to be the equal of high quality Port Salut, and should form a standard product of Canadian origin when commercially treated.

3. The manufacture of buttermilk cheese has been continued and as per special methods described in the previous report of this division with little change. This product, produced from a high quality buttermilk and subject to standardized methods of making, may be characterized as follows,—(1) apparently of almost equal popularity as compared with cream cheese as manufactured in this dairy (see Exhibition Circular No. 63). (2) capable of manufacture through a simple process from a cheap by-product and sold at a relatively high profit. (3) particularly acceptable to children and those on restricted diet where other forms of cheese are forbidden. This product has been most favourably spoken of by several local physicians and dieticians.

LABORATORY FACILITIES

The treatment of problems in connection with milk production and manufacture is being greatly facilitated through co-operative effort with the Dominion Bacteriologist. Among other problems receiving attention are the following: (1) The relative significance of various stable factors in clean milk production. (2) A comparison of different makes of milking machine from the standpoint of bacterial content of milk. (3) Tests of methods of cleansing, sterilizing solutions in connection with milking machines, etc., etc.

OUTSIDE ASSISTANCE

The dairyman, besides assistance given in the way of milk testing, has visited and assisted in the first manufacture of various forms of soft cheese and has acted as judge of dairy products at a number of fairs and exhibitions.

HORSES

At the present time, there are thirty-one horses at the Central Experimental Farm; fifteen draught geldings and mares, two general purpose horses, two drivers and twelve registered Clydesdales.

In work performed for the various divisions on the Central Farm, the horses have accounted for 7,865½ days.

COST OF MAINTENANCE OF 23 DRAUGHT HORSES—

Total feed	$2,538.10
Labour (stable attendance)	1,150.00
Interest 6 per cent on $5,200	312.00
Shelter (estimated at $25 per horse)	575.00
Harness and repairs	388.48
Horseshoeing only	418.04
Total yearly cost	$5,381.62
Cost per horse	173.60

The average yearly feed requirement per horse (grain and roughage) has been as follows:—

Hay (timothy and mixed)	6,772 lbs.
Oats	5,708·7 "
Bran	539 "

19 tons of range hay included, not very good, therefore extra tonnage fed.

FOAL REARING

Referring to the report for 1922-23, it will be noted under the above heading that a new preventive method was under trial in connection with the control of joint ill in foals—a condition prevalent in this stable in the past, although partially controlled, apparently, by the use of vaccines. Further reference to the same report will reveal the most unsatisfactory foal rearing results of the previous year, due to joint ill and other inexplicable causes, probably allied to joint ill infection—all of this in spite of the prophylactic and curative application of the vaccine treatment.

During the past winter and spring months, all in-foal mares have been administered one teaspoonful of potassium iodide in their drinking water on the first and fifteenth of each month, beginning with the month of October. Owing to the high quality of the mares and the limited numbers available, no comparison was made with other methods of prevention. Of the four foals dropped, none was affected with joint ill at any time. With the exception of one subsequently injured, all have developed normally and are of very high quality. This result may be taken as an indication that the use of potassium

iodide exerts a beneficial prophylactic action as regards joint ill. However, further trial will be carried on during the next several years before any definite pronouncement is made.

SHEEP

Flocks of Leicester and of Shropshire sheep are maintained on the Central Farm. There are, at the close of the fiscal year, 183 breeding sheep in the flock, made up as follows:—

Leicester—		Shropshire—	
Breeding ewes	72	Breeding ewes	66
Yearling ewes	21	Yearling ewes	17
Rams	5	Rams	2
	98		85

LEICESTERS

This flock has made notable gains in numbers and in uniformity, in spite of the fact that during the month of December, 1923, and in the early part of January, 1924, a number of losses were sustained from the same trouble as that which was reported on in the 1923 report, i.e., a very virulent form of pneumonia. Treatment was useless, and post mortem examination revealed only typical pneumonia lesions, with the exception of one case in which it was considered that a small worm cyst at the base of the brain might have indirectly caused the pneumonia. The Health of Animals Branch officers again undertook many post mortems and general inquiries into the nature of the disease, but nothing of a new or preventive nature was discovered. It is of particular note that up to the present this trouble has not occurred in a single instance in the Shropshire flock.

The flock was considerably strengthened by the addition of two rams and a ewe, imported in May, 1923. These were from two of the best flocks in Scotland and should still further improve the flock.

SHROPSHIRES

The flock of Shropshire sheep is becoming exceptionally uniform in type and quality as the result of the policy of using the best imported rams obtainable. This flock has also been materially strengthened by the addition of two rams imported in 1923. These are from the famous "Buttar" flock in Scotland and consequently should prove of considerable value in the improvement of the flock.

GRADING AND CROSSING

Much of the improvement noted in both flocks of sheep is due to the system of culling followed, which consists in grading the flock and using a pure bred ram of the same breed on the outstanding ewes of each flock. The remainder of the ewes of each flock, i.e., the cull purebreds, are bred to a ram of the opposite breed, the resulting lambs being sold for market purposes. This policy has worked out well, for it does away with having a large number of cull pure breds, rams and ewes, at the end of the season, and in their place there is a bunch of big, strong, thick market lambs that can be sold early to good advantage.

The following table gives the comparative weights of the pure bred and cross bred lambs at the time that the latter were sold:—

COMPARATIVE WEIGHTS PURE-BRED AND CROSS-BRED LAMBS

—		Shropshire Dam and Sire	Leicester Dam and Sire	Shropshire Dam Leicester Sire	Leicester Dam Shropshire Sire
Ewe lambs	No.	18	18	5	12
Ram lambs	"	16	25	13	8
Total	"	34	43	18	20
Average weight ewe lambs	lbs.	68	74	93	84·83
Average weight ram lambs	"	76	84	84	87·75
Average weight, all lambs	"	72	79	88·5	86·29

The above table goes to show how much cross breeding affects the size, growth, and early maturity of the lambs. It must be remembered that the pure bred lambs were from the best of the ewes and sired by the best rams, while the cross-bred lambs were from the cull ewes and sired by the rams that were not up to the standard of the sires of the pure bred lambs.

RESULTS OF 1924 LAMBING SEASON

—	Number Ewes Bred	Number Ewes Lambed Normally	Number Lambs Born	Number Lambs Raised
Leicester	50	37	55	50
Shropshire	47	31	41	31
Leicester ewe Shropshire ram cross	30	15	18	18
Shropshire ewe Leicester ram cross	26	16	25	21

The above results show a rather poor breeding and lambing season, due in part to crowded quarters previous to lambing, which was accountable for a good many premature births, and in part to the ravages of the peculiar type of pneumonia, already mentioned as occurring amongst the Leicesters earlier in the season.

WOOL

The 1923 wool clip amounted to 1,513 pounds, which was, as always, sold through the Canadian Co-operative Wool Growers on a graded basis and realized from 24 to 35 cents per pound. Most of the Shropshire wool sold at 31 and 35 cents and the Leicester wool at 24 and 27 cents. This represents an advance of 9 cents per pound over the price received for the 1922 clip, which, in turn, shows the strength of the sheep raising industry at the present time.

SWINE

The herd at the Central Experimental Farm now numbers 254 head, of which 180 are Yorkshires and 74 Berkshires. During the year the sales of breeding stock totalled 50 Yorkshires and 15 Berkshires. In addition to this sale was made of upwards of 42,000 pounds of pork.

During the past year, several important additions have been made to the Yorkshire herd. These include two imported boars, Culcairn Monarch 8-88845- and Dalmeny A. R.-88840-, and three imported sows, Dalmeny Maple Leaf 5-88841-, Dolphington Maud -88838- and Dolphington Maud 2-88839-.

The younger of the two boars, Dalmeny A. R.-88840- born August 1, 1922, is of excellent type and quality and rugged constitution. This boar was bred in the Dalmeny herd at Edinburgh. His sire is Spalding Wonder 6 (24521), one of the best boars ever used in Scotland and his dam is Histon Lady Mollington 17th (67428), well known as a breeder and in the show ring. She comes from a long line of prize winners. As the name would suggest, Spalding Wonder 6 was bred in the Spalding herd owned by A. W. White, Spalding, England, while the dam was bred by John Chivers and Sons, Histon, Cambridge, another outstanding breeder of Large Whites.

The older boar, Culcairn Monarch 8-88845-, born in June, 1922, is also a boar of excellent quality and type and exceptional promise but in appearance lacks a little of the thrift and vigour possessed by the Dalmeny boar. He appears, however, to have a slight superiority over the younger boar as a stock getter but at this early date it is unfair to discuss their respective merits or demerits in this respect.

Culcairn Monarch 8 was bred by John Mackenzie of Inverness and this boar carries the blood of three well-known herds, Spalding, Dalmeny and Bourne. His paternal grandsire was Spalding Wonder 6th and granddam Dalmeny Mana 2 (53258) while his maternal grandsire was Bourne Bar None all of these being outstanding individuals of exceptional merit.

The gilt purchased at Dalmeny (from a May 1922 litter) was also sired by Spalding Wonder 6th and out of Dalmeny Maple Leaf 2nd (78018) and she in turn sired by Jellico (18803) the supreme champion over all breeds at the Highland Show in 1919.

The two other gilts were purchased from A. N. Dudgeon, Dalmeny, Aberdeenshire. These gilts—farrowed in June, 1922—were sired by a Bourne-bred boar by Bourne King John (26091) and out of a granddaughter of Jellico and Dalmeny Maple (44090).

These three gilts have farrowed since coming into the herd and averaged over twelve pigs per litter.

The Berkshire herd is now headed by the boar Sanford Lord —64632—. This is an outstanding boar of great promise and possesses the quality and type desired further to improve the Berkshire herd at this Farm. Another valuable addition is the boar Blythwood Model Baron —64718—. Both these boars were farrowed in 1923 and have yet to prove their worth as breeders.

As in former years, considerable investigational work has been conducted with swine. This includes feeding tests, breeding tests, production costs and various phases of herd management.

Yorkshires vs. Berkshires on Pasture

Clover Pasture, Japanese Millet and Sweet Clover.

Plan of Experiment

Period 1

Lot	Breed	Number of Hogs	Days on test	Meal Ration Fed	Other Feeds
1	Yorkshires.....	15	42	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran, 1 part; tankage, 5 per cent; oil meal, 3 per cent.	Skim-milk, clover pasture.
11	Berkshires.....	9	42	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran, 1 part; tankage, 5 per cent; oil meal, 3 per cent.	Skim-milk, clover pasture.

Period II

1	Yorkshires.....	9	27	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran, ½ part; tankage, 5 per cent; oil meal, 3 per cent.	Skim-milk, Japanese millet and sweet clover.
11	Berkshires.....	9	27	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran ½ part; tankage, 5 per cent; oil meal, 3 per cent.	Skim-milk, Japanese millet and sweet clover.

As will be observed from the plan, the hogs were pastured on clover for the first forty-two days and then transferred to Japanese millet and Sweet clover pasture for the remaining twenty-seven days. During the second period the amount of bran in the meal ration was reduced by half.

The test was commenced on June 6th, and in all covered a period of sixty-nine days.

The hogs were weighed individually when placed on the test, at the end of forty-two days and at the end of sixty-nine days. The feeds were checked up on the same dates and the amounts consumed charged up to the respective lots.

Valuation of Feeds.—During the first period the meal ration was valued at $33.40 per ton; during the second period at $34.10; skim-milk was valued at $4 per ton; no charge was made for pasture.

YORKSHIRES VS. BERKSHIRES ON CLOVER PASTURE

		Lot I Yorkshires	Lot II Berkshires
Number of hogs	No.	15	9
Total initial weight	lbs.	1,004	465
Average initial weight	"	66	51·6
Total finished weight	"	1,440	762
Average finished weight	"	96	84·6
Total gain	"	436	297
Number of days in test	days	42	42
Average gain per hog	lbs.	29·06	33
Average daily gain per hog	"	0·692	0·785
Total meal consumed	"	1,103	530
Total milk consumed	"	3,348	2,050
Pounds meal eaten per pound gain	"	2·53	1·78
Pounds milk eaten per pound gain	"	7·67	6·90
Total cost of feed	$	25 11	12 95
Cost of feed per head per day	cts.	3·98	3·42
Cost of feed per pound gain	"	5·75	4·36

YORKSHIRES VS. BERKSHIRES ON JAPANESE MILLET AND WHITE SWEET CLOVER PASTURE

		Lot I Yorkshires	Lot II Berkshires
Number of hogs	No.	9	9
Total initial weight	lbs.	980	762
Average initial weight	"	108·9	84·6
Total finished weight	"	1,252	976
Average finished weight	"	139·1	108·4
Total gain	"	272	214
Average gain per hog	"	30·2	23·8
Days on test	days	27	27
Average gain per hog per day	lbs.	1·12	·881
Total meal consumed	"	610	470
Total milk consumed	"	1,450	1,450
Pounds meal eaten per pound gain	"	2·24	2·19
Pounds milk eaten per pound gain	"	5·33	6·77
Total cost of feed	$	13 30	10 91
Cost of feed per head	$	1 48	1 21
Cost of feed per head per day	cts.	5·47	4·49
Cost of feed per pound gain	"	4·88	5·09

During the first period, when the hogs were on clover pasture, the Yorkshire lot made lower gains than the Berkshire lot, showing an average daily gain per hog of ·692 pounds as compared with ·782 pounds for the Berkshires or ·092 pounds more. The Yorkshires suffered to some extent from sunburn during this period. The Yorkshires showed an average food consumption of 2.53 pounds of meal and 7.67 pounds of milk per pound of gain in addition to the pasture, while the Berkshires consumed 1·78 pounds of meal and 6·90 pounds of milk in addition to the clover. The feed costs per pound of gain were 5·75 cents and 4·36 cents respectively or 1·39 cents less for the Berkshires.

During the second period, when Japanese millet and sweet clover pasture was used as a supplement to the meal and milk ration, the Yorkshire lot showed an average daily gain per hog of 1·12 pounds and the Berkshire lot ·881 of a pound, a difference of ·239 of a pound in favour of the Yorkshires. These greater gains by the Yorkshire lot resulted in a reduction in the costs, this lot showing a cost per pound of gain of 4·88 cents, while the Berkshire showed an average cost of 5·09 cents.

An average of the two periods shows the Yorkshires to have made the greatest gains but also the most expensive gains, the average cost of feed per pound of gain being 5·33 cents for the Yorkshire lot and 4·73 cents for the Berkshire lot, a difference in favour of the Berkshires of ·06 of a cent per pound of gain.

Deductions.—1. The Berkshire hogs made slightly more economical gains than the Yorkshire hogs on pasture.

2. The Yorkshires made the greatest gains.

3. The Yorkshires consumed more meal and milk per pound of gain produced.

4. The Yorkshires are more subject to sunburn than the Berkshires and this factor may prove detrimental when feeding these hogs on pasture.

5. The hogs readily consumed the clover during the first period and also the Japanese millet and sweet clover pasture during the second period.

Sudan Grass vs. Marrow-Stemmed Kale as Pasture Crop for Hogs

One lot of Berkshires was placed on Sudan grass pasture on July 16, 1923. This lot included eight pigs and they consumed all the grass by September 12. This plot measured 30 by 115 feet, or roughly a twelfth of an acre.

One lot of Yorkshires including six pigs was placed on Marrow-stemmed kale on July 30, 1923. The area of this pasture was the same as for the Berkshire lot, and the six Yorkshire pigs consumed all the kale pasture by September 17. Both these pasture crops were about a foot in height when the hogs were placed on them.

Plan of Experiment

Lot	Breed	Number of Hogs	Days on test	Meal Ration	Other Feeds
I	Berkshires.....	8	58	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran, ½ part; oil meal, 3%; Tankage, 5%.	Skim-milk, Sudan grass pasture.
II	Yorkshires.....	6	49	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran, ½ part; oil meal, 3%; tankage, 5%.	Skim-milk, marrow stemmed kale.

The hogs were weighed individually at the commencement of the test, at the end of thirty days and on completion of the test.

The meal and milk consumed were weighed and charged to the lot receiving same. It will be noted that two breeds of hogs were used in this test, and this additional factor must not be lost sight of in comparing these two pasture crops.

Valuation of Feeds.—The meal mixture was valued at $34.18 per ton; skim-milk at $4 per ton; no charge was made for pasture.

—		Lot I Sudan grass	Lot II Marrow kale
Number of hogs	No.	8	6
Total initial weight	lbs.	474	586
Average initial weight	"	59·2	97·6
Total finished weight	"	962	941
Average finished weight	"	120·2	156·8
Total gain	"	488	355
Average gain per hog	"	61	59·1
Date commenced		July 16/23	July 30/23
Date finished		Sept. 12	Sept. 17
Number of days on test	days	58	49
Average daily gain per hog	lbs.	1·05	1·20
Total meal consumed	"	1,100	815
Total milk consumed	"	2,832	1,864
Pounds meal eaten per lb. gain	"	2·25	2·29
Pounds milk eaten per lb. gain	"	5·80	5·25
Total cost of feed	$	24 45	17 65
Cost of feed per head	$	3 06	2 94
Cost of feed per head per day	cts.	5·27	6·00
Cost of feed per lb. gain	"	5·01	4·97

Results.—The hogs on the marrow-kale made the greatest gains and slightly more economical gain. These hogs (on the marrow-kale) were about a month older than the other lot when placed on the test, and this would account in part at least for the greater gains. The fact that they made more economical gains would indicate that the kale is slightly superior to Sudan grass for pasturing purposes in so far as its actual feeding value is concerned, but the additional fact that there were two hogs less on the marrow kale gave this pasture crop an advantage over the Sudan grass.

The marrow-kale was fourteen days later than the Sudan grass in making a growth sufficiently heavy for pasturing but lasted five days later. Even with this additional five days the grazing period was nine days less than that of the lot on Sudan grass.

All things considered, the Sudan grass would appear to have a slight superiority over the Marrow-stemmed kale since this crop was ready for pasturing earlier than the kale, carried more hogs and continued to supply green feed for a longer period than the kale. Although the feed-cost, exclusive of pasture, was .04 of a cent higher per pound of gain, the two extra hogs carried on this plot more than offset this item. By placing a charge of two dollars for the pasture—which is low—for each lot, the feed cost per pound of gain would be 5·42 cents and 5·53 cents or a difference in favour of the Sudan grass of .11 of a cent. An increase in this charge for pasture would further increase this difference in favour of the Sudan grass pasture.

Hulless vs. Ordinary Oats—Self-feeding vs. Trough-feeding—Sows vs. Barrows

1. To compare ground hulless oats and ground oats for the feeding of Berkshires.
2. To compare self-feeding vs. trough-feeding of Berkshires.
3. To determine the economy of feeding sows vs. barrows.

PLAN OF EXPERIMENT

Lot	Breed	Sex	Number of hogs	Days on test	Meal Ration	Other Feeds
I	Berkshire....	Sows.....	7	103	Ground oats, 2 parts; hulless oats, 2 parts; shorts, 1 part; middlings, 1 part; tankage, 3%; oil meal, 3%; bone meal, 2%.	Skim-milk, turnips.
II	Berkshire....	Barrows..	6	103	Ground oats, 4 parts; shorts, 1 part middlings, 1 part; tankage, 3%; oil meal, 3%; bone meal, 2%.	Skim-milk, turnips.
III	Berkshire....	Sows.....	8	103	Ground oats, 4 parts; shorts, 1 part middlings, 1 part; tankage, 3%; oil meal, 3%; bone meal, 2%.	Skim-milk, turnips.
IV	Berkshire....	Mixed....	8	103	Self-fed. Ground oats, 4 parts; shorts, 1 part; middlings, 1 part; tankage, 3%; oil meal, 3%; bone meal, 2%.	Skim-milk.

There were eight hogs in each lot at the commencement of the test but lot 1 lost a hog on the 10th day and lot 11 lost two hogs, one on November 4 and the other on January 1. These losses were not due to the feeds being defective although some trouble was experienced in this respect during the first 30 days. The hogs which died were eliminated from the test and also the feed which they consumed.

The hogs were weighed individually at the beginning of the test, at the end of each thirty days, and on completion of the test. A careful and accurate record of all feeds consumed was also kept for each lot. This test was commenced on September 29, 1923.

Valuation of Feeds.—The meal mixture for Lot I was valued at $32.50 per ton; for lots II, III and IV at $32.60; turnips and skim-milk were valued at $4 per ton. Hulless oats were charged at same price as ordinary oats.

BERKSHIRE FEEDING TEST

——		Lot I Hulless Oats Sows	Lot II Ground Oats Barrows	Lot III Ground Oats. Sows.	Lot IV Ground Oats Self-fed. Mixed
Number of pigs	No.	7	6	8	8
Total initial weight	lbs.	329	302	506	379
Average initial weight	"	47	50·3	63·2	47·4
Total finished weight	"	1,021	804	1,171·	1,232
Average finished weight	"	145·9	134	146·2	154
Total gain	"	692	502	665	853
Average gain per hog	"	98·9	83·7	83·1	106·6
Number of days on test	days	103	103	103	103
Average daily gain per hog	lbs.	0·96	0·812	·807	1·03
Total meal consumed	"	1,460	1,294	1,700	2,500
Total roots consumed	"	300	251	348	.....
Total skim-milk consumed	"	3,275	2,858	3,875	3,880
Pounds meal eaten per lb. gain	"	2·11	2·58	2·56	2·93
Pounds roots eaten per lb. gain	"	0·43	0·50	·523	.....
Pounds milk eaten per lb. gain	"	4·73	5·69	5·83	4·50
Total cost of feed	$	30 87	26 31	36 15	48 51
Cost of feed per head	$	4 41	4 38	4 52	6 00
Cost of feed per head per day	cts.	4·28	4·25	4·38	5·88
Cost of feed per pound gain	"	4·32	5·24	3·43	5·68

In this test the comparison of self-feeding and hand-feeding shows the self-fed lot to have made the greatest gains with the highest meal consumption and also the greatest cost. These results are similar to results obtained in previous tests of a like nature, in that self-feeding is capable of making greater gains than hand-feeding but that these increased gains are not sufficient to compensate for the greater meal consumption and the increased feed cost per pound of gain.

The lot on hulless oats made the second highest gains in this test, .07 of a pound less per hog per day as compared to the self-fed lot and made the most economical gains, showing a feed cost per pound of gain of 4.32 cents or 1.36 cents less than the self-fed lot.

Comparing the sows on hulless oats with the sows fed ordinary oats the hulless oats fed lot made .96 of a pound and the lot fed ordinary oats .807 pounds or .159 of a pound less per hog per day. In economy of gains the hulless oats fed lot also led with 1.11 cents more economical gains in the final analysis of feed cost per pound of gain.

The barrows of Lot II and the sows of Lot III which were fed alike showed results in favour of the barrows these making more economical gains—at a cost of .19 of a cent less per pound of gain—and also slightly greater gains than the sows.

The self-fed hogs were thicker, and heavier at the shoulders than the trough-fed lots and all these hogs graded as thick-smooths.

Deductions.—1. The use of the self-feeder for hogs gave greater gains than trough-feeding.

2. Self-fed hogs consumed more feed and were the more expensive to feed.

3. A mixture of hulless oats and ordinary oats is capable of giving greater gains and also more economical gains than ordinary oats.

4. Barrows were capable of making slightly larger gains and also more economical gains than sows.

5. The self-fed hogs were thicker and produced a less desirable type of carcass for bacon purposes than did the trough-fed hogs.

Sweet Clover Meal and Alfalfa Meal for Growing Hogs

OBJECTS OF EXPERIMENT

1. To determine the value of alfalfa and sweet clover meal in the meal ration of growing hogs during the finishing period.

2. To compare sweet clover meal, alfalfa meal and a standard meal ration as to economy of gains produced.

PLAN OF EXPERIMENT

Lot	Breed	Number of Hogs	Days on test	Meal Ration	Other Feeds
I	Yorkshire	6	43	Oats, 2 parts; barley, 2 parts; shorts, 1 part; middlings, 1 part; oil meal, 3%.	Skim-milk.
II	Yorkshire	5	43	Oats, 2 parts; barley, 2 parts; shorts, 1 part; middlings, 1 part; oil meal, 3%.	Skim-milk, alfalfa meals.
III	Yorkshire	5	43	Oats, 2 parts; barley, 2 parts; shorts, 1 part; middlings, 1 part; oil meal, 3%.	Skim-milk, sweet clover meal.

The test was commenced on January 21, 1924.

One hundred pounds of sweet clover meal were fed to Lot III and the same quantity of alfalfa meal was fed to Lot II these feeds being added to the meal ration in uniform amounts throughout the test.

The hogs were weighed individually at the beginning of the test, at the end of 30 days and at the end of the test. All feeds consumed were accurately weighed.

Valuation of Feeds.—The following prices were charged for feeds:—Meal ration, per ton, $32.30 alfalfa meal, per ton, $31; sweet clover meal, per ton, $30; skim-milk, per ton, $4.

SWEET CLOVER MEAL VS. ALFALFA MEAL

—		Lot I Regular Meal Ration	Lot II Alfalfa meal Added	Lot III Sweet clover meal Added
Number of hogs	No.	6	5	5
Total initial weight	lbs.	623	660	607
Average initial weight	"	103·8	132	121·4
Total finished weight	"	1,021	1,003	952
Average finished weight	"	170·1	200·6	190·4
Total gain	"	398	343	345
Average gain per hog	"	66·3	68·6	69
Number of days on test	days	43	43	43
Average daily gain per hog	lbs.	1·54	1·59	1·60
Total meal consumed	"	1,000	880	880
Total alfalfa or sweet clover consumed	"	.....	100	100
Total skim-milk consumed	"	1,512	1,344	1,344
Pounds meal eaten per pound gain	"	2·51	2·56	2·55
Pounds alfalfa or sweet clover per lb. gain	"	.....	·291	·289
Pounds skim-milk per lb. gain	"	3·79	3·92	3·89
Total cost of feed	$	19 17	18 35	18 30
Cost of feed per head	$	3 19	3 67	3 60
Cost of feed per head per day	cts.	7·43	8·53	8·51
Cost of feed per pound gain	"	4·92	5·35	5·30

The addition of alfalfa meal or sweet clover meal at the rate of 1 pound to 8.8 pounds of the meal ration increased the total gains but this increase was not sufficient to compensate for the increased cost of the ration. The lot fed alfalfa meal showed an average daily gain per hog of 1.59 pounds or .05 of a pound more than the check lot, while the lot fed sweet clover meal showed an average daily gain of 1.60 pounds or .01 of a pound greater gain per hog per day than the alfalfa meal lot.

The hogs fed alfalfa meal showed a feed cost of 5.35 cents per pound of gain or 0.43 of a cent greater cost than the check lot while the lot fed sweet clover meal showed a feed cost of 5.30 cents, this being .05 of a cent less per pound of gain than the alfalfa meal lot and 0.38 of a cent greater than the check lot.

The hogs on the straight meal and milk ration did not show quite as much bloom as the other lots which were fed the supplementary meals, i.e.,—alfalfa and sweet clover meals.

Deductions.—1. The supplementing of a well-balanced meal ration with alfalfa meal or sweet clover meal gave greater gains but an increased cost.

2. In this test the addition of 1 pound of the sweet clover meal to 8.8 pounds of the meal mixture proved slightly superior to alfalfa meal fed at the same rate.

3. Alfalfa or sweet clover meal improved the health, thrift, and general appearance of the hogs.

4. The addition of alfalfa and sweet clover meal in the amount fed did not prove economical for the feeding of hogs which were finished at 170 to 200 pounds.

Milk Substitute Experiment

The Pro-lac meal used in this test was manufactured by the Pro-lac Milling Co., Des Moines, Iowa, and is described by the manufacturers as a whole buttermilk feed reinforced with choice cereal and animal proteins and fats.

The milk powder was manufactured by the Canadian Milk Products Co., and is a by-product. It consists of third grade milk powder which fails to meet the requirements of the manufacturers in the commercial grades and is, therefore, disposed of for feeding purposes. The available supply of this feed is limited.

OBJECTS OF EXPERIMENT

1. To determine the economy of feeding milk powder and Pro-lac meals as substitutes for skim-milk.
2. To determine the economy of substituting one-half the skim-milk with water.
3. To determine the economy of replacing all the skim-milk with water.

Plan of Experiment

Period I

Lot	Breed	Number of hogs	Days on test	Meal Ration	Other Feeds
I	Yorkshire	8	00	Oats, 2 parts; barley, 1 part; shorts, 1 part; middlings, 1 part; oil meal, 5%; tankage, 3%.	Skim-milk.
II	Yorkshire	8	60	Same as Lot I	Milk powder.
III	Yorkshire	8	60	Same as Lot I	Pro-lac.
IV	Yorkshire	8	60	Same as Lot I	Half skim-milk and half water.

Period II

I A	Yorkshire	4	30	Oats, 4 parts; barley, 3 parts; shorts, 2 parts; middlings, 1 part; oil meal, 5%; Tankage, 3%.	Skim-milk.
I B	Yorkshire	4	30	Same as Lot I A	Water.
II A	Yorkshire	4	30	Same as Lot I A	Milk powder.
II B	Yorkshire	4	30	Same as Lot I A	Water.
III A	Yorkshire	4	30	Same as Lot I A	Pro-lac.
III B	Yorkshire	4	30	Same as Lot I A	Water.
IV A	Yorkshire	4	30	Same as Lot I A	Half skim-milk and half water.
IV B	Yorkshire	4	30	Same as Lot I A	Water.

For the first sixty days, each lot included 8 pigs and for the remainder of the test each lot was uniformly divided, four pigs of each being fed meal and the same supplements as in the first period while the other four pigs were given meal and water. The meal ration was similar for all lots in each period.

The Pro-lac was prepared about twenty-four hours before feeding. It was mixed at the rate of one pound of Pro-lac meal to thirty-three pounds of water. This method of preparation was recommended by the manufacturers in order to permit the meal to start fermentation.

The milk powder was mixed at the rate of one pound of the powder to 16 pounds of water and was prepared 12 to 24 hours before feeding.

The test was commenced on June 19th, 1923.

The hogs were weighed individually at the commencement of the test, at the end of each thirty days, and on completion of the test.

An accurate record was kept of all feeds consumed.

Value of Feeds.—The following prices were charged for feeds:—Meal ration—first period, per ton, $33.60; second period, per ton, $32.50; Pro-lac, per cwt., $7.50; milk powder, per cwt., $6; skim-milk, per cwt., 20 cents.

PRO-LAC VS. MILK POWDER VS. SKIM MILK AND WATER
Period I

—		Lot I Skim Milk	Lot II Milk powder	Lot III Pro-lac	Lot IV Milk and Water
Number of hogs	No.	8	8	8	8
Total initial weight	lbs.	377	278	317	563
Average initial weight	"	47·2	34·7	39·6	70·4
Total finished weight	"	879	710	719	1128
Average finished weight	"	109·9	88·7	89·8	140·6
Total gain	"	502	432	402	562
Average gain per hog	"	62·7	54	50·2	70·2
No. of days on test	dys.	60	60	60	60
Average daily gain per hog	lbs.	1·05	0·9	0·837	1·17
Lbs. meal consumed	"	1030·	980	850	1655
Lbs. milk consumed	"	3264	.....	.....	1280
Lbs. supplements consumed	"	.....	210	114	.....
Lbs. meal eaten per lb. gain	"	2·05	2·27	2·11	2·94
Lbs. milk eaten per lb. gain	"	6·50	.....	.....	2·27
Lbs. supplements eaten per lb. gain	"	.....	·486	·283	.....
Total cost of feed	$	23 82	28 06	22 83	30 36
Cost of feed per head	$	2 98	3 50	2 83	3 79
Cost of feed per head per day	cts.	4·96	5·84	4·76	6·32
Cost of feed per pound gain	"	4·74	6·49	5·67	5·40

Period II

—		Lot IA Skim milk	Lot IB Water	Lot IIA Milk Powder	Lot IIB Water	Lot IIIA Pro-lac	Lot IIIB Water	Lot IVA Milk and Water	Lot IVB Water
Number of pigs	No.	4	4	4	4	4	4	4	4
Total initial weight	lbs.	465	414	364	346	335	384	508	617
Average initial weight	"	116·2	103·5	91	86·5	83·7	96	127	154·2
Total finished weight	"	625	539	524	469	503	504	625	756
Average finished weight	"	156·2	134·7	131	117·2	125·7	126	156·2	189
Total gain	"	160	125	160	123	168	120	117	139
Average gain per hog	"	40	31·2	40	30·7	42	30	29·2	34·7
No. of days on test	days	30	30	30	30	30	30	30	30
Average daily gain per hog	lbs.	1·33	1·04	1·33	1·02	1·40	1·0	·966	1·16
Total meal consumed	"	480	520	520	530	440	440	510	670
Total skim-milk consumed	"	856·	.....	.....	.....	.....	.....	344	.....
Total supplements consumed	"	.....	.....	95	.....	35	.....	.....	.....
Lbs. meal eaten per lb. gain	"	3·0	4·08	3·25	4·30	2·62	3·66	4·46	4·82
Lbs. milk eaten per lb. gain	"	5·35	.....	.....	.....	.....	.....	2·94	.....
Lbs. supplements per lb. gain	"	.....	.....	·593	.....	·208	.....	.....	.....
Total cost of feed	$	9 53	8 47	14 17	8 64	9 79	7 17	8 99	10 92
Cost of feed per head	$	2 38	2 12	3 54	2 16	2 45	1 79	2 25	2 73
Cost of feed per head per day	cts.	7·94	7·05	11·80	7·20	8·15	5·98	7·49	9·10
Cost of feed per lb. gain	"	5·95	6·77	8·85	7·01	5·83	5·98	7·68	7·85

Results.—The hogs fed half milk and half water during the first period as a supplement to the meal ration made the greatest gains but not the most economical gains. The fact that these hogs were about a month older than the other hogs gave them somewhat of an advantage and would, in part, explain the larger gains. The lot on skim-milk and meal made the next highest gains,

averaging 1.05 pounds per hog per day and also made the most economical gains, the feed cost being 4.74 cents per pound of gain as compared to 5.40 cents for the milk and water lot. The lot on milk powder stood next in total gains, with .9 of a pound per hog per day with a feed cost of 6.49 cents per pound of gain, this cost being considerably the highest in this period. The Pro-lac lot made the lowest gains during this period, averaging .84 of a pound per hog per day. The cost of feed per pound gain for this lot was .82 of a cent lower than the milk powder lot and .27 and .93 of a cent higher than for the skim-milk and water and the skim-milk lots, respectively.

In this period 1 pound of milk powder and 1.10 pounds of meal were equal to 1 pound of meal and 13.4 pounds of skim-milk, 1 pound of Pro-lac and 1.03 pounds of meal equal to 1 pound of meal and 22.9 pounds of milk and 1.43 pounds of meal and one pound of milk (mixed with water) equal to 1 pound of meal and 1.8 pounds of milk.

During the second period, the lot fed Pro-lac made the greatest gains as well as the most economical gains. Lot 1A on skim-milk ranked next in economy of gains, showing a feed cost per pound of gain of .12 of a cent more while the average daily gain per hog was 1.33 pounds or .07 of a pound less. The lot on milk powder made equally large gains as the lot on milk but the cost of this constituent added greatly to the total cost of the ration, the feed cost per pound gain being 3.02 cents greater than the Pro-lac lot and 2.90 cents greater than the skim-milk lot.

The lot on milk and water for some unaccountable reason made the lowest gains in this period averaging only .96 of a pound per hog per day. Even with these low gains, however, the cost per pound of gain was lower than the milk powder lot and also Lot IV B which had been fed milk and water in the first period and which was fed a similar ration in the second period.

The four lots fed water and meal during the second period made considerably lower gains than the lots receiving meal and a supplement, averaging about one pound gain per hog per day with the exception of Lot IVB which showed an average daily gain per hog of 1.16 pounds. The elimination of the milk or milk supplements in every instance increased the meal consumption, and also increased the cost of gains, the one exception being the milk powder lot.

Deductions.—1. Pro-lac can be fed successfully as a substitute for skim-milk.

2. Milk powder is capable of producing satisfactory gains but at the price of 6 cents per pound it is decidedly uneconomical.

3. Skim-milk is one of the most economical feeds with which to supplement the meal ration.

4. The dilution of skim-milk with water would seem economical but because of the contradictory nature of the results obtained in this test, no definite deductions are possible.

Alfalfa Meal and Organic Supplements for Hogs

OBJECTS OF EXPERIMENT

1. To determine the economy of adding organic supplements to the ration.

2. To determine the quantity of various organic supplements which may be consumed when these are available in self feeding hoppers.

3. To determine the economy of feeding alfalfa meal to hogs.

PLAN OF EXPERIMENT

Lot	Breed	Number of hogs	Days on test	Meal ration fed	Other Feed
I.....	Yorkshire.....	7	90	Oats, 2 parts; shorts, 1 part; middlings, 1 part; barley, 1 part; oil meal, 3%	Skim-milk.
II....	Yorkshire.....	7	90	Same as Lot I.....	Skim-milk, Swift's tankage.
III...	Yorkshire.....	7	90	Same as Lot I.....	Skim-milk, National tankage.
IV....	Yorkshire.....	7	90	Same as Lot I.....	Skim-milk, National meat meal.
V.....	Yorkshire.....	7	90	Oats 2 parts; alfalfa 1 part; shorts 1 part; middlings 1 part; barley 1 part; oil meal 3%.	Skim-milk.
VI....	Yorkshire.....	6	90	Same as Lot V.....	Skim-milk.
VII...	Yorkshire.....	6	90	Same as Lot 1.....	Skim-milk.

The organic supplements, Swift's digester tankage, National tankage and National meat meal, were supplied in self-feeding hoppers and these feeds were available at all times. The remainder of the ration fed these lots of hogs was all trough fed.

The test was commenced on January 9 and continued for a period of 90 days. All feeds consumed were carefully weighed. The pigs were weighed individually at the commencement of the test, at the end of each 30-day period and at the end of the test.

Valuation of Feeds.—The following prices were charged for feeds:—

Meal ration.—Lots I, II, III, IV and VII, per ton, $32.20; Lots V and VI, per ton, $31.80; alfalfa meal, per ton, $30; Swift's digester tankage, per ton, $45; National tankage, per ton, $50; National meat meal, per ton, $80; skim-milk, per ton, $4.

	I	II Tankage	III Tankage	IV Meat meal	V Alfalfa	VI Alfalfa	VII
Number of hogs in lot....No.	7	7	7	7	7	6	6
Total initial weight.....lbs.	310	338	345	378	465	280	267
Average initial weight... "	44·3	48·3	49·3	54·	66·4	46·6	44·5
Total finished weight.... "	962	1001	1025	1063	1083	879	886
Average finished weight. "	137·4	143	146·4	151·9	154·7	146·5	147·6
Total gain..... "	652	663	680	685	618	599	619
No. of days in test.....dys	90	90	90	90	90	90	90
Average gain per hog..... lbs.	93·1	94·7	97·1	97·8	88·3	99·8	103·1
Average daily gain per hog "	1·03	1·05	1·08	1·09	0·981	1·109	1·14
Total meal consumed.... "	1705·	1710	1710	1710	1760	1210	1310
Total milk consumed.... "	3322	3322	3322	3322	3620	2834	2834
Total supplements consumed..... "	.....	155	195	155	.....	.....	.....
Lbs. meal eaten per lb. gain..... "	2·61	2·59	2·51	2·49	2·84	2·02	2·11
Lbs. milk eaten per lb. gain..... "	5·09	5·01	4·88	4·85	5·87	4·73	4·57
Lbs. supplements eaten per lb. gain..... "	.....	0·23	0·28	·226	.....	.....	.....
Per cent of supplements consumed..... %	.....	9·06	11·4	9·06	.....	.....	.....
Total cost of feed..... $	34 09	37 65	39 04	40 37	35 24	24 90	26 75
Cost of feed per hog per day..... cts.	5·41	5·97	6·19	6·40	5·59	4·61	4·95
Cost of feed per lb gain... "	5·23	5·68	5·74	5·89	5·70	4·15	4·32

It is of interest to note in this test that the lots which made the greatest gains, lots VI and VII, were fed in the main piggery and were confined in pens without open air yards, while the other lots were housed in experimental pens all of which had access to yards throughout the test, and the fact that these latter hogs were able to take more exercise may, to some extent at least, explain the lower gains which were made.

Another feature brought out in this test is the greater economy of gains made by the hogs confined in the smaller area. Greater care and judgment in feeding are required, however, to prevent the hogs going off their feet when fed in pens with little exercise possible.

One rather surprising feature of the test is found in the alfalfa meal fed lots. With similar meal and milk rations, lot V shows the highest meal and milk consumption per pound of gain of any lot in the test while lot VI shows the lowest meal and milk consumption. These two lots of hogs presented the best appearance of any of the lots on the completion of the test.

An average of the results obtained from the two alfalfa-meal-fed lots compared with the two check lots shows the ration in which the alfalfa meal was fed to be somewhat inferior to the check ration. The only difference in these two rations was the addition of one part of alfalfa meal to approximately five parts of the regular meal ration. The alfalfa meal gave slightly lower gains with a higher meal and milk consumption and a greater cost per pound of gain even although the alfalfa meal ration cost 40 cents less per ton.

Comparing the lots fed the organic supplements in self-feeding hoppers with the check lot (No. 1) fed under similar conditions these lots gave slightly greater gains with a somewhat lower meal and milk consumption per pound of gain but as these gains were not sufficiently large to offset the greater cost of these rations, the check lot made considerably more economical gains in the final analysis of feed cost per pound of gain.

The hogs which were fed the National meat meal made slightly greater gains, five pounds more in the ninety days, than the lot on National tankage and made these gains with a slightly lower meal and milk consumption per

pound of gain but because of the greater cost of the meat meal constituent, even although 20 per cent less of it was consumed, this lot showed the most expensive gains.

The lot fed Swift's tankage made a total gain of 22 pounds less than the meat meal lot but because of the lower cost of this constituent the cost per pound of gain of this ration was 0.21 of a cent less.

Deductions.—1. The substitution of one-sixth of the meal ration with alfalfa meal did not prove economical or advantageous except in that the general appearance of the hogs was improved.

2. The addition of from 9 to 11 per cent of organic supplements to the ration slightly increased the gains but such gains were not sufficiently large to compensate for the increased cost of the ration at the prices charged for these supplements.

3. Because of the cost of commercial organic supplements such as tankage or meat meal the addition of much more than 4 to 6 per cent of these feeds to a well balanced ration of meal and milk is not economical.

Lictonic

Lictonic a product of the Lambert Lictonic Company, St. Louis, U.S.A., is sold as a live stock condiment and recommended for hogs. It was purchased in brick form and pulverized before feeding to the hogs in the meal ration. It is described by the manufacturers as a concentrated mineral and tonic combination containing chemicals, drugs, herbs, minerals and proteins, and that it is a worm eradicator, blood purifier, conditioner and feed saver.

Feeding Lictonic in Summer

Object of Experiment

To determine whether Lictonic is beneficial in the ration of growing hogs which are poor doers or culls.

Plan of Experiment

Lot I	Breed	No. of hogs	Meal Ration	Other Feeds
I.....	Yorkshires.....	4	Oats, 2 parts; corn, 1 part; middlings, 1 part; bran, half pt; tankage, 5% oil meal, 3%	Skim-milk. Lictonic, 4 bricks.
II....	Yorkshires.....	4	Same as fed Lot I.....	Skim-milk.

The corn was replaced by barley during the last 30 days of the test.

The Lictonic was pulverized and fed in small amounts daily in the meal ration, four bricks of this preparation being fed to three hogs in the course of 90 days.

Procedure.—The hogs were placed on clover paddocks. The clover, however, was soon consumed and for the greater part of the period of 90 days little green feed was available for the pigs in the paddocks.

The pigs receiving the Lictonic were the poorer pigs when placed on the test.

One pig from each lot died during the test and the comparison which follows is based on the results obtained from the remaining pigs.

The hogs were weighed when placed on the test, each thirty days and at the end of the test.

The feeds were accurately weighed and mixed in the proportions outlined in the plan.

Valuation of Feeds.—The feeds used were valued as follows: Meal mixture, per ton, $35; skim-milk, per ton, $4; Lictonic, per dozen bricks, $5.

LICTONIC VS. NO LICTONIC

		Lot I	Lot II
		Lictonic	No Lictonic
Number of pigs in experiment	No.	3	3
Total initial weight	lbs.	134	148
Average initial weight	"	44·6	49·3
Total finished weight	"	458	486
Average finished weight	"	152·6	162
Total gain	"	324	338
Number of days on test	dys.	90	90
Average gain per hog	lbs.	108	112·6
Average daily gain per hog	"	1·20	1·25
Total meal consumed	"	737·00	800
Total milk consumed	"	1636	1742
Total Lictonic consumed	bricks	4	.....
Lbs. meal eaten per pound gain	lbs.	2·27	2·36
Lbs. milk eaten per lb. gain	"	5·05	5·15
Total cost of feed	$	17·82	17·48
Cost of feed per hog per day	cts.	6·60	6·47
Cost of feed per pound gain	"	5·50	5·17

Deductions.—The addition of Lictonic to the ration did not prove of any particular benefit in the amount fed. The manufacturers recommend this preparation because of its tonic properties for the feeding of all classes of livestock. The hogs receiving this tonic showed considerable improvement in appearance and condition generally but as this was equally true of the check lot, no particular credit can be given to the Lictonic in this particular test. The small number of pigs in the test, however, does not permit of any very definite deductions being drawn. The form of this tonic, in a hard brick, makes it awkward to feed to pigs as it must be pulverized before it can be mixed with the meal ration.

FEEDING LICTONIC IN WINTER

OBJECT OF EXPERIMENT

To determine whether the addition of Lictonic to the ration of growing pigs exercises a beneficial influence on the health and vigour of the pigs.

PLAN OF EXPERIMENT

Lot	Breed	No. of hogs	Meal Ration	Other Feeds
I.....	Berkshires.....	7	Oats, 2 parts; shorts, 1 part; middlings, 1 pt. Barley, 1 part; oil meal 5%.	Skim-milk. Lictonic.
II....	Berkshires.....	7	Same as Lot I.....	Skim-milk.

The Lictonic was finely ground and added to the ration in small amounts daily.

Procedure.—The hogs were confined in pens throughout the test. Weights of the hogs were taken individually at the commencement of the test, at the end of 30 days, and at the end of the test. Accurate records of all feeds consumed were carefully kept. In preparing the ration the meals were mixed in the specified proportions by weight and not by measured quantities.

Valuation of Feeds.—The feeds used were valued as follows: Meal mixture, per ton, $32.20; skim-milk, per ton, $4; Lictonic, per dozen bricks, $5.

LICTONIC VS. NO LICTONIC

——		Lot I Lictonic	Lot II No Lictonic
Number of pigs in experiment	No.	7	7
Total initial weight	lbs.	495	432
Average initial weight	"	70·7	61·7
Total finished weight	"	931	890
Average finished weight	"	133	127·1
Total gain	"	436	458
Number of days on test	dys	60	60
Average gain per hog	lbs.	62·3	65·4
Average daily gain per hog	lbs.	1·04	1·09
Total meal consumed	"	960	950
Total milk consumed	"	1960	1960
Total Lictonic consumed	bricks.	5	.....
Lbs. of meal eaten per lb. gain	lbs.	2·20	2·07
Lbs. of milk eaten per lb. gain	"	4·49	4·06
Total cost of feed	$	21·45	19·21
Cost of feed per hog per day	cts.	5·10	4·5
Cost of feed per pound of gain	"	4·92	4·19

Results.—As with the test conducted during the summer in which Lictonic was supplied to the hogs, the lot receiving this preparation gave poorer results than the check lot. The gains were slightly lower, and the total amount of meal and milk consumed slightly greater while the addition of the Lictonic merely added to the cost of the ration without producing any beneficial results. In view of the fact that somewhat similar results were obtained from both these tests, the Lictonic merely adding to the cost of the ration without increasing the total gains or the economy of gain, it would be difficult to justify a place for it in the ration of hogs. Considerable labour was also required in the preparation of the bricks for feeding, since they had to be finely pulverized in order to get a uniform distribution throughout the meal ration, and this was a further objection.

Deductions.—1. Lictonic bricks when pulverized and added to the meal ration of feeding hogs did not appear to possess any appreciable medicinal or economic value.

2. The addition of Lictonic increased the cost of the ration while failing to show any increase in gains produced.

ALFALFA MEAL VS. ALFALFA HAY FOR BROOD SOWS

In order to compare alfalfa meal with uncut alfalfa hay for brood sows two lots of Yorkshire sows were selected and placed on test during the month of December, 1923. Lot 1 included eight sows and Lot 2 seven sows, but as several of the sows in each lot were rebred too late in the test to farrow within a reasonable time of the remaining sows it was decided for the purposes of uniformity to remove the late farrowing sows from the test. This left five sows in lot 1 and three sows in lot 2. The ration fed to the former lot included roots and a meal mixture composed of shorts, two parts, bran, two parts; oats, one part; alfalfa meal, one part; tank-

age, five per cent, and bone meal, two per cent. The ration for lot 1 was similar with the exception that the alfalfa meal was replaced by alfalfa hay and this was fed in racks. The meal ration cost $29.62 for lot 1 and $30.07 for lot 2, the roots $4, and alfalfa hay $10 per ton.

The sows were housed in cabins. Their meal and root ration was fed in troughs in the open. The hay fed to lot 2 was placed in a feeding rack. About a week before farrowing each sow was placed in a farrowing pen in the main piggery and remained there until the pigs were eight weeks of age.

ALFALFA MEAL VS ALFALFA HAY

—		Lot I (Meal)	LotII (Hay)
Number of sows in lot	No.	5	3
Average number of days on test	days	111·2	111
Total meal consumed—			
(a) Gestation period	lbs.	1,155	815
(b) Nursing period	"	3,088	2,016
Total roots consumed	"	1,547	942
Total hay consumed	"	.....	196
Cost of feed per sow	$	13.54	15.14
Total cost of feed per period	"	67.70	45.42

FARROWING RECORDS

Total number of pigs farrowed	No.	59	33
Average per litter	"	11·8	11
Total weight of pigs farrowed	lbs.	142·5	91
Average weight per pig	"	2·42	2·75
Total good pigs farrowed	No.	49	31
Percent of good pigs	%	83·03	93·9
Total weak pigs farrowed	No.	7	1
Per cent of weak pigs	%	11·86	3·03
Total dead pigs farrowed	No.	3	1
Per cent of dead pigs	%	5·09	3·03

RECORD AT FOUR WEEKS OF AGE

Number of pigs at 4 weeks	No.	42	31
Average per litter	No.	8·4	10·3
Total weight of pigs	lbs.	553	398
Average weight per pig	"	13·16	12·8

RECORD AT EIGHT WEEKS OF AGE

Number of pigs at 8 weeks	No.	38	26
Average per litter	No.	7·6	8·6
Total weight of pigs	lbs.	992	753
Average weight per pig	"	26·1	28·9

SUMMARY

—		Lot I	Lot II
Total number of pigs farrowed	No.	59	33
Total number raised to 8 weeks	"	38	26
Percent of pigs raised	%	64·4	78·7
Average initial weight of pigs	lbs.	2·42	2·75
Average weight at eight weeks	"	26·10	28·96
Average gain per pig	"	23·68	26·21
Total feed cost of litters	$	67.70	45.42
Average feed cost per pig at 8 weeks	$	1.78	1.75

Deductions.—The alfalfa meal-fed sows consumed less meal, averaging 7·5 pounds as compared to 8·5 pounds per sow per day, but due to the greater losses of pigs suffered by these sows, the feed cost of the pigs at eight weeks of age was ·03 of a cent higher.

The sows on alfalfa hay gave decidedly better results at farrowing, the percentage of good pigs farrowed being 93·9 per cent as compared to 83·03 per cent for the alfalfa meal lot, and also raised a greater percentage of the pigs, the figures at that time showing 78·7 per cent for the lot fed hay and 64·4 per cent for the lot fed alfalfa meal, or a difference in favour of the sows on hay of 15·3 per cent.

The fact that the individuality of the sow exercises a considerable influence in a test of this nature must not be overlooked and when only a few individuals are compared as was the case in this test the results may have been largely influenced by this single factor. For this reason among others it is not desirable to draw definite conclusions from a single test.

Cost of Bacon Production

The following tables indicate the cost of bacon production by the use of commercial feeds purchased at market prices and also by the use of such home-grown feeds as barley and oats which may readily be grown on the farm. The rations in which these feeds were used appear at the end of these tables. The following cost of production figures cover the period from service of the dam until the pigs are ready for market at 180 pounds in weight.

Cost of Raising Pigs to Ten Weeks of Age

1. Service of boar	$ 1 00	
		$ 1 00
2. *Feed cost of sow during gestation—*		
575 lbs. meal (shorts and bran, 4 parts; oats, 1 part) at $29.60 per ton.	8 15	
600 lbs. mangels at $4.00 per ton	1 20	
50 lbs. hay at $7.00 per ton	0 17	
		$ 9 52
3. *Feed cost of sow from farrowing to weaning—*		
444 lbs. meal (shorts, oats, middlings, equal parts) at $31.60 per ton..	7 03	
400 lbs. skim-milk at $4.00 per ton	0 80	
		$ 7 83
4. *Feed consumed by 7 pigs until 10 weeks of age—*		
84 lbs. of meal (middlings and oats, equal parts) at $32.75	1 37	
480 lbs. skim milk at $4.00	0 96	
		$ 2 33
Total cost		$20 68
Average cost per pig		2 95

The above feeds are all charged at commercial prices but by using home-grown oats of good quality the total cost of the pigs at ten weeks of age could be reduced to $18.85 or an average cost per pig of $2.69 a difference of 26 cents.

Feed Cost of Seven Pigs from Ten Weeks to Finish

(Averaging 38 pounds at start and 180 pounds at finish)

All commercial feeds—	
346 lbs. meal (10–14 weeks) at $32.97 per ton	$ 5 70
1,087 lbs. meal (14-20 weeks) at $31.36 per ton	17 04
1,560 lbs. meal (20-finishing) at $32.65 per ton	25 46
4,970 lbs. milk at 20 cts. per hundredweight	9 94
560 lbs. of green feed at $7.00 per ton	1 96
	$ 60 10
Total feed cost of 7 pigs, 10 weeks to finish	$ 60 10
Average feed cost per pig, 10 weeks to finish	8 58

By using home-grown oats and barley with the oats costing 34·5 cents per bushel and barley costing 41·5 cents per bushel (cost of production), these hogs would show a total cost of $48.78, or an average per hog of $6.97.

The total cost of rearing market hogs to market weight (180 pounds) on purchased feeds would be as follows:—

SUMMARY OF FEED COSTS

Average cost of rearing 7 pigs to 10 weeks	$ 2 95
Average cost from 10 weeks to finishing	8 58
	$ 11 53
Total feed cost of producing 180 lbs. pork	$ 11 53
Value of 180 pounds of pork at 8 cts. per lb	$ 14 40
Return per pig	$ 2 87

On the basis of home-grown barley and oats the cost of producing 180 pounds of pork would average as follows:—

SUMMARY OF FEED COSTS

Average cost of 7 pigs at 10 weeks of age	$ 2 69
Average cost from 10 weeks to finishing (180 lbs.)	6 97
	$ 9 66
Value of 180 pounds of pork at 8 cts. per lb	$ 14 40
Total feed cost of producing 180 lbs. pork	9 66
Return per pig	$ 4 74

These latter figures serve to indicate the saving which can be effected by the judicious use of home-grown feeds in the hog's ration. The hogs which were fed on feeds purchased at market prices showed a return over and above feed costs of $2.87 while those which were fed home-grown barley and oats instead of purchased feeds showed a return per pig of $4.74 or $1.87 more per hog.

The meal combinations after the ten weeks' period are, herewith, submitted.

From ten to fourteen weeks.—Ground oats, 2 parts; middlings, 2 parts; ground barley, 1 part; bran, 1 part; linseed oil meal, 3 per cent; tankage, 5 per cent.

From fourteen to twenty weeks.—Ground oats, 1 part; ground barley, 1 part; bran, 1 part; shorts, 1 part; linseed oil meal, 3 per cent; tankage, 5 per cent.

From twenty weeks to finishing (180 pounds).—Barley, 2 parts; oats, 2 parts; shorts, 1 part; oil meal, 3 per cent; tankage, 5 per cent.

In addition to the meal ration skim-milk and green feed were fed as noted in the above tables.

COMPARISON OF YORKSHIRE AND BERKSHIRE FARROWING AND WEANING RECORDS, 1923 AND 1924

Breed	Total number of sows	Total number of pigs in litters	Average number of pigs per litter	Total number of good pigs at birth	Per cent of good pigs	Total number of small and weak pigs at birth	Per cent of small and weak pigs	Total number of dead pigs at birth	Per cent of dead pigs	Total number of living pigs at eight weeks	Total losses during the first eight weeks	Per cent of losses to 8 weeks	Average number of pigs per litter at eight weeks	Per cent of pigs raised to eight weeks	Number fit for breeding purposes	Per cent fit for breeding purposes	Number fit only for feeding purposes	Per cent fit only for feeders
Yorkshire	33	365	11·06	299	81·9	59	16·16	7	1·92	205	160	43·8	6·21	56·16	143	70	62	30
Berkshire	18	138	7·66	116	84·05	12	8·7	10	7·25	104	34	24·6	5·7	75·4	65	62·5	39	37·5
1922-23																		
Yorkshire	30	327	10·9	276	84·4	39	11·9	12	3·6	205	122	37·3	6·83	62·6	153	75	52	25
Berkshire	15	128	8·53	115	89·8	12	9·4	1	0·8	90	32	25	6·4	75·0	63	65·5	33	34·5

DATA FROM RECORDS OF YORKSHIRE AND BERKSHIRE HERDS

During the spring of 1923, the losses of young pigs were somewhat heavier than usual, particularly in the earlier-farrowed Yorkshire litters. These losses were very difficult definitely to account for and were general throughout this part of the province. Many of the pigs died when several weeks of age. Post mortem examinations of these pigs failed to determine definitely any specific disease but the general symptoms indicated pneumonia.

A comparison of the Yorkshire litters farrowed in 1923 with those farrowed in 1922 showed a total of 365 pigs or an increase of 38 pigs, a slight increase in number of pigs per litter, a decrease of 2.5 per cent of good pigs, a decrease of 1.68 per cent of dead pigs and an increase of 4.26 per cent small and weak pigs.

Because of the heavy losses suffered by the early litters, the per cent of pigs raised to eight weeks of age was 6.4 per cent lower than in the previous year. The total number of pigs raised, however, was 205, the same as for the previous year.

There were also more Berkshire pigs farrowed, a total of 138 as compared to 128, but the number of pigs per litter averaged .87 pigs less than in the previous year.

The number of good pigs was 5.75 per cent lower, dead pigs 6.45 per cent higher and the small and weak pigs .7 per cent lower while the number of pigs raised to eight weeks was 75.4 per cent, or .4 per cent higher than during the previous year.

A summary of the Yorkshire and the Berkshire farrowing records for the last three years showed a higher percentage of good pigs, a lower percentage of small and weak pigs and with the exception of the last year a lower mortality at birth for the Berkshire herd as well as a considerably greater percentage of pigs raised to eight weeks of age.

OIL OF CHENEPODIUM FOR INTERNAL PARASITIC INFESTATIONS

For the purpose of determining methods of controlling internal parasites in hogs, several Yorkshire brood sows were selected, part of this number being treated with oil of chenepodium and the remainder used as checks on those treated. This oil is recommended for the eradication of worms in hogs because of its penetrating character and destructive properties with regard to parasitic infestations in the intestines and lungs.

The greatest measure of success is possible by the treatment of the brood sow before farrowing and also the young pigs after farrowing.

The sow receives the first treatment about three weeks before farrowing and the second treatment about three days before farrowing. For an adult sow the dose is one half ounce, or a tablespoonful, mixed with the feed. Because of the strong and somewhat objectionable odour and taste, the sow should be starved before administering the oil so that it will be consumed readily.

The young pigs are treated when five weeks of age or as soon after as they are eating freely from the trough, and again six weeks later. The pigs must also be starved in order to ensure that they consume this material. The dose for young pigs is one-half teaspoonful per pig.

There has not been any indication of worms in the sows or the pigs, whether treated or not, so no deductions can be drawn to date. The young pigs from the treated litters will be kept under observation and a further record of the developments will be submitted in a subsequent report.

Stanolax Medium

This is a mineral oil manufactured by Imperial Oil, Limited, and is a liquid petrolatum product. It is recommended as an intestinal lubricant which mechanically facilitates the movement of the bowels and also assists in the removal of intestinal parasites. The severe purging which results from the use of some of the vegetable oils and salines, when used in excess, does not result when Stanolax Medium is used as a laxative.

This oil was given to one lot of Yorkshires and one of Berkshires as well as to other pigs on different occasions. The results obtained in all cases were quite satisfactory, the pigs consuming the oil readily without the necessity of preparatory starving. The oil was mixed with the feed on all occasions.

The dosage as administered here consisted of three ounces per hog per day for three consecutive days, repeated after five or six days. The action of the oil on the hogs was purely mechanical, there being no external evidence in the intestinal secretions such as would be the case with the administering of salines, the oil merely facilitating the regular movements of the bowels and aiding in the expulsion of the fæces.

EXPERIMENTS IN HYBRIDIZING

The following paragraphs briefly review experimental work in hybridizing and cattalo breeding at the Buffalo Park, Wainwright, Alberta.

THE ORIGINAL HYBRIDS AND THEIR PROGENY

In 1915 the Experimental Farms Branch made a selection from the herd of the late Mossom Boyd of Bobcaygeon. This famous herd was made up of hybrids (bison-domestic), individuals of both sexes containing varying percentages of the blood of the domestic and bison, and of true cattalo, a term generally accepted in America as referring to the progeny of two hybrids. In the original hybridizing work in the Boyd herd, the domestic parent stock was Shorthorn, Hereford and Angus of both pure bred and grade extraction, and a brief description of the selection made is as follows:—

Four first cross hybrid cows (50 per cent buffalo) proven breeders.
Four second cross hybrid cows (75 per cent buffalo) proven breeders.
One second cross hybrid cow (25 per cent buffalo).
Seven cattalo cows and heifers (25 to 50 per cent buffalo).
Three hybrid bulls (31 to 75 per cent buffalo) one proven sire, one possibly fertile.

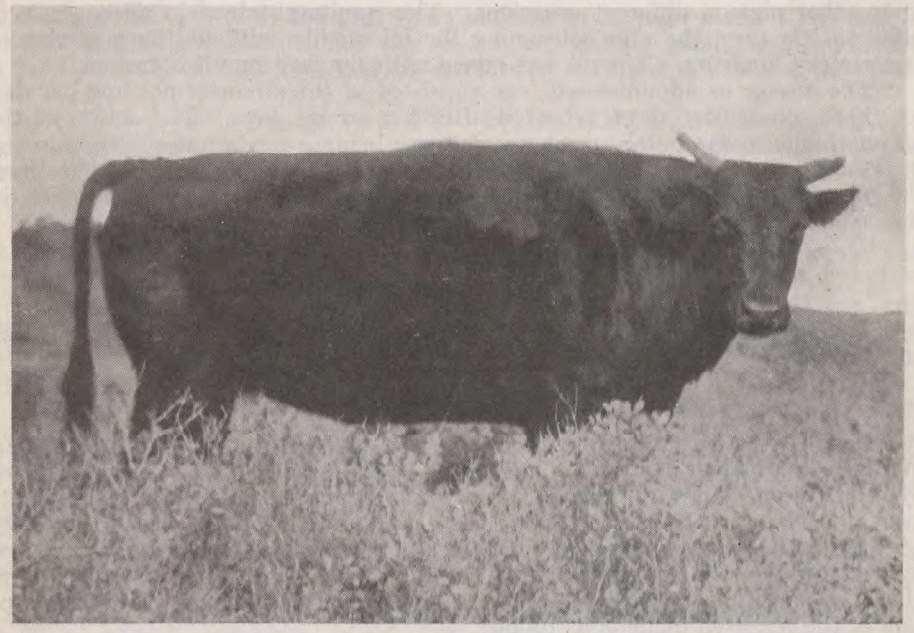
DESIRABLE FEATURES OF THE HYBRID BISON AND CATTALO

1. Improvement in fleshing qualities, distribution of meat and dressing percentage of the bison.
2. Improvement in the ruggedness and rustling qualities of the domestic breeds of cattle.
3. Improving the hide of the domestic in quality, durability, thickness and length of hair and general heat retaining or cold resisting qualities.

DIFFICULTIES IN THE WAY

Previous hybridization investigations in the Boyd herd and elsewhere in America have been hampered naturally by the provisions of nature for the segregation of her species. The problem of utilizing bison blood in the formation of hardier animals of the domestic type and containing fairly heavy percentages of the blood of domestic stock, is by no means simple of solution for the following main reasons:—

1. The first cross (bison male-domestic female) shows a remarkably high percentage of dead calves due more to the presence of excessive quantities of the amniotic fluid (hydramnios), than, as popularly supposed, to the heavier shoulder development of the foetus sired by the bison. Not only do the hybrid calves die in large numbers, but in many cases the dams as well. This heavy mortality, although largely confined to the first cross and experienced to a much lesser extent later on, has been responsible for the discontinuance of further effort on the part of many investigators.



True Cattalo—"Crugerite."

2. As would be expected, sterility is one of the greatest difficulties met with in the first cross. First cross males are few; in practically all cases they are either aborted or still-born, and in very many cases the dam succumbs as well; nearly all of the few males on record have proven sterile.

On the other hand, the first cross females quite commonly are fertile, and normal from the standpoint of reproduction, and very frequently capable of conception to males of either pure blood bison or domestic extraction.

THE PURPOSE OF THE EXPERIMENT

Starting with the herd of hybrids and their progeny, as already briefly described, and made up of fourteen proven breeding females and two apparently proven bulls, the plan of breeding had the following objectives in view:—

1. To produce fertile, prepotent cattalo males (the result of mating hybrids) such as might be used in the building up or improvement of herds in the great northern sections of the prairie provinces.

2. To fix, if possible, the type and fertility of the cattalo, obtaining a good beef carcass and retaining the rustling qualities and hardiness of the bison, together with the desirable hide producing qualities of the latter.

It will readily be seen that the anticipated purpose of this breed was not to replace or cross with domestic breeds under conditions where the latter thrive satisfactorily and produce with economy and profit.

To the foregoing objectives might be added a third—i.e., to establish a young breeding herd of bison and cattle by rearing both side by side from calfhood onward and thus facilitating later consort and the production of hybrids for further study.

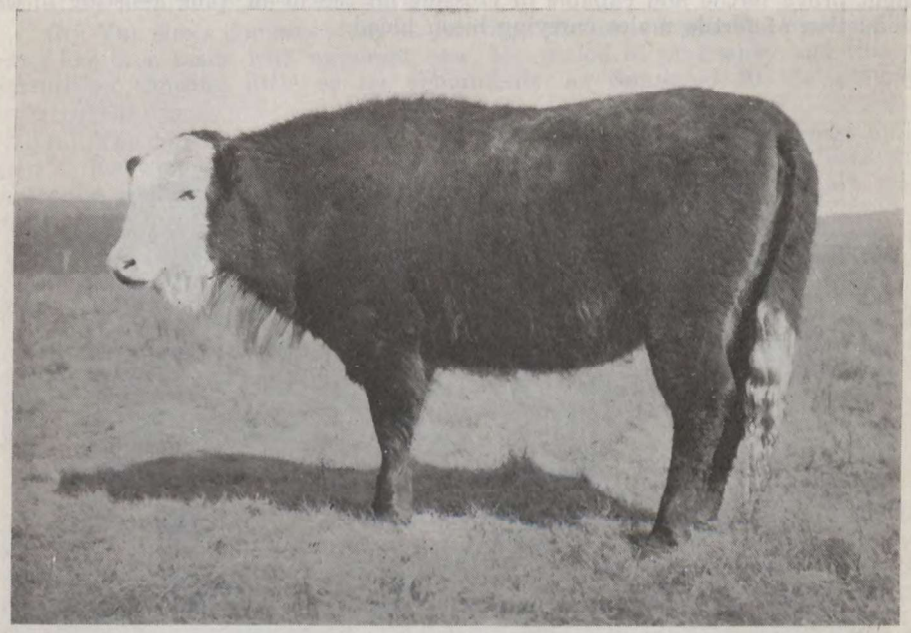
SUMMARY OF EXPERIMENT TO DATE

The first matings were as follows:—

1. Hybrid bison and cattalo cows with bison sires.

2. Hybrid bison and cattalo cows with domestic sires (Angus and Hereford bulls were used).

3. Domestic cows with hybrid bison sire (high grade Angus, Shorthorn and Hereford cows were used). Although examination of the hybrid sires at time of purchase indicated the presence of active spermatozoa in one or possibly two individuals, subsequent trial proved them to be infertile.



Buffalo—Domestic heifer calf (1923)

From these matings little progress has been made to date for the following reasons:—

1. Infertility of males.

2. The combined effects of (*a*) increasing age of females; (*b*) their continued open or non-pregnant state; (*c*) genital abnormalities arising from the foregoing; (*d*) the constant high condition of the females, owing to abundant grazing conditions.

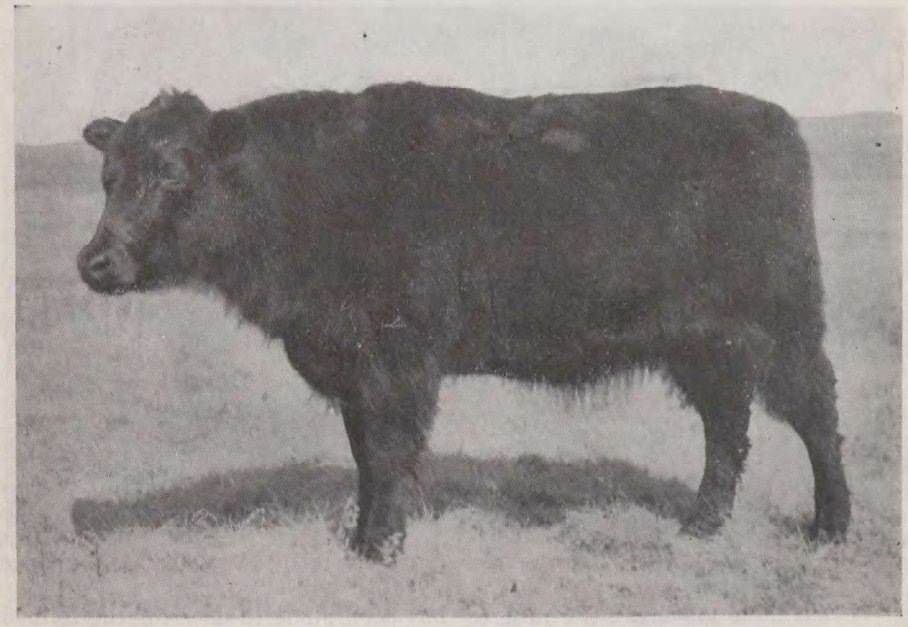
Every effort has been put forth toward the increase of this herd, all combinations of sires have been used, females have been subject to regular examination and treatment by veterinarians expert in the treatment of abnormal genital conditions. In spite of these efforts, no increase has been obtained from the original herd.

BUILDING UP A NEW HERD OF HYBRIDS

While still maintaining efforts toward increasing the original herd, but realizing probable failure, it was decided to arrange for the building up of a young hybrid herd. Male and female bison calves have been secured from the main bison herd from time to time and these reared by domestic cows along with domestic calves. Thus reared, bison and domestic calves were found later to consort readily and early difficulties in mating have been largely obviated.

THE POSSIBILITIES OF THE YAK

At this juncture it was decided to investigate the hybridizing possibilities of the Yak (*Polphagus Grunniens*). With Central Asia as the original habitat this animal appears as the link between the bison and the domestic race of cattle. The Yak may be crossed safely and readily with domestic cattle, such practice being followed in Asia, and it was hoped that the Yak-bison cross might be made with no great difficulty, further that the Yak-domestic hybrid might prove fertile and capable of crossing on the bison, thus assisting in the production of fertile males carrying bison blood.



Yak—Domestic heifer calf (1923)

Incidentally, the Yak, in size, is comparable to the Aberdeen Angus, and is distinguished by very long, fine, tapering horns; long, fine hair; a mane of long hair running along the flank from the elbow to the hind quarters, and lastly, by the peculiar tail, shorter but otherwise not unlike that of the horse. In colour, the Yak is black as a rule, but occasionally white or brown. They are splendid range animals; capable of withstanding the effects of long, rigorous winters in the open, and at the same time are domesticated or, at least, semi-domestic, and apparently resistant to common diseases. The meat, aside from being finer grained, is almost identical to beef.

DOMESTIC, BISON, YAK MATINGS

The following matings were possible at this time:—

1. Bison sire x domestic dam.
2. Yak sire x domestic dam.
3. Domestic sire x Yak dam.
4. Yak sire x Bison dam.

It will of course be noted that other combinations are possible, but not as yet included, as for example—

5. Bison sire x Yak dam.
6. Domestic sire x Bison dam.

RESULTS AT CONCLUSION OF 1923 BREEDING SEASON

(*a*) Bison sire x domestic dam—2 yearling females (a violent cross accompanied by abnormalities described.)

(*b*) Yak sire x domestic dam—5 yearling females:—1 yearling male. (This cross has been made with apparent ease, the period of pregnancy and time of parturition showing little or no abnormality as compared to the previous cross (*a*)).

(*c*) Yak sire x bison dam—1 yearling female. (Probably the first of its kind.) Knowing that this cross was not accompanied by abnormalities, the indication would support the theory that the Yak holds an intermediary relationship between the bison and the domestic.

From present indications it is hoped that a number of hybrid calves may be produced during the summer of 1924; at that time, too, some of the hybrid two-year-olds will be ready for further crossing.

Finally, it would seem that excellent progress has been made toward the laying of a foundation for the really difficult work to come, the results of which will be reported from time to time.

VENTILATION

Two years ago, a number of ventilation tests were carried out in order to determine the efficiency with which the ventilation systems in a number of the buildings—the main cow barn, the calf barn and the horse barn—were operating, and also to find out the most efficient way of operation relative to the external weather conditions. The objective was to maintain the inside temperature uniformly between 50 and 55 degrees Fahrenheit and the humidity at a comfortable point, or about 75 per cent. It was found that these could be regulated by a careful adjustment of the inlets and outlets, the last named playing the most important part in regulating the temperature.

During the past winter another experiment was conducted in the experimental cow barn, with the idea of testing different systems of ventilation. The system as installed in this barn is the Rutherford. In order to conduct these comparisons, the King system was also installed, making it possible to change from one to the other and also to use a combination of both, in all making it possible to compare four different systems, modifications, or combinations in the one barn. These were as follows: (*a*) the Rutherford system with fresh air inlets at the floor and the foul air outlets at ceiling; (*b*) the King system with inlets at the ceiling and outlets carried down to one foot above floor level, while two other systems were tried by combining features of both (*a*) and (*b*). This was arranged, first, by opening both inlets and outlets at the ceiling (King system inlets and Rutherford system outlets) and, secondly, by opening both inlets and outlets at floor level (Rutherford inlets and King outlets).

The stable in which this experiment was conducted is 56 feet by 41 feet by 10 feet, giving a capacity of 22,960 cubic feet and stabling accommodation for 24 head of cattle, thus giving an average air space per head of approximately 956 cubic feet. As already stated, the ventilation system originally installed in this barn was the Rutherford, the King system being effectively improvised by carrying the inlets up to the ceiling and the outlets to the floor level by the use of movable wooden boxes or shafts, these being so arranged that it was

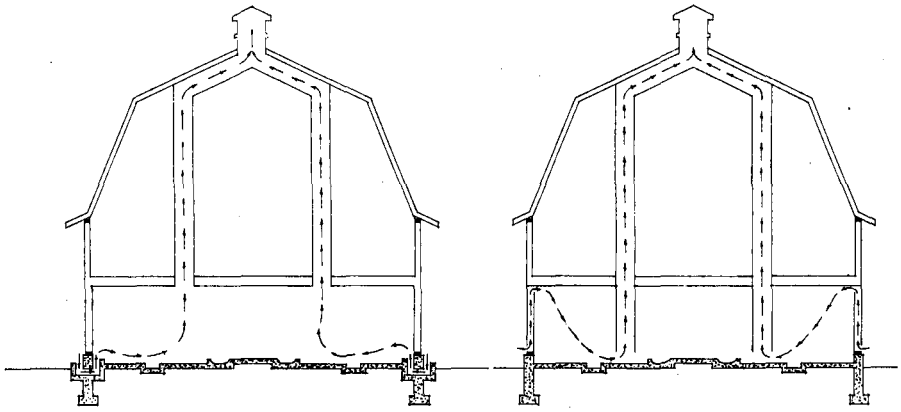


FIG. 1
RUTHERFORD SYSTEM

FIG. 2
KING SYSTEM

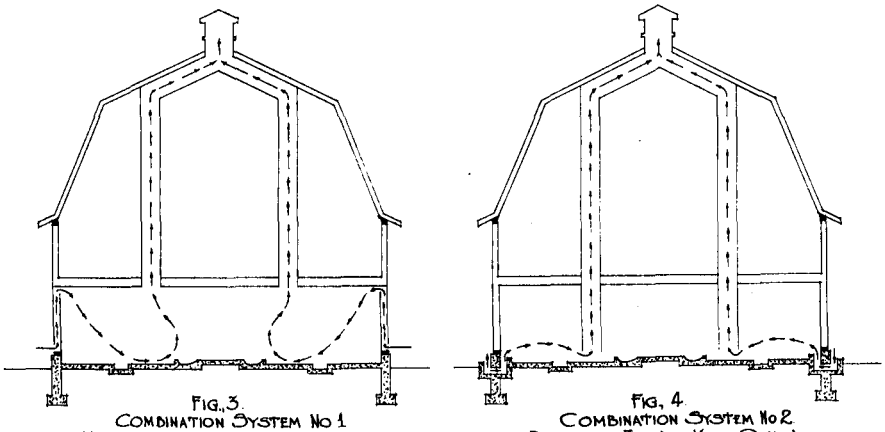


FIG. 3.
COMBINATION SYSTEM NO 1
KING INLETS—RUTHERFORD OUTLETS

FIG. 4.
COMBINATION SYSTEM NO 2.
RUTHERFORD INLETS—KING OUTLETS.

possible to use either system by the adjustment of the dampers. There are in all 9 inlets as originally installed, with glazed tile 6 inches in diameter, thus giving a maximum inlet capacity of about 10 square inches per animal. There are two outlets 18 inches by 18 inches, making an outlet capacity of 27 square inches per animal. These air intakes and outlets may be controlled by means of dampers, which may be wholly or partly opened or closed at any time according to the temperature, wind direction, etc.

The test in question was started in November, 1923. The recording instruments used were ordinary thermometers placed at about six inches from the floor, and two hygrometers or wet and dry bulb thermometers, in order to record the humidity as well as the temperature. These hygrometers were placed one

at about midway from the floor and the other at the ceiling, all instruments being placed near the centre of the stable and at different levels in order to determine the differences in temperature and humidity and to ascertain comparative results with the different systems of ventilation.

When started, the plan was to continue this test throughout the winter. However, it was found impossible to secure any reliable or useful data after the severe weather commencing early in January, after which all of the inlets had to be closed and the outlets also partly closed during the greater part of the time. This condition was due to the stable having too great an air capacity for the number of cattle accommodated and which acted as heating units. The air space per animal, almost 1,000 cubic feet, was found to be excessive, the animals failing to generate sufficient heat in extreme weather to maintain the stable at a comfortable temperature with fresh air inlets open. Even when the outlets could be left open or partly open, the animals did not generate enough heat to stimulate a free circulation of the air in the stable.

The work started on November 22nd with the Rutherford system in operation and on each successive morning it was changed to an alternate system, either the King system, the Rutherford, or a combination of these two.

Readings of the thermometers were taken every three hours during the day and night. Three hours were allowed for the change in the morning before the next reading was made. It was found impossible with any system to keep the humidity down to the point desired, this probably due to the fact that the weather was not cold enough outside to stimulate a free movement of the air inside the stable and its replacement by outside air.

Had it been possible to conduct this test during January and February, when the difference between the inside and outside temperature is likely to promote free circulation of air in the stable, there very probably might have been an inside humidity of around 75 per cent, or even 70 per cent as was registered the previous year in the main cow barn where the cubic air space per head is apparently close to the optimum, that is, 770 cubic feet per animal instead of 1,000 cubic feet as was the case in the building under discussion.

The results obtained in temperature and humidity are recorded further in different tables, these being average results obtained for a period of about ten to twelve days under each system.

RUTHERFORD SYSTEM

No. days	Outside Temp.	—	Inside Temperature					Remarks
			Ceiling		Midway		Floor	
			Temp. Fahr.	Hum. %	Temp. Fahr.	Hum. %	Temp. Fahr.	
11	29°	Average	58·8°	81	58·7°	80·4	53°	General conditions, fair.
	43°	Maximum	64°	90	64·5°	90	59°	No condensation of moisture on ceiling except once during a rainy day.
	−5°	Minimum	48°	73	48°	73	44°	Ventilation system kept open at all times except on one cold day when it had to be partly closed.

Following is a table giving the results when the King system was in operation:—

KING SYSTEM

No. days	Outside Temp.	—	Inside Temperature					Remarks
			Ceiling		Midway		Floor	
			Temp. Fahr.	Hum. %	Tem. Fahr.	Hum. %	Temp. Fahr.	
11	22°	Average	58·9°	82·9	58·9°	82·8	54·2°	Conditions fair.
	43°	Maximum	66°	92·0	66°	91	62°	Ventilation system kept fully open at all times.
	3°	Minimum	49°	75·0	49°	75	44°	

In the following system, fresh air entered through the intakes in the walls about the ceiling level and foul air escaped from the outlets in the centre of the stable at ceiling level also.

COMBINATION SYSTEM NO. 1—RUTHERFORD SYSTEM OUTLETS AND KING SYSTEM INLETS

No. days	Outside Temp.	—	Inside Temperature					Remarks
			Ceiling		Midway		Floor	
			Temp. Fahr.	Hum. %	Temp. Fahr.	Hum. %	Temp. Fahr.	
10	29°	Average	60·2°	82·4	59·9°	82·3	55·2°	Conditions, fair.
	48°	Maximum	66°	90·0	66°	90	62°	Inlets and outlets kept open at all times.
	6°	Minimum	50°	74·0	51°	74	44°	

In this following table the results of a combination where both fresh and foul air entered and escaped from the floor level is shown.

COMBINATION SYSTEM NO. 2—KING SYSTEM OUTLETS AND RUTHERFORD SYSTEM INLETS

No. days	Outside Temp.	—	Inside Temperature					Remarks
			Ceiling		Midway		Floor	
			Temp. Fahr.	Hum. %	Temp. Fahr.	Hum. %	Temp. Fahr.	
10	26°	Average	58·9°	85·2	58·5°	83·3	54·3°	Fair conditions at times, but bad most of the time.
	39°	Maximum	65°	92·0	64·5°	91·0	61°	Water dripping from ceiling occasionally.
	−13°	Minimum	50°	78·0	50°	78·0	45°	

With this system, unsatisfactory results were obtained. No air movement was observed through the stable as was the case with the first mentioned three systems (Rutherford, King, Combination No. 1).

As can be seen from the above results, it was not possible to secure a dry atmosphere or at least not as dry as might have been desirable since the aim was to keep the stable at a temperature of 50 degrees to 60 degrees F., and at a humidity of about 75 per cent.

The Rutherford system gave the best results from the standpoint of humidity, which was about 1 per cent lower than with any of the other systems; but there was very little difference in this respect between the first three systems. With the fourth system, using King system outlets and Rutherford system inlets, moisture collected on the ceiling in a few spots and the average moisture was 85 per cent, with a maximum of 92 per cent on one occasion.

In order to secure as much data as possible from the combination system with the fresh air coming in at the ceiling and the foul air escaping at the same level, this system was used during January and February whenever possible, that is, on the milder days when the inlets and outlets could be kept open.

One reason for the accumulation of information on this particular system was that this arrangement of ventilator shafts is being installed in the country in some new farm buildings, and it was desired to have a more definite idea of the comparative merits between this and the two well-known "King" and "Rutherford" systems.

During the remainder of the winter it was possible to secure further data on this system on twelve different days and the following table gives the average of the readings made eight times per day during that time.

COMBINATION KING AND RUTHERFORD SYSTEM—INLETS AND OUTLETS AT CEILING

No. days	Outside Temp.	—	Inside Temperature					Remarks
			Ceiling		Midway		Floor	
			Temp. Fahr.	Hum. %	Temp. Fahr.	Hum. %	Temp. Fahr.	
12	.....	Average	52·4°	81·6	51·1°	82·2	46°	General condition was good.
	15·5	Maximum	60°	87·0	58°	88·0	51°	Inlets and outlets being all
		Minimum	42°	75·0	42°	75·0	38°	open during days reported

It is apparent from the preceding table that this combination system compares very well with the Rutherford or King systems. As previously stated, because of the necessity of closing the ventilation flues during cold weather, it was not possible to secure enough information to establish by a complete test the particular advantages of one system over the other, but enough information was secured to indicate that in this present test as good results were obtained with this combination as with the straight Rutherford system.

Deductions.—The necessity of a suitable ventilation system in a dairy barn capable of supplying fresh air and facilitating the removal of foul air has been established long ago.

From previous work on ventilation it was found that in a well-constructed dairy barn, properly insulated and proportioned to accommodate a given number of cattle, it was possible to secure good ventilation, and maintain a uniform temperature and a comfortable degree of humidity with the Rutherford system, when properly operated.

In this last year's test it was found very difficult, if not almost impossible, properly to ventilate a stable with an air space in excess of that actually required. The body heat of the animals under these circumstances was not sufficient to warm the air in the stable to a sufficiently high temperature to

insure a regular circulation, and condensation of moisture on the ceiling was the result. An air space of 700 to 800 cubic feet per mature animal has proven to be about the optimum amount to insure a good ventilation, but 1,000 cubic feet per animal, as was the case in the stable where the test in question was conducted, is excessive. In such a stable during cold weather all the intakes and outlets must be closed most of the time in order to keep the temperature at or near a comfortable point.

According to the findings there was very little difference in the general conditions of the interior of the stable when any of the first three systems were used, the Rutherford, the King or the combination of the Rutherford system outlets and King system inlets.

The combination of King system outlets and Rutherford system inlets, that is, with the foul air escaping from the floor level and the fresh air coming in at the same level did not prove satisfactory, the average moisture being a little over 85 per cent. With this system there did not seem to be any circulation of the air inside the stable.

With any one of these systems in operation there was always a difference in temperature between the floor level (12 inches above floor) and the ceiling, the temperature at the ceiling being always from 4 to 5 degrees higher than that at the floor. This condition did not seem to vary to any extent with the different systems in operation. It was further observed that the temperature at medium height was about the same as the temperature at the ceiling.

MISCELLANEOUS

During the year increasing calls have been made upon members of the Animal Husbandry Division staff in connection with work and assistance at various live stock shows; judging, lecturing, demonstrating, etc.

The regular trips of inspection over the Branch Farms System have been made by the Dominion Animal Husbandman.

As in the past, assistance has been offered prospective builders or those contemplating remodeling farm buildings,—through the distribution of stock plans in the form of blue prints and of special plans where required.

ANIMAL HUSBANDRY EXPERIMENTAL PROJECTS

BEEF CATTLE

A. 508. Economy of marketing steers locally vs. as export steers.

DAIRY CATTLE

A. 501. Breeding Ayrshire cattle.
A. 502. Breeding Holstein cattle.
A. 503. Breeding Jersey cattle.
A. 505. Breeding French-Canadian cattle.
A. 7. Corn ensilage vs. mangels for milch cows.
A. 18. Winter feeding of milch cows.
A. 19. Summer feeding of milch cows.
A. 54. Ventilation systems for dairy barns.
A. 55. Comparison of dairy breeds in milk and butter fat production.
A. 56. Cost of milk production.
A. 57. Record of merit (Holstein).
A. 58. Record of Performance (Holstein).
A. 58. Record of Performance (Ayrshire).
A. 58. Record of Performance (Jersey).
A. 59. Cost of rearing dairy-bred calves and heifers.
A. 86. Testing of milking machines.
A. 93. Control of tuberculosis and management of Bang herd.
A. 205. Supplying dairy sires at reasonable prices.
A. 207. Exhibition work with dairy cattle.
A. 452. Corn ensilage vs. O.P.V. ensilage for milch cows.
A. 498. Comparison of calf meal mixtures.
A. 506. Comparison of alfalfa meal vs. bran for milch cows.
A. 507. Corn silage vs. sweet clover silage for milch cows.

DAIRY

A. 81. Manufacture of Cream cheese.
A. 83. Manufacture of Meilleur cheese.
A. 84. Manufacture of Cheddar cheese.
A. 100. Manufacture of butter.
A. 469. Manufacture of buttermilk cheese.

HORSES

A. 509. Breeding Clydesdale horses.
A. 282. Feeding brood mares.
A. 283. Feeding work horses.
A. 331. Cost of maintaining work horses.
A. 340. Treatment of joint ill in foals.
A. 335. Exhibition work with horses.

SHEEP

A. 510. Breeding Leicester sheep.
A. 511. Breeding Shropshire sheep.
A. 312. Comparison of pure-bred vs. cross-bred sheep and lambs.
A. 324. Co-operative selling of wool.
A. 512. Lambing results from pure-bred vs. cross-bred ewes.

SWINE

A. 513. Breeding Yorkshire swine.
A. 514. Breeding Berkshire swine.
A. 120. Self-feeding vs. trough-feeding of swine.
A. 116. Comparison of protein feeds for rearing of swine.
A. 131. Value of water for hogs in winter.
A. 154. Control of intestinal and lung worms in hogs.
A. 156. Comparing breeds of swine and crosses in feeding characteristics.

SWINE—*Concluded*

A. 158. Cost of feeding brood sows.
A. 160. Cost of rearing pigs to time of weaning.
A. 163. Cost of pork production.
A. 168. Skim-milk vs. tankage for hogs.
A. 445. Comparison of ground oats vs. ground hulless oats for hogs.
A. 446. Comparison of Pro-lac meal vs. skim-milk for hogs.
A. 451. Comparison of breeds and crosses in breeding characteristics.
A. 470. Value of Lictonic for hogs.
A. 471. Alfalfa meal vs. sweet clover meal for hogs.
A. 472. Value of milk powder vs. skim-milk for hogs.
A. 473. Alfalfa meal vs. alfalfa hay for brood sows.
A. 515. Value of alfalfa hay for market hogs.
A. 516. Comparison of sows vs. barrows as market hogs.
A. 523. Supplying breeding stock at reasonable prices.

EXPERIMENTS IN HYBRIDIZING

A. 517. Breeding cattalo.
A. 581. Study of causes of sterility in hybrid, second-cross and catallo cows.
A. 582. Establishing a herd of hybrids of Bison, Domestic cattle, and Yak extraction.
A. 583. The Bison-Domestic cross.
A. 584. The Yak-Domestic cross.
A. 585. The Domestic-Yak cross.
A. 586. The Yak-Bison cross.