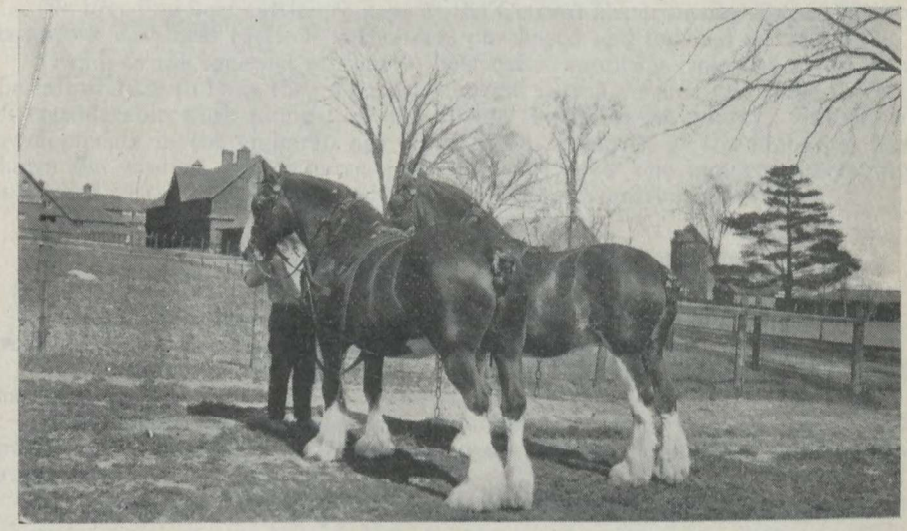
DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
DOMINION EXPERIMENTAL FARMS

ANIMAL HUSBANDRY DIVISION

REPORT OF THE DOMINION ANIMAL HUSBANDMAN

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

FOR THE YEAR 1922



POWER

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1924

THE ANIMAL HUSBANDRY DIVISION

In presenting the report of the Animal Husbandry Division for the year ending March 31, 1923, credit is due to the following members of the staff for good work during the year and for assistance in the preparation of this report: Mr. G. W. Muir, Animal Husbandman; Mr. W. G. Dunsmore, Assistant Animal Husbandman; Mr. Robert Cunningham, Assistant Animal Husbandman; Mr. S. J. Chagnon, Assistant Animal Husbandman; Mr. Joseph Meilleur, Dairyman; and to Messrs. F. W. Reid, J. Nevins, A. McKendrick, and other members of the outside staff. To the first two mentioned members, particular credit is due for the preparation of a large part of this report.

Satisfactory progress has been made with practically all lines of live stock work, with the possible exception of horse breeding, as further reported. Aside from the regular divisional work, agricultural survey work has been carried on in the province of Quebec, by Mr. S. J. Chagnon, this being a continuation of survey work already made in previous years.

BEEF CATTLE

No breeding beef cattle are kept at the Central Experimental Farm, Ottawa. Any work with beef cattle is with steers purchased and finished for market.

Owing to the renewed interest in beef cattle resulting from the agitation in the fall of 1922 to have the embargo removed, it was deemed advisable to carry on considerable work along this line during the following winter. Subsequent developments in the embargo negotiations, i.e., removal of the embargo, have shown the wisdom of this move. Consequently, over one hundred steers were purchased in the fall of 1922 and used for feeding work as follows:—

STEER FEEDING EXPERIMENTS

Objects.—To determine the possibilities of profit in wintering steers on a growth and maintenance ration only, then finishing on grass.

To compare the winter finishing of steers with grass finishing from a profit-making standpoint.

To compare yearlings and two-year-olds as to relative gains and profits, first, in feed lots on growth and maintenance ration; secondly, in finishing on grass.

To compare corn and sunflower silage for steer feeding purposes.

Plan.—One hundred and twenty-six steers were purchased locally in October, 1922, at a net cost of $5,870, plus $130 expenses. They were run on the Rifle Range pasture for a period of 40 days, ending November 27, 1922. They were then brought in and run into the outdoor feeding yards. They were then tuberculin tested, two only reacting. These were subsequently slaughtered, found only slightly infected, and the carcasses sold for $71.

As there was insufficient room for the 124 remaining, 20 were sold for feeding purposes to a third party at 5¼ cents. They weighed 19,505 pounds, bringing in $1,024.01.

The remaining 104 steers were divided into four pens on December 18 and were then weighed.

Pen 1, consisting of 22 two-year-olds, was fed a ration of corn silage, sunflower silage, range hay and meal, starting the latter January 2 at one pound per steer per day, and giving an additional pound each week until at the end of ten weeks, ten pounds per day was being fed. Later, in an effort to hasten the finish on these animals, twelve pounds per day was fed for a period of three weeks, but it was found that this was more than they would stand, so they were reduced to ten pounds per day again till the end of the feeding period. This lot was being finished for spring sale and present plans are that it will constitute a part of an experimental shipment to the Old Country in May. This of necessity will have to be reported on further in the next annual report.

Pen 2, consisting of 26 two-year-old steers, was fed a ration of corn silage to February 2 and then received sunflower silage for a period of 62 days, then went back on corn silage again. In addition, they received all the rough range hay they would eat.

Pen 3, consisting of 26 two-year-old steers, was fed similarly to pen 2, except that they received corn silage throughout the whole of the experiment. Thus, pens 2 and 3 constituted a comparison of corn and sunflower silage for maintenance feeding of beef cattle.

Pen 4, consisting of 29 yearlings, was fed similarly to pen 2. These yearling steers were especially secured to obtain further figures with regard to relative profit when wintered over and finished on grass, of two-year-old and year-old steers.

The only data in connection with the foregoing experiments which it is possible to present in this report is that on the relative value of sunflower and corn silage. As previously stated, pens 2 and 3 were used for this experiment. Both pens received corn silage and range hay from December 18, 1922, to February 2, 1923. Then pen 2 was changed to sunflower silage and pen 3 continued on corn silage. This was continued for 62 days and then both pens were fed corn silage again until turned to grass. The data for the experiment is to be found in the table following:—

SUNFLOWER SILAGE VS. CORN SILAGE

Item		Lot 2 Sunflower Silage	Lot 3 Corn Silage
Number of steers	No.	26	26
First weight—gross, Feb. 2, 1923	lb.	25,850·0	24,960·0
First weight—average, Feb. 2, 1923	"	994·2	960·0
Finished weight—gross, April 5, 1923	"	25,220·0	25,310·0
Finished weight—average, April 5, 1923	"	970·0	973·5
Total gain or loss in 62 days	"	(loss) 630·0	350·0
Total gain or loss per steer	"	(loss) 24·2	13·5
Total hay consumed per lot	"	25,739·0	32,364·0
Total sunflower silage consumed per lot	"	43,524.0	
Total corn silage consumed per lot	"	.....	49,600·0
Total cost of hay at $10 per ton	$	128·69	161·82
Total cost of silage at $1.80 and $2.95 per ton	$	39·17	73·16
Total cost of feed		$167·86	$234·98

It will be seen from table I that lot 2 on sunflower silage lost weight at the rate of 24·2 pounds per steer during the period of sunflower silage feeding, while lot 3 made a gain of 13·5 pounds per steer during the same period. It is interesting to note that previous to the sunflower silage feeding period, lot 2 had been making much greater gains than lot 3. During the sunflower silage period, lot 2 went back and was never able to catch up on lot 3 again.

It must be said, however, that the two silages were not in the same condition. Both were of good quality. The corn silage, however, was only slightly frozen, i.e., for about a foot inside the silo. On the other hand, the sunflower silage froze almost solid toward the latter part of the feeding period. As the silage was taken directly from the silo to the steers, it had no chance of being thawed out, therefore the sunflower silage was not in as good condition as the corn silage. The susceptibility of the sunflower silage to frost is largely due to the extra moisture contained, and is to its disadvantage when stored in above-ground silos where frost is severe. If stored in pit or trench silos, as is often done in Western Canada, trouble with frost would not be experienced and possibly better results would be obtained.

The results of the experiments with the remainder of the steers will be reported on in the next annual report.

DAIRY CATTLE

The dairy cattle at the Central Experimental Farm are one of the main features of the live stock work, 175 head of stock being on hand at the close of the fiscal year. This number is made up as follows:—

Pure-bred Breeding Cattle—			
Ayrshires	34 milch cows,	23 heifers,	15 bulls
Holsteins	20 "	24 "	15 "
Jerseys	8 "	7 "	4 "
French Canadian	5 "	3 "	1 "
Grade Cows—			
Ayrshires	2 milch cows,	1 heifer	
Holsteins	3 "		

The above-listed cattle are kept for demonstration work with the different breeds as well as for breeding, experimental and cost of production studies.

Ayrshires.—The Ayrshire herd shows a substantial increase in numbers and improvement in quality. Members of the herd were exhibited at the Royal Winter Fair in November, 1922, and gave a good account of themselves considering the competition at that fair. The get of the imported bull "Overton Lord Kyle" stood up particularly well and give promise of being exceptionally good doers. There were no purchases of breeding stock during the year. In the year's work, this breed takes second place in the economy of milk production, third place in the economy of fat production and second place in total profit over feed consumed.

Holsteins.—This breed continues to show advancement both in type and production. A small contingent from the herd was exhibited at the Royal Winter Fair with creditable results. The breed takes the first three places in the herd standing for the year which is based on the butter produced less feed cost. It will also be noticed that they produced milk the cheapest, butter fat the second cheapest and made the greatest profit over feed consumed of the three breeds—Ayrshire, Holstein, and Jersey. The cow "Grace Fayne Aaggie" excelled herself by producing 21,473 pounds milk and 832 pounds fat, equal to 1,040 pounds 80 per cent butter, and dropping two calves within the year, thus easily taking first place as the most profitable cow of any breed in the herd.

Jerseys.—The Jersey herd, while small in numbers, is of nice uniform quality and can be said to be making good progress, the young stock from the present herd sire being of exceptionally good quality. This herd stands third in economy of milk production but first in economy of butter production for the year. The cow "Leoni of Pinehurst" made the creditable record of 12,617 pounds milk and 622 pounds of fat in 365 days.

French-Canadians.—The French-Canadian herd is barely holding its own in numbers and is falling off in quality in spite of the best of breeding bulls having been used. It will, in all probability, eventually be eliminated from the Farm at Ottawa.

SALES OF BREEDING STOCK

The policy of offering nothing for sale but what was a credit to the breed, and an assurance of improved stock to the purchaser, has been strictly adhered to during the past year, even to the extent of killing some well-bred bulls that were poor individuals. Pure-bred stock values having declined materially, the prices for breeding bulls have been cut accordingly, and many excellent individuals have been sold at moderate prices. The following bulls have been disposed of during the year: Ayrshires, 10; Holsteins, 7; Jerseys, 1; French-Canadians, 1. Two of the Ayrshire bulls were sent to Branch Farms, one to Kapuskasing, Ont., and one to Ste. Anne de la Pocatiere, Que.

SUMMER FEEDING

The heifers were pastured on the Connaught Rifle Ranges during the summer of 1922. The season was a fairly good one for pasture and these cattle were stabled in excellent condition in the fall about the middle of November. During the season, two heifers were lost, one by what appeared to be a case of sunstroke and the other by blackleg. A third heifer, a pure bred, was bred by a scrub bull that had broken in. These constituted the losses for the season amongst the heifers.

The milch cows in the main herd have a very limited area for pasture. It is always new meadow, composed of alfalfa, red clover, alsike clover, and timothy. While it makes excellent pasture in the early part of the seeason, the large herd on a limited area soon crops it off and it never gets a chance to recover, so the pasture becomes an exercising ground after the first month or six weeks. Consequently the cows are only charged with two months' pasture per season. Corn silage of the previous year's crop forms the bulk of the summer feed for the milk cows. In addition, they get clover hay, and green cut alfalfa and other soiling crops in season. A light grain ration is fed, consisting of bran, cottonseed meal and brewers' or distillers' grains or some other protein rich grain such as gluten feed. During the early and late seasons, the cows are turned out during the day and in the heat of the summer they are turned out during the evenings only.

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, peas-and-oats silage, sweet clover silage, were fed at times in an experimental way but these are not looked on as the main feeds. The acreage devoted to grain growing is not sufficient to supply much feed for dairy cattle, consequently most of the concentrates must be purchased. During the summer and fall of 1922, mill feeds were down to a very low level and a good supply for winter feeding was laid in. The meal mixture fed the milch cows consisted of bran, 4 parts; brewers' or distillers' grains, 8 parts; cottonseed meal, 2 parts, and oil cake meal, 2 parts, plus bone meal, 1 per cent; salt, 1 per cent, and charcoal, 1 per cent. This mixture is fed at the rate of one pound

for every three to 4 pounds of milk produced in the case of fresh calved heavy milking cows, easing off slightly in the case of cows well on in their lactation periods. During the past season, considerable beet pulp was fed, during which time the grain ration fed was reduced proportionately.

The winter feeding of dry two-year-old heifers and senior yearlings is a simple matter as they receive a liberal ration of corn silage and rough hay with an occasional feed of clover hay. Younger heifers get grain in addition to promote growth as rapidly as possible while young when it is easiest obtained.

All cattle are exercised in the barnyard daily, except when very stormy or slippery.

EXPERIMENTAL FEEDING

CORN SILAGE VS. ROOTS (MANGELS) FOR DAIRY COWS

Owing to the repeated calls for information as to the relative value of corn silage and roots it was thought advisable to conduct an experiment along these lines. Accordingly a group of eleven cows including seven Holsteins and four French Canadians was designated for this work.

The experiment was divided into five three-week periods, during which the following average experimental rations were fed:—

Period 1—Corn silage, 40·0 pounds.
Period 2—Corn silage, 23 pounds and roots 53 pounds.
Period 3—Corn silage, 32 pounds.
Period 4—Roots alone 73 pounds.
Period 5—Corn silage, 33 pounds.

The differences in the rations throughout the whole experiment were that in period 2 half the corn silage was replaced by roots and in period 4 all the corn silage was replaced by roots. Certain adjustments were made in the amount of meal fed in period 1 and in the amount of hay fed in period 4 the latter being necessary to provide the necessary amount of dry matter.

It was also found necessary to decrease the amount of silage from period to period as old silage was run into and the cows would not consume so much of it.

By averaging data from periods 1 and 3 and comparing with period 2 a comparison of corn silage versus roots and corn silage is obtained and similarly an average of periods 3 and 5 compared to period 4 affords a comparison of corn silage versus roots. Data were taken during the final week of each period only the first two weeks in each case being considered as a transition period.

The following table gives the data for the first part of the experiment:—

TABLE I.—CORN SILAGE VS. ROOTS AND CORN SILAGE

Items		Period 1	Period 2	Period 3	Average of Periods 1 and 3
		Silage	Roots and Silage	Silage	Silage
Number of cows in test	No.	11	11	11	11
Pounds of milk produced by 11 cows	lbs.	2,397·00	2,456·50	2,013·50	2,205·25
Average milk per cow per day	"	31·13	31·90	26·15	28·64
Average per cent fat in milk	%	4·21	4·17	4·25	4·23
Total pounds fat produced by 11 cows	lbs.	100·90	102·41	85·63	93·26
Average pounds fat per cow per day	"	1·31	1·33	1·11	1·21
Total meal consumed	"	805·00	658·00	658·00	731·50
Total hay consumed	"	462·00	462·00	462·00	462·00
Total roots consumed	"	.....	4,060·00	.....	.....
Total corn ensilage consumed	"	3,045·00	1,785·00	2,660·00	2,852·50
Meal mixture consumed per 100 pounds milk produced	"	33·58	26·79	32·68	33·13
Corn silage consumed per 100 pounds milk produced	"	127·88	72·66	132·10	129·99
Roots consumed per 100 pounds milk produced	"	.....	165·27	.....	.....
Findings from Experiment					
Cost of meal mixture fed at $1.50 per cwt	$	12·07	9·87	9·87	10·97
Cost of roots fed, at $2.50 per ton	$	.....	5·07	.....	.....
Cost of silage fed, at $2.95 per ton	$	4·49	2·63	3·92	4·20
Cost of hay fed, at $8.15 per ton	$	1·88	1·88	1·88	1·88
Total cost of feed	$	18·44	19·45	15·67	17·05
Feed cost to produce 100 pounds fat	$	18·28	18·99	18·30	18·29
Feed cost to produce 100 pounds milk	$	0·77	0·79	0·78	0·775

TABLE II.—CORN SILAGE VS. ROOTS (MANGELS)

Items		Period 3	Period 4	Period 5	Average of Periods 3 and 5
		Corn Silage	Roots	Corn Silage	Corn Silage
Number of cows in test	No.	11	11	11	11
Pounds of milk produced by 11 cows	lbs.	2,013·50	1,941·00	1,651·50	1,832·5
Average milk per cow per day	"	26·15	25·21	21·45	23·80
Average per cent fat in milk	%	4·25	3·95	3·96	4·12
Total pounds fat produced by 11 cows	lbs.	85·63	76·72	65·39	75·51
Average pounds fat per cow per day	"	1·11	1·00	0·85	0·98
Total meal consumed	"	658·00	658·00	658·00	658·00
Total hay consumed	"	462·00	616·00	462·00	462·00
Total roots consumed	"	.....	5,600·00	.....	.....
Total corn silage consumed	"	2,660·00	.....	2,506·00	2,583·00
Meal mixture consumed per 100 pounds milk produced	"	32·68	33·90	39·84	36·26
Corn silage consumed per 100 pounds milk produced	"	132·10	.....	151·75	141·92
Roots consumed per 100 pounds milk produced	"	.....	334·88	.....	.....
Findings from Experiment					
Cost of meal mixture fed, at $1.50 per cwt	$	9·87	9·87	9·87	9·87
Cost of roots fed, at $2.50 per ton	$	.....	7·00	.....	.....
Cost of silage fed, at $2.95 per ton	$	3·92	.....	3·70	3·81
Cost of hay fed, at $8.15 per ton	$	1·88	2·51	1·88	1·88
Total cost of feed	$	15·67	19·38	15·45	15·56
Feed cost to produce 100 pounds fat	$	18·30	25·26	23·62	20·96
Feed cost to produce 100 pounds milk	$	0·78	1·00	0·94	0·86

It will be noticed in table I, that the corn silage and roots ration produced 251 pounds, or 11·3 per cent more milk and 9 pounds or 9·8 per cent more fat than the straight silage ration. This increased production, however, was at an increased cost of 1·5 cents per 100 pounds of milk or 1·9 per cent. The 4,060 pounds of roots fed proved equal to 154 pounds of meal, 51 pounds of hay and 1,381 pounds of silage giving roots a valuation of $2.24 per ton in this ration with other feeds at prices charged.

Reversing the calculation and using the cost of production figure of $2.50 per ton for roots gives corn silage a valuation of $3.70 per ton in this ration with other feeds at prices charged.

It will be noticed in table II that the straight root ration produced 108.5 pounds or 5·92 per cent more milk and 1·21 pounds or 1·6 per cent more fat than the straight silage ration. In this case the increased production was at an increased cost of 14 cents per 100 pounds of milk or 16.3 per cent. Thirty-nine pounds of meal and 2,738 pounds of silage proved equal to 126 pounds of hay and 5,600 pounds of roots giving roots a valuation of only $1.47 per ton in this ration with other feeds at prices charged. Reversing the calculation and using the cost of production figure of $2.50 per ton for roots gives corn silage a valution of $2.53 per ton in this ration with other feeds at prices charged.

The average of the preceding results gives corn silage a valuation of $3.11 per ton and roots a valuation of $1.85 per ton. The dry matter in corn at time of storing amounted to 22·66 per cent while roots contained 10·9 per cent so that dry matter in corn cost 65 cents per hundred pounds and proved to be worth 69 cents per hundred pounds, while dry matter in roots cost $1.15 per hundred pounds and proved to be worth only 85 cents per hundred pounds.

This experiment constitutes a comparison of two succulent crops so that the extra succulence of the roots over corn silage a point often stressed shows up fairly well in that the milk production was increased when roots were fed. The increased production was not so profitable, however. There is no doubt but that roots would make a profitable showing in a ration otherwise lacking in succulence.

In other words, roots (in this case, mangels) should be grown if corn or other silage can not be grown, but where the latter crops can be grown, roots are not economical as the main succulent crop for feeding dairy cattle. An exception to this observation might be made in a case where a farmer wished to get maximum milk production regardless of cost as in Record of Merit or Record of Performance work, for, as shown in the table, a mixture of silage and roots is better than either alone.

CORN SILAGE VS. PEAS, OATS AND VETCH SILAGE

This experiment was conducted in the same manner as the corn silage versus sunflower silage experiment. Here again the changes in the quality of the corn silage affected the amount consumed to a small extent and in this case also it was found that the cows would not consume as much peas, oats and vetch silage as they did of the corn silage. It is only fair to say, however, that the quality of the peas, oats and vetch silage was not all that it should have been. It was impossible to determine definitely what was the cause of the poor keeping quality of this silage. It went into the silo in good shape and was well tramped. Additional water was added and it was thought that this gave the silage too high a moisture content to allow it to cure properly. Then again the silo was filled in July and the hot weather following, during August and September, may have been responsible for the undesirable fermentation. At any rate the silage seemed to develop undesirable odors and also to keep up the fermentation process, for it did not freeze to any extent throughout the winter.

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

Items		Period 1	Period 2	Period 3	Average of Periods 1 and 3
		Corn Silage	Peas and oats silage	Corn Silage	Corn Silage
Number of cows in test	No.	14	14	14	14
Pounds of milk produced by 14 cows	lbs.	3,236·5	2,908·50	2,661·00	2,948·75
Average milk per cow per day	"	33·03	29·68	27·15	30·09
Average per cent fat in milk	%	3·72	3·94	3·67	3·70
Total pounds fat produced by 14 cows	lbs.	120·39	114·43	97·56	108·97
Average pounds fat per cow per day	"	1·23	1·17	1·00	1·11
Total meal consumed	"	924·00	924·00	924·00	924·00
Total hay consumed	"	588·00	588·00	588·00	588·00
Total beet pulp consumed	"	392·00	392·00	392·00	392·00
Total corn silage consumed	"	3,120·00	.....	3,024·00	3,072·00
Total peas, oats and vetch silage consumed	"	.....	2,760·00	.....	.....
Meal mixture consumed per 100 pounds milk produced	"	28·54	31·68	35·10	31·82
Corn silage consumed per 100 pounds milk produced	"	96·40	.....	113·64	105·02
Peas, oats and vetch silage consumed per 100 pounds milk produced	"	.....	94·89	.....	.....
Findings from Experiment					
Cost of meal mixture fed at $1.50 per cwt	$	13·86	13·86	13·86	13·86
Cost of beet pulp at $28 per ton	$	5·49	5·49	5·49	5·49
Cost of corn silage fed at $2.95 per ton	$	4·60	.....	4·46	4·53
Cost of peas, oats andvetch silage fed, at $5.60 per ton	$	.....	7·73	.....	.....
Cost of milk production for hay fed, at $8.15 per ton	$	2·40	2·40	2·40	2·40
Total cost of feed	$	26·35	29·48	26·21	26·28
Feed cost to produce 100 pounds fat	$	21·89	25·76	26·87	24·38
Feed cost to produce 100 pounds milk	$	0·81	1·01	0·98	0·89

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

Items		Period 1	Period 2	Period 3	Average of periods 1 and 3
		Corn Silage	Peas and Oats Silage	Corn Silage	Corn Silage
Number of cows in test	No.	19	19	19	19
Pounds of milk produced by 19 cows	lbs.	2,874·50	2,763·00	2,872·50	2,873·50
Average milk per cow per day	"	21·61	20·77	21·60	21·60
Average per cent fat in milk	%	4·61	4·67	4·71	4·66
Total fat produced by 19 cows	lbs.	132·68	129·12	135·12	134·00
Average fat per cow per day	"	1·00	0·97	1·02	1·01
Total meal consumed	"	896·00	896·00	896·00	896·00
Total hay consumed	"	798·00	798·00	798·00	798·00
Total beet pulp consumed	"	532·00	532·00	532·00	532·00
Total silage consumed	"	3,458·00	.....	3,878·00	3,668·00
Total peas, oats and vetch silage consumed	"	.....	3,045 00	.....	.....
Meal mixture consumed per 100 lbs. milk produced	"	31·18	32·43	31·12	31·30
Corn silage consumed per 100 lbs. milk produced	"	120·32	.....	135·00	127·66
Peas, oats and vetch silage consumed per 100 lbs. milk produced	"	.....	110·20	.....	.....
FINDINGS FROM EXPERIMENT					
Cost of meal mixture fed, at $1.50 per cwt.	$	13·44	13·44	13·44	13·44
Cost of beet pulp fed, at $28 per ton	$	7·40	7·40	7·40	7·40
Cost of corn silage fed, at $2.95 per ton	$	5·10	.....	5·72	5·41
Cost of peas, oats and vetch silage fed, at $5.60 per ton	$	.....	8·53	.....	.....
Cost of hay fed, at $8.15 per ton	$	3·25	3·25	3·25	3·25
Total cost of feed	$	29·19	32·62	29·81	29·50
Feed cost to produce 100 pounds fat	$	22·00	25·26	22·02	22·01
Feed cost to produce 100 pounds milk	$	1·01	1·18	1·03	1·02

It will be noted in table III that the corn silage ration produced 40·25 pounds, or 1·4 per cent more milk, but 5·5 pounds or 4·8 per cent less fat than the peas, oats, and vetch silage ration. However, in spite of the increased fat production when peas, oats and vetch silage was being fed, corn silage produced milk for 12 cents per cwt. or 11·8 per cent less and fat for $1.38 per cwt. or 5·7 per cent less than did the P.O.V. silage. In this case 3,120 pounds of corn silage proved equal to 13 pounds meal, 8 pounds hay, 5 pounds beet pulp and 2,799 pounds of peas, oats and vetch silage, giving the latter a valuation of $2.92 per ton with other feeds at prices charged.

In table IIIA which constitutes a duplication of this experiment on another lot of cows, corn silage produced 110·5 pounds, or 4 per cent more milk and 4.88 pounds or 3.7 per cent more fat than the peas, oats and vetch silage. In this table the increase in per cent fat when peas, oats and vetch silage was fed was not so great as in table III but, nevertheless, it was higher than when corn silage was fed. Corn silage produced milk for 15 cents per cwt. or 13·5 cent less and fat for $3.25 per cwt. or 12 per cent less than peas, oats and vetch silage. It was found that 3,668 pounds of corn silage proved equal to 36 pounds of meal, 32 pounds of hay, 21 pounds of beet pulp and 3,167 pounds of peas, oats and vetch silage which gives the latter a valuation of $2.84 per ton with other feeds at prices charged.

The results of these two experiments gives peas, oats and vetch silage an average valuation of $2.88 per ton when other feeds are at the prices quoted.

The peas, oats, and vetch crop only yielded at a rate of 5·7 tons per acre compared to 15 tons per acre for corn which accounts for the rather high cost of production figure of $5.60 per ton.

Deductions

The result of this experiment would go to show that peas, oats and vetch silage compares fairly favourably with corn silage in so far as its ability to produce milk goes, but owing to the relatively low production per acre and consequent high cost of production together with the possibility of its keeping rather poorly it is not as economical to grow as corn silage. When corn silage cannot be grown, however, and fairly good yields of peas, oats and vetches can be obtained these make a good crop to ensile to provide the necessary succulent feed for winter feeding.

CORN SILAGE VS. SUNFLOWER SILAGE

This experiment was conducted in the same manner as the corn silage vs. peas, oats and vetch experiment already described. During the experiment the corn silage being fed was gradually becoming stronger as it consisted of the lower portion in the silo of the 1922 crop and when this was finished some left over from the 1921 crop. During period 5, table IVA, 1922 silage was fed again. As a consequence of these changes more corn silage was consumed during the first part of the experiment than during the latter part with the exception of period 5. At no time during the experiment would the cows eat as much sunflower silage as they did corn silage.

TABLE IV—CORN SILAGE VS. SUNFLOWER SILAGE

Items		Period 1	Period 2	Period 3	Average of periods 1 and 3
		Corn Silage	Sunflower Silage	Corn Silage	Corn Silage
Number of cows in test	No.	17	17	17	17
Pounds of milk produced by 17 cows	lbs.	2,771·00	2,545·00	2,382·50	2,576·75
Average milk per cow per day	"	23·29	21·39	20·02	21·66
Average per cent fat in milk	%	4·55	4·60	4·61	4·58
Total pounds fat produced by 17 cows	lbs.	126·08	116·08	109·99	118·03
Average pounds fat per cow per day	"	1·06	0·98	0·92	0·99
Total meal consumed	"	798·00	798·00	798·00	798·00
Total hay consumed	"	714·00	714·00	714·00	714·00
Total beet pulp consumed	"	476 00	476 00	476 00	476 00
Total corn silage consumed	"	3,360·00	.....	3,122·00	3,241·00
Total sunflower silage consumed	"	.....	3,003·00	.....	.....
Meal mixture consumed per 100 lbs. milk produced	"	28·80	31·35	33·49	31·19
Corn silage consumed per 100 lbs. milk produced	"	121·25	.....	131·03	126·14
Sunflower silage consumed per 100 lbs. milk	"	.....	118·00	.....	.....
FINDINGS FROM EXPERIMENT					
Cost of meal mixture fed at $1.50 per cwt	$	11·97	11·97	11·97	11·97
Cost of beet pulp fed at $28 per ton	$	6·66	6·66	6·66	6·66
Cost of corn silage fed at $2.95 per ton	$	4·96	.....	4·60	4·78
Cost of sunflower silage fed at $1.80 per ton	$	.....	2·70	.....	.....
Cost of hay fed at $8.15 per ton	$	2·91	2·91	2·91	2·91
Total cost of feed	$	26·50	24·24	26·14	26·32
Feed cost to produce 100 pounds fat	$	21·02	20·72	23·77	22·39
Feed cost to produce 100 pounds milk	$	0·96	0·95	1·10	1·03

TABLE IVA—CORN SILAGE VS. SUNFLOWER SILAGE

Items		Period 3	Period 4	Period 5	Average of periods 3 and 5
		Corn Silage	Sunflower Silage	Corn Silage	Corn Silage
Number of cows in test	No.	12	12	12	12
Pounds of milk produced by 12 cows	lbs.	2,371·00	2,174·50	2,203·5	2,287·25
Average milk per cow per day	"	28·33	26·72	26·40	27·36
Average per cent fat in milk	%	3·67	3·72	3·67	3·67
Total pounds fat produced by 12 cows	lbs.	86·98	80·91	81·04	84·01
Average pounds fat per cow per day	"	1·04	0·96	0·97	1·00
Total meal consumed	"	700·00	700·00	700·00	700·00
Total hay consumed	"	504·00	504·00	504·00	504·00
Total beet pulp consumed	"	336·00	336·00	336·00	336·00
Total corn silage consumed	"	2,688·00	.....	2·765·00	2,726·50
Total sunflower silage consumed	"	.....	2,688·00	.....	.....
Meal mixture consumed per 100 lbs. milk produced	"	29·52	32·19	31·76	30·64
Corn silage consumed per 100 lbs. milk produced	"	113·37	.....	125·43	119·40
Sunflower silage consumed per 100 lbs. milk produced	"	.....	123·61	.....	.....
FINDINGS FROM EXPERIMENT					
Cost of meal mixture fed at $1.50 per cwt.	$	10·50	10·50	10·50	10·50
Cost of beet pulp fed, at $28 per ton	$	4·70	4·70	4·70	4·70
Cost of corn silage fed, at $2.95 per ton	$	3·96	.....	4·08	4·02
Cost of sunflower silage fed at $1.80 per ton	$	.....	2·42	.....	.....
Cost of hay fed at $8.15 per ton	$	2·39	2·39	2·39	2·39
Total cost of feed	$	21·55	20·01	21·67	21·61
Feed cost to produce 100 pounds fat	$	24·77	24·73	26·74	25·75
Feed cost to produce 100 pounds milk	$	0·95	0·92	0·98	0·965

It will be noted in table IV that the corn silage ration produced 31·75 pounds, or 1·25 per cent more milk, and 1·05 pounds or 0·9 per cent more fat, than the sunflower silage ration. The sunflower silage ration produced milk and fat slightly more cheaply than the corn silage ration. In this case 3,241 pounds of corn silage proved equal to 9·5 pounds meal, 8·5 pounds hay, 5·5 pounds beet pulp and 3,039 pounds sunflower silage which at the prices charged for the other feeds gives sunflowers a valuation of $2.98 per ton.

In table IVA, which constitutes a duplication on another lot of cows, of the experiment reported in table IV similar results were obtained, in that the corn silage ration produced 112·75 pounds or 5 per cent more milk and 3·1 pounds or 3·8 per cent more fat than the sunflower silage ration. The sunflower silage ration produced milk for 4.5 cents or 4.9 per cent less per 100 pounds and fat for $1.02 or 4·1 per cent less per 100 pounds than the corn silage ration. In this case 2,726 pounds of corn silage proved equal to 26 pounds meal, 26 pounds hay, 17 pounds beet pulp and 2,828 pounds of sunflower silage which at the prices charged for other feeds gives sunflower silage a valuation of $2.55 per ton or an average valuation for the two experiments of $2.76 per ton.

This may seem high in comparison to the cost of production figure of $1.80 per ton but it must be remembered that the cost of production of sunflower silage is low largely because of the heavy tonnage per acre and this heavy tonnage is due in turn to the high moisture content of the sunflowers while excess moisture is so much waste as a lot of it runs out of the silo. If the cost of production was figured on a dry matter basis it would work out about the same for the two crops. There is another objectionable feature in connection with the high moisture content of sunflower silage which is that even though a lot of it runs off there is still so much more than in corn that the

silage from the former freezes much more severely than that from the latter. So much so that it is not adaptable to out-door feeding when stored in an exposed silo with no facilities for thawing it out such as are available in a warm stable.

If stored in a pit or trench silo however as is often done in the West where sunflowers are commonly grown the objection would be largely if not entirely overcome.

The fact that the cows would not eat as much of the sunflower silage as of the corn silage goes to prove the lack of palatability of the former.

Deductions

The deductions that can be made from this experiment coincide with those obtained in a similar experiment reported in the 1922 report of this Division. These deductions are to the effect that in general sunflower silage approximates but does not equal corn silage for feeding to milch cows.

Therefore sunflower silage is not to be recommended where corn silage can be grown. On the other hand where corn silage cannot be grown sunflower silage makes an excellent substitute.

TUBERCULOSIS ERADICATION

During the year two reactions to the tuberculin tests have occurred, one in May, 1922, and one in December, 1922. These isolated reactions occurring as they did at different tests have delayed the receipt of the accredited herd certificate. However, the entire herd has passed one clean test and should be well on the way to final accreditation.

THE BANG HERD

Neither of the animals reacting during the year was added to the Bang herd, so there have been no additions to the latter. One cow from this herd was killed during the year as she had developed into a generalized case of tuberculosis showing all the usual clinical symptoms. Apart from this one case, the general health of the Bang herd has been as good as could be expected. The percentage of calves born has been good but a few losses were sustained in removing them to the main herd, particularly during the severe winter weather.

DAIRY HERD RECORDS

The table 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, 1923.

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	8 15	"
Roots	2 50	"
Silage (corn)	2 95	"
Green feed	5 00	"
Beet pulp	28 00	"
Bran	20 00	"

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 value was used which amounted to 40 cents per pound for butter and 30 cents per hundredweight for skim-milk.

The 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 counter-balance the above-mentioned items, though not sufficiently to cover other over-head charges such as interest, depreciation, etc.

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INDIVIDUAL MILK RECORDS COMPLETED

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 40c. per pound	Value of skim milk at 30c. per cwt.
				lbs.	lbs.	p.c.	lbs.	$ cts.	$ cts.
Grace Fayne Aaggie.....H.	6	Dec. 28, 1921	317	21,626	68·22	3·87	984·62	393 85	62 37
Midnight Jewel de Kol .....H.	5	Feb. 21, 1922	404	22,035	54·54	3·71	961·61	384 64	63 65
Grace Allen Ormsby.....H.	10	Oct. 25, 1921	420	25,972	61·83	3·28	1,004·9	401 96	75 35
Auchenbay Mina 5th.....A.	4	Sept. 24, 1921	432	17,421	40·33	4·14	848·37	339 35	50 10
Leoni of Pinehurst.....J.	5	Nov. 1, 1921	391	12,749[5]	32·61	4·91	736·85	294 74	36 37
Helena Keyes Posch.....H.	10	April 4, 1922	258	18,526	71·81	3·11	678·94	271 58	53 85
Starlight of Fredericton.....A.	4	Nov. 7, 1921	337	12,565	37·28	4·37	645·73	258 29	36 05
Cherry Lou.....J.	7	Feb. 24, 1921	681	12,829	18·84	4·5	686·21	274 48	36 74
Maud of Fernbrook.....A.	11	April 13, 1922	333	14,166[5]	42·54	3·64	606·74	242 69	40 95
Helena Keyes Plus.....H.	5	May 14, 1921	400	13,999	34·99	3·72	614·02	245 61	40 43
Leila Posch Mechthilde.....H.	7	Mar. 25, 1922	320	12,252[5]	38·29	3·76	542·79	217 12	35 37
Maud of Fernbrook 4th.....A.	8	May 6, 1921	492	12,898[5]	26·22	4·25	645·09	258 04	37 05
Springbank Posch Canary.....H.	6	July 13, 1921	332	13,349	40·21	3·48	546·86	218 74	38 65
Zorra De Kol.....H.	9	Aug. 20, 1921	437	13,204[5]	30·22	3·75	583·39	233 36	38 13
Culcaigrie Dot.....A.	8	Oct. 29, 1921	400	11,613	29·03	4·09	559,63	223 85	33 41
Hairshaw Tibbie.....A.	7	Aug. 3, 1921	454	11,523[5]	25·38	4·06	550·81	220 32	33 16
Queen Colantha Dswdrop.....H.	6	June 19, 1921	285	11,977[5]	42·03	3·59	506·05	202 42	34 64
Brampton Vinnie Beth.....J.	4	Nov. 27, 1921	310	7,350[5]	23·71	5·7	495·52	198 21	20 79
Milly of Wishtomrish.....J.	4	Jan. 30, 1922	304	7,095	23·34	5·66	472·58	189 03	20 08
Ottawa Burma Lady 2nd.....J.	2	Aug. 30, 1921	386	7,645	19·81	5·01	450·93	180 37	21 78
Evergreen March 3rd.....H.	12	May 30, 1921	638	14,217[5]	22·28	3·39	568·52	227 41	41 20
Flavia 8th of Ottawa.....A.	2	Aug. 30, 1921	363	8,385[5]	23·10	4·44	438·22	175 29	24 04
Lulu Posch Regina.....H.	4	Dec. 9, 1921	348	12,505[5]	35 93	3·14	463·04	185 22	36 34
Brampton Triumph 2nd.....J.	3	Nov. 3, 1921	331	6,302[5]	19·04	6·1	449·58	179 83	17 76
Canaan Beauty 2nd.....H.	8	Mar. 11, 1921	447	13,462	30·12	3·13	495·92	198 37	39 12
Jessie of Oaklawn.....A.	6	July 23, 1921	322	10,091	31·34	3·66	434·67	173 87	29 16
Hardcroft Dewdrop 3rd.....A.	6	Aug. 2, 1921	338	9,241	27·29	4·17	453·05	181 22	26 56
Biddy C.....Gr.H.	2	Oct. 9, 1921	299	11,051	36·9	3·51	456·76	182 70	31 99
Maud of Fernbrook 5th.....A.	6	May 13, 1921	441	11,358[5]	25·76	3·36	449·99	179 80	32 93
Fairy's Fern.....J.	3	Dec. 30, 1921	295	5,172[5]	17·53	5·98	364·14	145 66	14 43
Primrose of Athens.....A.	5	May 5, 1922	331	8,398[5]	25·37	4·09	404·53	161 81	24 16
Diamond A-2.....Gr. H.	2	Aug. 6, 192'	347	10,943[5]	31·54	3·19	411·9	164 76	31 78
Beauty of Oaklawn.....A.	6	April 14, 1921	348	8,560	24·6	4·15	417·58	167 03	24 62
Pauline.....Gr. A.	.....	.....	409	10,220[5]	24·96	3·55	426·53	170 61	29 57
Zaza Fille 5th.....Fr. Can.	2	Sept. 3, 1921	392	6,429[5]	16·4	5·16	390·56	156 22	18 29
Lyons Segis Helena Keyes.....H.	2	July 20, 1921	376	9,916	26·37	3·46	404·14	161 66	28 72
Allancroft Ada.....A.	7	Nov. 19, 1921	280	7,497[5]	26·78	4·17	368·19	147 28	22 39
Lyons Segis Bessie Ann.....H.	2	Aug. 18, 1921	370	12,595[5]	34·04	3·07	455·	182 00	26 37
St. Valentine' Pet.....A.	8	April 19, 1921	461	8,712[5]	18·88	4·09	419·56	167 82	25 07
Old Hall Maggie 9th.....A.	9	Aug. 3, 1921	348	8,517[5]	24·38	3·83	384·07	153 63	24 57
Bess Hengerveld.....H.	3	Oct. 15, 1921	300	7,507[5]	25·03	3·71	328·12	131 24	21 69
Belle of Oban.....A.	10	Nov. 16, 1921	269	8,129	30·22	3·87	370·47	148 19	23 44
Ottawa March Posch.....H.	3	Dec. 28, 1921	277	8,031[5]	28·99	3·52	333·21	133 28	23 24
Flora de Kol Korndyke.....H.	7	May 13, 1922	321	9,014	28·08	3·55	377·02	150 81	17 39
Allancroft Pansy.....A.	8	April 25, 1922	309	5,585[5]	18·08	5·12	336·68	134 67	15 84
Lillian of Oban.....A.	4	Mar. 29, 1922	257	5,625[5]	21·89	4·61	305·15	122 06	16 10
Lyons Segis Keyes Lass.....H.	2	Aug. 26, 1921	343	8,151	23·76	3·84	368·43	147 37	23 51
Ottawa Woodcrest Lyn.....H.	5	June 16, 1921	288	7,576	26·31	3·35	294·34	117 74	21 98
Catlinn's Barbara.....A.	7	May 3, 1921	366	7,068[5]	19·31	3·48	289·99	115 99	20 47
White Bess of Ottawa 2nd.....A.	2	Nov. 24, 1921	341	7,112	20·85	3·69	309·15	123 66	20 55
Dunlop Betsy.....A.	5	Sept. 1, 1921	366	5,775[5]	15·78	4·26	289·32	115 73	16 59
Allancroft Betsy 2nd.....A.	4	Nov. 5, 1921	243	5,571[5]	22·88	3·8	249·66	99 86	16 08
Ottawa Fanny.....J.	2	July 15, 1921	385	4,113[5]	9·67	4·88	236·04	94 42	12 28
Ottawa Lady 2nd.....A.	2	Aug. 23, 1921	352	4,441	12·62	4·0	209·1	83 64	12 79
Ottawa Elsie.....J.	2	Nov. 7, 1921	310	2,621	8·45	5·63	173·62	69 45	7 42
Total for herd (55 cows).....	289	.....	19,904	570,699	.....	.....	26,247·89	10,498 95	1,627 36
Average for herd (55 cows)....	5·2	.....	361·89	10,376·34	28·6	3·91	477·23	190 89	29 59

TOTAL AND AVERAGE PRODUCTION OF FIVE HOL

Grace Fayne Aaggie.....	6	Dec. 28, 1921	317	21,626	68·22	3·87	984·62	393 85	62 37
Midnight Jewel De Kol.....	5	Feb. 21, 1922	404	22,035	54·54	3·71	961·61	384 64	63 65
Grace Allen Ormsby.....	10	Oct. 25, 1921	420	25,972	61·83	3·28	1,004·9	401 96	75 35
Helena Keyes Posch.....	10	April 4, 1922	258	18,526	71·81	3·11	678·94	271 58	53 85
Helena Keyes Plus.....	5	May 14, 1921	400	13,999	34·99	3·72	614·02	245 61	40 43
Average of best 5 cows.....	7·2	.....	359·8	20,431·6	58·28	3·54	848·82	339 53	59 13
Average of herd (19 cows).....	5·9	.....	362·1	13,469·3	38·05	3·49	553·2	221 28	38 00

DURING THE YEAR

Total value of product	Amount of meal eaten at 1½c. per pound	Amount of roots at $2.50 per ton and ensilage at $2.95 per ton	Amount of hay eaten at $8.15 per ton	Amount of green feed eaten at $5.00 per ton	Amount of beet pulp eaten at $28.00 per ton	Months on pasture at $2.00 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.	mos.	$ cts.	$ cts.	cts.	cts.	$ cts.
456 22	5,521	22,110	1,692	6,100	360 Bran	2	142 91	0·66	14·5	25·5	313 31
448 29	6,263	15,475	3,460	484	.....	2	136 08	0·62	14·2	25·8	312 21
477·31	7,371	31,370	2,298	6,100	.....	2	181 51	0·70	18·1	21·9	295 80
389 45	5,140	21,760	2,380	1,650	.....	2	125 02	0·72	14·7	25·3	264 43
331 11	4,290	16,105	2,259	700	.....	2	101 98	0·80	13·8	26·2	229 13
325·43	3,648	10,480	2,450	.....	72	2	115 16	0·62	16·9	23·1	210 27
294·34	5,937	11,600	2,259	.....	.....	2	89 37	0·71	13·8	26·2	204 97
311 22	4,988	21,380	4,140	700	.....	4	133 09	1·04	19·4	20·6	178 13
283 64	4,116	17,660	2,523	750	408	2	108 52	0·76	17·9	22·1	175 12
286 04	4,435	19,270	3,204	.....	.....	2	111 20	0·79	18·1	21·9	174 84
252 49	3,780	10,470	1,611	750	280	2	85 96	0·70	15·8	24·2	166 53
295 09	4,562	21,755	4,287	750	484	4	134 63	1·04	21·0	19·0	160 46
257 39	4,075	15,095	2,622	.....	.....	2	98 07	0·73	17·9	22·1	159 32
271 49	4,551	15,638	2,742	750	.....	4	112 38	0·85	19·3	20·7	159 11
257 26	4,136	14,975	2,754	.....	.....	2	99 35	0·86	17·8	22·2	157 91
253 48	4,132	16,775	3,114	.....	.....	2	103 40	0·90	18·8	21·2	150 08
237 06	3,785	11,580	2,010	.....	.....	2	87 05	0·73	17·2	22·8	150 01
219 00	2,844	12,755	1,914	700	.....	2	74 41	1·01	15·0	25·0	144 59
209 11	2,530	9,575	1,731	886	.....	2	65 33	0·92	13·8	26·2	143 78
202 15	2,450	10,430	2,107	700	.....	2	66 47	0·87	14·7	25·3	135 68
268 61	5,018	23,135	4,101	750	.....	4	135 97	0·96	23·9	16·1	132 64
199 33	2,362	10,645	2,088	.....	.....	4	67 63	0·81	15·4	24·6	131 70
221 56	3,896	13,285	2,328	.....	.....	2	91 53	0·73	19·8	20·2	130 03
197 59	2,462	12,475	1,914	700	.....	2	68 32	1·08	15·2	24·8	129 27
237 49	4,538	18,390	3,404	.....	.....	2	113 06	0·84	22·8	17·2	124 43
203 03	3,219	13,985	2,736	.....	.....	2	84 06	0·83	19·3	20·7	118 97
207 78	3,604	13,115	2,931	.....	.....	2	89 34	0·97	19·7	20·3	118 44
214 69	3,267	13,590	1,825	750	945	3	96 51	0·87	21·1	18·9	118 18
212 73	3,892	14,915	2,742	.....	.....	3	97 55	0·86	21·7	18·3	115 18
160 09	1,700	7,670	1,407	700	.....	2	48 66	0·94	13·4	26·6	111 43
185 97	2,709	10,530	2,097	750	484	2	77 35	0·92	19·1	20·9	108 62
196 54	3,708	14,925	2,164	460	.....	2	90 54	0·83	22·0	18·0	106 00
191 65	3,376	14,910	2,710	.....	.....	2	87 17	1·02	20·9	19·1	104 48
200 18	3,568	17,540	3,375	.....	.....	2	97 44	0·95	22·8	17·2	102 74
174 51	2,530	12,650	2,542	750	.....	3	74 85	1·16	19·1	20·9	99 66
190 38	3,501	13,370	3,166	.....	.....	3	91 13	0·92	22·5	17·5	99 25
169 67	2,618	12,525	1,878	750	.....	2	70 63	0·94	19·2	20·8	99 04
208 37	3,807	15,463	2,897	945	.....	3	109 89	0·87	24·1	15·9	98 48
192 89	3,364	16,102	3,163	593	.....	3	94 58	1·08	22·5	17·5	98 31
178 20	3,062	13,595	2,668	.....	.....	2	80 85	0·95	21·1	18·9	97 35
152 93	2,308	8,870	1,710	750	.....	1	58 55	0·78	17·8	22·2	94 38
171 63	3,043	14·910	2,133	750	.....	2	81 29	1·00	21·9	18·1	90 34
156 52	2,582	10,035	2,190	.....	.....	2	66 45	0·83	19·9	20·1	90 07
168 20	2,654	11,410	2,079	1,950	484	2	80 74	0·90	21·4	18·6	87 46
150 51	2,236	9,600	1,728	.....	360	2	63 78	1·14	18·9	21·1	86 73
138 16	1,939	8,940	1,785	750	.....	2	55 41	0·99	18·1	21·9	82 75
170 88	2,858	14,945	2,021	250	945	3	91 94	1·13	24·9	15·1	78 94
139 72	2,610	12,630	1,932	.....	.....	2	69 65	0·92	23·7	16·3	70 07
136 46	2,678	13,085	2,376	.....	.....	2	73 15	1·03	25·2	14·8	63 31
144 21	3,030	13,720	2,469	750	.....	2	81 34	1·14	26·3	13·7	62 87
132 32	2,188	14,945	2,748	.....	.....	2	70 05	1·21	24·2	15·8	62 27
115 94	1,845	7,515	1,471	157	.....	1	54 60	0·98	21·9	18·1	61 34
106 70	1,735	10,212	2,257	147	.....	2	54 60	1·33	23·0	17·0	52 10
96 43	1,850	11,360	2,284	750	.....	2	59 70	1·34	28·6	11·4	36 73
76 87	1,466	9,480	1,849	700	.....	2	48 77	1·86	28·0	12·0	28 10
12,126 31	189,797	780,670	134,815	35,122	Bran 360 4,462	125	4,948 97				7,177 34
220 48	3,450·8	14,194	2,451·18	638·58	6·54 81·12	2·27	89 98	0·867	18·85	21·15	130 50

BEST COWS IN EACH BREED

STEINS

456 22	5,521	22,110	1,692	6,100	Bran 360	2	142 91	0·66	14·5	25·5	313 31
448 29	6,263	15,475	3,460	484	.....	2	136 08	0·62	14·2	25·8	312 21
477 31	7,371	31,370	2,298	6,100	.....	2	181 51	0·70	18·1	21·9	295 80
325 43	5,648	10,480	2,450	.....	72	2	115 16	0·62	16·9	23·1	210 27
286 04	4,435	19,270	3,204	.....	.....	2	111 20	0·79	18·1	21·9	174 84
398 66	5,847·6	19,741	2,620·8	2,536·8	Bran 72 14·4	2	137 37	0·672	16·18	23·82	261 29
259 28	4,168·5	15,422	2,521·9	991	Bran 18·94 93·73	2·3	104 17	0·773	18·8	21·20	155 11

AYR

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 40c. per pound	Value of skim-milk at 30c. per cwt.
				lbs.	lbs.	(.c.	lbs.	$ cts.	$ cts.
Auchenbay Mina 5th	4	Sept. 24, 1921	432	17,421	40·33	4·14	848·37	339 35	50 10
Starlight of Fredericton	4	Nov. 7, 1921	337	12,565	37·28	4·37	645·73	258 29	36 05
Maud of Fernbrook	11	April 13, 1922	333	14,166[5]	42·54	3·64	606·74	242 69	40 95
Maud of Fernbrook 4th	8	May 6, 1921	492	12,898[5]	26·22	4·25	645·09	258 14	37 05
Culcaigrie Dot	8	Oct. 29, 1921	400	11,613	29·03	4·09	559·63	223 85	33 41
Average of best 5 cows	7	.....	398·8	13,732·8	35·08	4·38	661·11	264 44	39 51
Average of herd (23 cows)	6	.....	355·7	9,141·65	25·65	4·03	434·16	173 65	26 35

JER

Leonie of Pinehurst	5	Nov. 1, 1921	391	12,749[5]	32·61	4·91	736 85	294 74	36 37
Cherry Lou	7	Feb. 24, 1921	681	12,329	18·84	4·5	686 21	274 48	36 74
Brampton Vinnie Beth	4	Nov. 27, 1921	310	7,350[5]	23·71	5·7	495·52	198 21	20 79
Milly of Wiantonwish	4	Jan. 30, 1922	304	7,095	23·34	5·66	472·58	189 03	20 08
Ottawa Burma Lady 2nd	2	Aug. 30, 1921	386	7,645	19·81	5·01	450·93	180 37	21 78
Average of best 5 cows	4·4	.....	414·4	9,533·8	23·62	5·06	568·42	227 36	27 15
Average of herd (9 cows)	3·5	.....	377	7,319·8	19·22	5·24	451·72	180 69	20 85

SHIRES

Total value of product	Amount of meal eaten at 1½c. per pound	Amount of roots at $2.50 per ton and ensilage at $2.95 per ton	Amount of hay eaten at $8.15 per ton	Amount of green feed eaten at $5.00 per ton	Amount of beet pulp eaten at $28.00 per ton	Months on pasture at $2.00 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.	mos.	$ cts.	$	cts.	cts.	$ cts.
389·45	5,140	21,700	2,380	1,650	.....	2	125 02	0·72	14·7	25·3	264 43
294·34	3,937	11,600	2,259	.....	.....	2	89 37	0·71	13·8	26·2	204 97
283·64	4,116	17,660	2,523	750	408	2	108 52	0·76	17·9	22·1	175 12
295 09	4,562	21,755	4,287	750	484	4	134 63	1·04	21·0	19·0	160 46
257 26	4,136	14,975	2,754	.....	.....	2	99 35	0·86	17·8	22·2	157 91
303 95	4,378·2	17,538	2,840·6	630	178·4	2·4	111 38	0·811	16·85	23·15	192 57
200 00	3,175·5	13,863·5	2,492·3	365·2	75·5	2·2	84 73	0·926	19·5	20·5	115 27

SEYS

331 11	4,290	16,105	2,259	700	.....	2	101 98	0·80	13·8	26·2	229 13
311 22	4,988	21,380	4,140	700	.....	4	133 09	1·04	19·4	20·6	178 13
219 00	2,844	12,755	1,914	700	.....	2	74 41	1·01	15·0	25·0	144 59
209 11	2,530	9,575	1,731	886	.....	2	65 33	0·92	13·8	26·2	143 78
302 15	2,450	10,430	2,107	700	.....	2	66 47	0·87	14·7	25·3	135·68
254 51	3,420·4	14,049	2,430·2	737·2	.....	2·4	88 25	0·93	15·5	24·5	166 26
201 54	2,718·3	12,231	2,185·3	659·2	.....	2·2	73 52	1·004	16·3	23·7	128 02

From the foregoing tables it will be seen that the average production for the 55 cows and heifers of the Ayrshire, French-Canadian, Holstein and Jersey breeds reported is 10,376 pounds of milk and 477 pounds of 85 per cent butter. This is an increase over the average production of the previous year of 1,382 pounds of milk and 68 pounds of butter.

The herd averages for the three main breeds, Ayrshires, Holsteins, and Jerseys, taken separately, each show a decided increase over the production for the previous year, showing that improvement in production has taken place equally in each of the breeds.

THE EFFECT OF INCREASED PRODUCTION ON THE FEED COST OF MILK AND BUTTER FAT

Many further analyses might be made of the figures in the above and like tables for preceding years. One and that an important one is included herewith, namely, a comparison of the feed cost of milk and butter fat production with increasingly heavy producing cows.

All lactation periods reported in the years ending March 31, 1921, 1922, and 1923 were grouped into classes starting at 3,000 pounds, with a range within each class of 2,000 pounds. That is, all animals producing between 3,000 and 5,000 pounds of milk per year were grouped in one class, while all those producing between 5,000 and 7,000 pounds were grouped in another class, etc. All those producing over 19,000 pounds per year were grouped in a final class.

The average production of milk and butter fat and the average feed cost of production of milk and butter fat were then calculated for each class. This information is given in the following table:—

THE EFFECT OF INCREASED PRODUCTION ON THE FEED COST OF MILK AND BUTTER FAT

Class	Number lactations averaged	Production		Feed Cost of Production	
		Milk lbs.	Butter fat lbs.	Milk per cwt.	Butter fat per lb.
				$ cts.	cts.
3,000- 5,000 lbs. per year	13	4,202·5	181·71	1 57	37·03
5,000- 7,000 "	28	6,047·64	258·25	1 35	32·56
7,000- 9,000 "	34	7,887·73	321·39	1 12	27·90
9,000-11,000 "	27	10,076·11	365·44	1 09	30·26
11,000-13,000 "	20	12,195·77	458·58	0 93	25·96
13,000-15,000 "	9	13,802·00	489·26	0 92	25·74
15,000-17,000 "	4	15,368·10	566·40	1 05	28·62
17,000-19,000 "	3	17,784·00	632·82	0 81	23·10
19,000 lbs. and over	3	23,211·00	836·15	0 66	18·40

It will be noted from the above table that with one exception in the case of the feed cost of milk production and two exceptions in the case of the feed cost of fat production, the feed cost of both milk and butter fat show a decided decrease almost proportional to the increased milk production.

In the 9,000 to 11,000 pound class, the feed cost of butter fat is higher than in the previous class. This is readily explained by the fact that in this class there were two cows with high charges against them due to being dry for a considerable period before the lactation period reported started. The feed charged up against them during this long dry period ran up the cost of producing butter fat.

In the 15,000 to 17,000 pound class, both milk and butter fat are produced at higher cost than in the previous class where the average milk production is considerably lower. This is explained by the fact that of the four records averaged, one was reported in 1921, the other three in 1922, and none in 1923. Feed prices were higher in 1921 and 1922 than in 1923, and as there are no 1923 records to pull the cost of production average down, an irregularity in the table results.

Had these anomalies been removed, a gradual decrease in the feed cost of milk and butter fat production as milk production increased would have been shown.

This analysis of milk records is given to show that even extra heavy milk production, requiring as it does liberal feeding, is the most economical production. In other words, the opinion often expressed to the effect that heavy production is not profitable owing to the extra heavy feeding necessary is not borne out by the facts.

It is true, of course, that only the feed cost of milk production is included in the foregoing statement, but the other costs would be very little if any more for a high producing cow than for a low producing one.

OFFICIAL RECORDS

As usual, all normal milking cows and heifers that had not previously been tested 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 for the breed.

The following tables give the lists of cows qualifying under each of these tests during the year:—

HOLSTEIN RECORD OF MERIT TESTS ON CENTRAL EXPERIMENTAL FARM, APRIL 1, 1922 TO MARCH 31, 1923

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				
Grace Fayne Aaggie No. 48,612.....	6	3	27	300	21,066·5	805·81	1,007·27
	7	3	26	7	537·5	21·86	27·33
	7	3	26	30	2,250·0	89·70	112·13
	7	3	26	60	4,418·0	173·59	216·99
Helena Keyes Posch No. 21,376....	9	11	2	7	653·0	20·54	25·68
	9	11	2	30	2,716·5	84·72	105·90
Lyons Segis Helena Keyes No. 64,327.....	3	8	28	7	503·2	20·58	25·73
	3	8	28	30	2,212·1	79·61	99·52
Midnight Jewel DeKol No. 46,558..	5	11	23	7	412·5	19·21	24·02
	5	11	23	30	1,844·0	77·94	97·43
Lyons Segis Butter Girl No. 68,058.	2	10	29	7	440·0	18·82	23·53
	2	10	29	30	2,078·0	67·83	84·80
Ottawa March Posch No. 60,982....	4	1	9	7	473·6	17·96	22·46
	4	1	9	30	1,997·2	73·53	91·92
Bess Hengerveld No. 63,936.....	4	9	19	7	419·0	17·95	22·44
	4	9	19	30	1,625·5	62·86	78·58
Helena Keyes Plus No. 44,067.....	6	11	26	7	484·0	16·85	21·06
	6	11	26	30	2,038·0	67·86	84·84
Johanna Helena Keyes No. 76,334..	2	6	10	7	445·2	16·32	20·40
	2	6	10	30	1,891·7	65·24	81·56
Lyons Segis Bessie Ann No. 64,286.	3	9	12	7	557·5	15·21	19·02
	3	9	12	30	2,182·5	57·62	72·03
Susan Mercena Sylvia No. 77744....	2	7	2	7	424·0	14·03	17·54
	2	7	2	30	1,812·0	57·42	71·78
Johanna Butter Maid No. 80456....	2	5	8	7	369·5	13·73	17·17
	2	5	8	30	1,570·5	52·06	65·09
Francy Canaan Beauty No. 71719..	2	9	22	7	371·5	12·34	15·43
	2	9	22	30	1,564·0	49·26	61·58
Zorra Hengerveld No. 77746.....	2	6	1	7	355·0	12·13	15·17
	2	6	1	30	1,421·5	47·14	58·93
Ottawa Francy Bos De Kol No. 75342.....	2	7	1	7	324·0	10·87	13·59
	2	7	1	30	1,374·0	44·29	55·36

Name and Number of Cow	Breed	Age at commencement of test	Number days milking	Pounds of milk produced	Pounds of fat produced	Average per cent fat
Grace Fayne Aaggie, No. 48612	Holstein	6	305	21,473	832	3·87
Grace Allen Ormsby, No. 22333	"	9	365	24,630	802	3·25
Midnight Jewel De Kol, No. 46558	"	6	365	20,467	774	3·78
Lyons Segis Butter Girl, No. 68058	"	2	365	17,825	640	3·59
Helena Keyes Posch, No. 21376	"	9	259	18,526	561	3·03
Helena Keyes Plus, No. 44067	"	5	365	13,660	503	3·68
Sprinbank Posch Canary, No. 39598	"	6	333	13,349	493	3·69
Queen Colantha Dewdrop, No. 40768	"	5	305	12,220	458	3·75
Zorra De Kol, No. 22593	"	9	365	12,044	456	3·78
Korndyke Canary Butter Maid, No. 49648	"	4	365	12,710	453	3·56
Flora De Kol Korndyke, No. 41737	"	5	305	11,185	396	3·54
Lyons Segis Bessie Ann, No. 64286	"	2	365	12,581	379	3·01
Auchenbay Mina 5th, No. 70080	Ayrshire	4	365	16,243	677	4·17
Starlight of Fredericton, No. 53712	"	4	340	12,565	567	4·51
Hairshaw Tibbie, No. 70082	"	7	365	10,315	438	4·25
Jessie of Oaklawn, No. 45657	"	6	323	10,095	385	3·81
Brampton Vinnie Beth, No. 17341	Jersey	4	305	7,346	411	5·59
Ottawa Burma Lady 2nd, No. 11398	"	2	365	7,409	374	5·05

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 milk 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.

HORSES

At the present time, there are 31 horses at the Central Experimental Farm, 14 draught geldings and mares, 2 general-purpose horses, 3 drivers and 12 registered Clydesdales.

In connection with work performed for the various divisions on the Central Farm, the horses have accounted for 7,210 days.

COST OF MAINTENANCE OF TWENTY-THREE DRAUGHT HORSES

Total feed	$ 2,634 59
Labour (stable attendance)	1,150 00
Interest (6% on $5,750)	345 00
Shelter (estimated at $25 per horse)	575 00
Harness and repairs	240 97
Miscellaneous (including shoeing, veterinary service and sundries)	374 40
Total yearly cost	$ 5,319 96
Cost per horse	171 58

YEARLY FEED CONSUMPTION

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

Hay (timothy and mixed)	6,530·0 lbs.
Oats	5,862·3 "
Bran	547·5 "

Two great Clydesdale mares at the Central Experimental Farm. Good examples of the kind that raise the type of horses in demand for farm or city and that can themselves develop the most economical farm power.

FOAL REARING IN 1922

The rearing of pure-bred foals has not been successful during the past year, due to conditions difficult of satisfactory explanation. As in the past, pre-inoculation of mares has been carried on, making use of a product of the Lederle Antitoxin Laboratories. Of six foals delivered, one foal was lost from joint ill. This was a typical case, symptoms appearing two days after foaling, the foal dying the following night. Four of the remaining foals were lost from a condition which could not definitely be considered as having any connection with joint ill. All foals were strong at birth, with the exception in all cases that they were unable to stand on the front legs. Post mortem examination (see later) showed weakness and actual rupture of the tendons of the front legs.

A brief description of each case is given as follows:—

Foal No. 1.—Mare; foaled May 8, 1922, to service of stallion No. 1. Weak in front legs at birth; very strong foal otherwise; evidence of weakness, July 19, 1922.

Foal No. 2.—Mare; foaled May 31, 1922, to service of stallion No. 2. Strong and normal at birth. Symptoms of joint ill noticed June 2 and curative doses vaccine administered; foal died June 3, a typical case of joint ill.

Foal No. 3.—Mare; foaled June 3, 1922 to service of stallion No. 1. Apparently strong and normal aside from front legs; absolute lack of control and unable to stand; strong and normal on hind legs. Died June 5. Post mortem examination disclosed weakened, elongated tendons in front legs.

Foal No. 4.—Horse; foaled June 23, 1922 to service of stallion No. 1. Strong and normal in hind quarters but no control of front legs. Died July 4, after having been placed in splints and bandages. Immediate cause of death due to septic poisoning, the result of naval infection; no symptoms of joint ill. Post mortem examination disclosed one elongated and weakened and one ruptured tendon in front legs.

Foal No. 5.—Horse; foaled June 30, 1922 to service of stallion No. 2. Normal with exception of front legs; absolutely no control; splinted and bandaged; died July 4. Post mortem examination disclosed both tendons in front legs ruptured.

Foal No. 6.—Horse; foaled July 10, 1922 to service of stallion No. 1; strong, other than front legs, which were similar to previous cases. Died July 16, examination disclosing one ruptured tendon and one weak and elongated.

Whether the cause of the foregoing chapter of accidents, all of peculiarly like nature, has been due to the sire, to methods of management, or to some obscure combination of both influences, is not clear. All mares were apparently in the best condition for normal foaling; none were over fat; all had received plenty of exercise during the winter; in one case only was there evidence of joint ill.

During the past winter, a test has been started in order to ascertain (1) some further insight into the cause of the trouble experienced and as described; (2) to obtain further evidence as to the effect of vaccines in controlling joint ill infection; (3) to note the probable effect of administering potassium iodide in small quantities, at two-week intervals, to pregnant mares. While owing to the high quality and limited number of the mares and the risk in subjecting them to experiment—the scope of such work must of necessity be limited, interesting results are hoped for during the approaching foaling season. The services of imported horses of high quality and sound breeding have been available and at this writing the mares are in excellent condition.

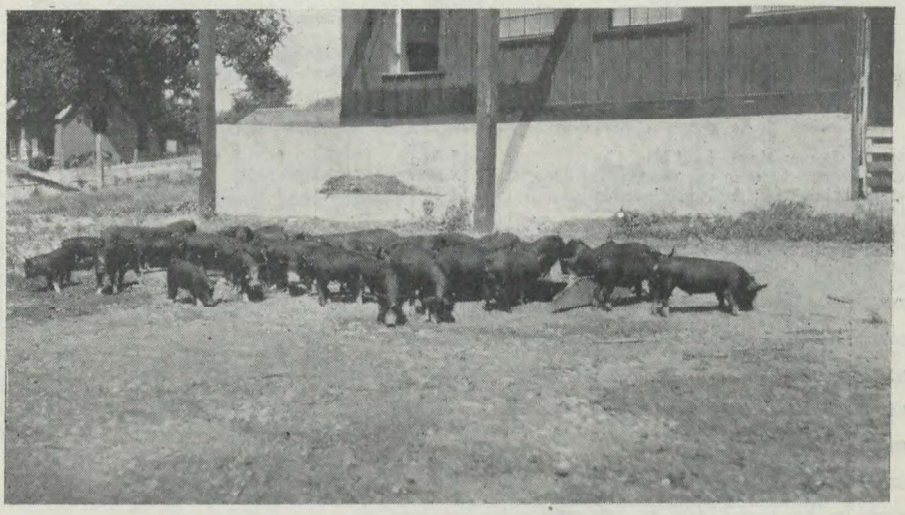
SWINE

The herd at Central Experimental Farm numbers in all 185 head, this including 119 Yorkshires and 66 Berkshires. During the year 68 Yorkshire pigs and 18 Berkshire pigs were sold for breeding purposes, the majority of these being boars, and over 25,000 pounds of pork were also sold.

New Yorkshire blood was introduced into the herd through the Yorkshire boar Agassiz Bonus—80699 from the highclass herd of Yorkshires at the Experimental Farm at Agassiz, B.C.

Constructive breeding has been continued with the Berkshire herd and many of the younger sows give strong promise of developing into individuals

possessing remarkable length and depth of body, smoothness of shoulders, and a general smoothness and blending of the parts that promises well for the improvement of the bacon type possessed by this breed, combined with a retention of the desired Berkshire characteristics.



To develop essential bacon characteristics careful feeding at weaning time is particularly essential in the case of the Berkshire pig.

The Berkshire sows at the Central Experimental Farm are of good bacon type, not quite so prolific as the Yorkshires but capable of raising more pigs to weaning age.

ANALYSIS OF FEEDS

In order to obtain a definite knowledge of the character of the feeds which were utilized for the different experiments, representative samples of each of these feeds were taken and presented for analysis to the Division of Chemistry.

The results of these analyses are herewith submitted:—

ANALYSES OF FEEDS

Animal Husbandry Division, C.E.F.

Lab'y. No.	——	Moisture	Protein	Fat	Carbo-hydrates	Fibre	Ash
		%	%	%	%	%	%
63023	Shorts: Maple Leaf Mlg. Co.	12·59	16·35	4·56	53·65	8·75	4·20
63024	Bran: Lake of the Woods Mlg. Co.	13·59	15·82	4·35	50·39	10·50	5·35
63025	Middlings: Ogilvie Flour Mills Co.	12·55	16·51	4·20	58·33	4·97	3·44
63026	Grd. Barley Meal, C.E.F.	12·36	13·02	2·12	66·58	3·72	2·20
63027	Grd. Oats, Geo. Saunders, Ottawa.	9·02	11·35	5·87	61·08	9·97	2·71
63028	Hulless Oats, C.E.F.	12·05	15·74	5·87	61·10	2·91	2·33
63029	Grd. Corn, Geo. Saunders, Ottawa.	11·08	8·66	4·45	73·34	2·40	1·07
63030	Bone Meal, Swift Can. Co.	7·80	26·20	5·48	.....	.....	58·52
63031	Beef Bone Meat Meal, St. John Fert. and Stock Feed Co.	2·71	24·96	20·52	.....	.....	46·99
63032	Fish Meal, St. John Fert. and Stock Feed Co.	14·00	43·94	2·61	.....	.....	34·07
63033	Linseed Oil Meal. Sherwin Williams Ltd.	7·09	37·12	8·30	35·76	6·99	4·74
63034	Digester Tankage, Reg. No. 545, Swifts Can. Co.	11·50	48·08	8·26	.....	.....	26·43
63035	Meat Meal, Reg. No. 546, Swifts Low Percent Tankage	8·81	44·84	7·79	.....	.....	32·22
63036	Motherwell's Staminax Milk Hog Feed Motherwell Grain Co., Dundas, Ont.	11·35	16·29	4·16	56·68	2·95	8·57
63037	Prolac. Prolac., Mlg. Co., Des Moines, Iowa	11·42	16·72	5·82	55·28	5·12	5·64

Lab'y No. 63023.—Shorts: Guarantee: protein 16·0%, fat 5·0%, fibre 9·5%. Though slightly lower in fat this feed may be said to fairly meet its guarantee.

The guaranteed analysis is not in accord with the standard for shorts in the matter of fibre: the standard for shorts is protein 16·0%, fat 5·0%, fibre 8%.

Lab'y No. 63024. Bran: The standards for bran are protein 15·0%, fat 3·5%, fibre 11·5%. The sample satisfactorily meets the requirements of the standards.

Lab'y No. 63025. Middlings: The standards for middlings are protein 16·5%, fat 3·5%, fibre 4·5%. Though very slightly higher in fibre, this sample meets satisfactorily the requirements of the standards.

Lab'y No. 63026. Ground Barley Meal: of excellent quality.

Lab'y No. 63027. Ground oats: of good quality.

Lab'y No. 63028. Hulless oats: of good quality.

Lab'y No. 63029. Ground corn: of good quality but somewhat below the average in protein.

Lab'y No. 63030: Bone meal: This sample in addition to 26·20% protein and 5·48% fat contains 23·70% phosphoric acid, the equivalent of 51·66% tricalcic phosphate.

Lab'y No. 63031. Beef, bone meal. This sample in addition to 24·96% protein 20·52% fat, contains 18·18% phosphoric acid, the equivalent of 39·63% tricalcic phosphate.

Lab'y No. 63032. Fish Meal. A dry yellowish-brown product, in the form of a fine and coarse powder, odour not altogether pleasant but not distinctly offensive. Apparently sound and wholesome. The protein content is to be considered as satisfactory, having in view the somewhat large percentage of bone that is present. The percentage of fat is exceptionally low for a fish meal; this, while from one point of view, may be considered as an undesirable feature may on the other hand be regarded as enhancing the keeping qualities of the product.

It contains 12·28 per cent of phosphoric acid, the equivalent of 26·77 per cent tricalcic phosphate.

Lab'y No. 63033. Linseed Oil Meal: of good quality. It carries a guarantee of protein: 33·0%, fat 5·5% fibre 7·5%, which it very satisfactorily meets.

Lab'y No. 63034. Digester Tankage. Guarantee: protein 60·0%, fat 8·0%, phosphates 6·0%. This feed does not meet its guarantee in protein by approximately 12%. It contains 9·73% phosphoric acid, the equivalent of 21·21% tricalcic phosphate. While not in agreement with its guarantee, it is apparently a sound, wholesome meal.

Lab'y No. 63035. Low per cent Tankage: Guarantee: protein 46%, fat 4·0%, phosphates 10%. It scarcely meets its guarantee in protein, but otherwise is satisfactory. Its phosphoric acid content is 11·93% the equivalent of 26·01% tricalcic phosphate. It is apparently a sound, wholesome meal, and is quite similar in appearance to No. 63034.

Lab'y No. 63036. Motherwell's Staminax Milk Hog Feed. In composition this feed approaches a fine quality of middlings. Its guarantee reads, protein 17·0%, fat 4·0%, fibre 3·9%. It may be said to satisfactorily meet its guarantee.

Lab'y No. 63037. Prolac: Its guarantee reads—protein 27·45%, fat 4·75%, fibre 3·0%. It fails to meet its guarantee in protein by more than 10% and further contains an excess of 2% fibre.

Experiments 1922 and 1923

The following experimental tests were conducted at various periods throughout the summer and winter, as will be observed from a study of these tests. Three breeds of swine entered into these tests, i.e. the Yorkshire, Berkshire and Tamworth breeds. Of these three the last named breed, however, features in only one test. Each pair of hogs in this particular test was entered by a different breeder, with the exception of two lots which were selected from the herd at the Central Experimental Farm, Ottawa.

In the remainder of the tests only the Yorkshires and Berkshires have featured, and these two breeds have been utilized for the various feeding tests, breed tests and comparisons, and also for the purpose of obtaining figures on the cost of bacon production.

PASTURING HOGS

OBJECTS OF EXPERIMENT

1. To compare oats, barley, Japanese millet, sweet clover and oats, and sudan grass, as pasture crops for hogs.
2. To determine the cost of bacon production with hogs on pasture.

Plan of Experiment

Lot	Breed	Number of days on test	Meal rations fed	Other Feeds
I	Yorkshires	40	Middlings 1 Shorts 1 Oats 1 Corn 1 Tankage 5%	Skim-milk. Oat pasture.
II	Yorkshires	62	Middlings 4 Shorts 1 Oats 1 Corn 1 Tankage 5%	Skim-milk. Barley pasture.
III	Berkshires	58	Middlings 1 Shorts 1 Oats 1 Barley 1 Tankage 5%	Skim-milk. Japanese millet.
V	Yorkshires	58	Same as fed to Lot III.	Skim-milk. Sweet clover and oat pasture.

Breed		Pen 1 Oat pasture	Pen II Barley pasture	Pen III Japanese millet	Pen V Sweetclover and oats
		Yorks	Yorks	Berks	Yorks
Number of pigs in experiment	No.	8	6	9	8
Initial wt. gross (July 6)	lbs.	735	453	455	517
Initial wt. average	"	91·8	75·5	50·5	64·6
No. of days on test	days	40	62	58	58
Finished wt. gross	lbs.	1,069	923	913	907
Finished wt. average	"	133·6	153·6	101·4	113·3
Total gain for period	"	334	470	458	390
Av. daily gain per group	"	8·3	7·58	7·9	6·71
Av. daily gain per hog	"	1·03	1·26	0·87	0·84
Area of pasture (acres)	acres	0·15	0·15	0·09	0·09
Amount of meal eaten by group	lbs.	880	1,127	890	896
Amount of milk eaten by group	"	2,050	2,380	2,040	2,366
Amount meal per lb. gain	"	2·63	2·39	1·94	2·29
Amount milk per lb. gain	"	6·1	5·06	4·23	6·06
*Total cost of feed	$	18·25	22·90	18·40	18·64
Cost of feed per head	$	2·28	3·65	2·04	2·33
Cost of feed per head daily	cts.	5·7	5·8	3·5	4·01
Feed cost to produce 1 lb. gain	"	5·46	5·87	4·01	4·79

*No charge for pasture, in table.

DEDUCTIONS

The strongest and most persistent growth was experienced with the Japanese millet. The nine hogs on this plot (115 by 30 feet) were unable to consume this crop quickly enough and it was found necessary after August 3, 1922, to divide the plot in half and place six other pigs on the remaining half of the plot.

The meal consumption was lowest per pound of gain with the hogs on the Japanese millet as was also the milk consumption, and even although the average daily gains per hog were lower than with the hogs on oats or barley pasture this lot made the most economical gains by a considerable margin.

The greatest gains were made by the lot on barley pasture, this lot showing an average gain of 1·26 pounds per hog per day and a feed consumption of 2·39 pounds of meal and 5·06 pounds of milk per pound of gain at a feed cost of 4·87 cents.

The second highest gains were made by the hogs on the oat pasture, but these were the most expensive gains made by any lot in the test, the hogs on this pasture averaging 2·63 pounds of meal and 6·1 pounds of milk at a cost of 5·46 cents per pound of gain. The lowest gains were made by the hogs on sweet clover and oat pasture, but this lot ranked second to the lot on Japanese millet in economy of gains with a feed cost of 4·79 cents, and a feed consumption of 2·29 pounds of meal and 6·06 pounds of milk.

Lot IV which was placed on sudan grass pasture had to be eliminated from the test as this pasture lasted only for about one week and no comparison could be obtained.

The pasture crops were sown on June 5, 1922, and the hogs were placed on the plots on July 6, 1922, when the growth of forage averaged from 6 to 9 inches in length.

Fresh water was supplied to lot 1 and although this was kept before them at all times no particular benefit seems to have been derived from this practice since the cost of production was highest with this lot.

Therefore in so far as this test is concerned it may be stated.—

1. That Japanese millet has a materially greater carrying capacity as a pasture crop than either oat, barley, or sweet clover and oats pasture.

2. That Japanese millet is the most persistent grower of these four pasture crops followed by sweet clover and oats, barley, and oat pasture in the order named.

3. That Japanese millet pasture is capable of producing pork most economically and is followed in order by combination sweet clover and oat pasture, barley pasture, and oat pasture.

To raise litters such as these, a sow must have capacity, strength, good mammary development and plenty of teats.

BACON HOG FEEDING TEST

OBJECTS OF EXPERIMENT

1. To compare Yorkshire, Berkshire, and Tamworth hogs of different lines of breeding with regard to their respective adaptabilities for the production of bacon carcasses.

2. To determine the age at which hogs representing these three breeds of swine can be finished for manufacture into bacon carcasses when fed on similar rations.

3. To determine the cost of bacon production.

WEIGHTS

All feeds consumed were accurately weighed and the meal for each lot kept in a separate compartment in the feed house.

The hogs were weighed at the commencement of the test and at varying intervals during the test to determine when the hogs were heavy enough for bacons, and were also weighed on removal from the experiment.

PRICES CHARGED FOR FEEDS

All feeds consumed were charged at the actual cost of these feeds. The meal ration cost $31.20 per ton. The composition of this ration is given in the summary following the table. The cracked corn cost $30 per ton, the green feed $7 per ton and the skim-milk 30 cents per hundred pounds.

Hog Feeding Contest

Central Experimental Farm, Ottawa

Lots	Lot No. 1	Lot No. 2	Lot No. 3	Lot No. 4	Lot No. 5	Lot No. 6	Lot No. 9	Lot No. 10	Lot No. 11	Lot No. 12	Lot No. 13	Lot No. 14
Sex	2 barrows.	2 barrows.	2 sows....	1 barrow..	2 sows....	2 barrows.	2 barrows.	2 barrows.	2 sows....	2 sows....	2 barrows.	2 barrows.
Breed	York.....	York.....	York.....	York.....	York.....	York.....	Tam.....	Tam.....	Tam.....	Berk.....	Berk.....	Berk.....
Number of hogs in contest	2	2	2	(1 hog died, elimin-ated)	2	2	2	2	2	2	2	2
Date of birth	Mar. 11/22	Mar. 16/22	Mar. 9/22	Mar. 25/22	Mar. 14/22	Mar. 20/22	Mar. 29/22	Mar. 9/22	Mar. 29/22	Mar. 22/22	Mar. 23/22	Mar. 3/22
Age at commencement of test (days)	81	76	83	67	78	72	63	83	63	70	69	89
Age at end of test (days) (average)	188	238	217·5	195	212·5	189·5	225	200·5	225	198	197	196
Initial weight gross (lbs.)	125	83	117	50	77	87	96	106	77	114	103	113
Initial weight average (lbs.)	62·5	41·5	58·5	50	38·5	43·5	48	53	38·5	57	51·5	56·5
Finished weight gross (lbs.)	431	445	407	190	456	397	481	398	475	403	380	381
Finished weight average (lbs.)	215·5	222·5	203·5	190	228	198·5	240·5	199	237·5	201·5	190	195·5
No. of days on test (aver.), (days)	107	162	134·5	128	134·5	117·5	162	117·5	162	128	128	107
Total gain for period (lbs.)	306	362	290	140	379	310	385	292	398	289	277	258
Average gain per animal (lbs.)	153	181	145	140	189·5	155	192·5	146	199	144·5	138·5	149
Average daily gain per animal (lbs.)	1·43	1·11	1·08	1·09	1·41	1·32	1·18	1·24	1·22	1·13	1·08	1·39
Amount of meal eaten for period (lbs.)	721	1,022	930	440	919	802	1,016	717	998	722	715	568
Amount of milk eaten for period (lbs.)	2,260	3,350	2,770	1,392	2,770	2,310	3,500	2,115	3,440	2,390	2,390	1,015
Amount of green feed eaten for period (lbs.)	120	120	120	80	120	120	120	120	120	120	120	120
Amount of meal eaten per lb. gain (lbs.)	2·35	2·82	3·20	3·55	2·42	2·58	2·63	2·45	2·50	2·49	2·58	2·12
Amount of milk eaten per lb. gain (lbs.)	7·38	9·25	9·55	9·95	7·31	7·45	9·09	7·24	8·64	8·27	8·62	7·14
Total cost of feed $	18·39	26·30	23·15	11·31	22·98	19·80	26·67	17·90	26·22	18·82	18·70	15·01
Cost of feed per head (aver.). $	9·19	13·15	11·57	11·31	11·49	9·90	13·33	8·95	13·11	9·41	9·35	7·50
Cost of feed per head per day. cts.	8·59	8·11	8·52	8·83	8·40	8·42	8·23	7·61	8·09	7·35	7·30	7·00
Cost per pound gain cts.	6·00	7·26	7·98	8·07	6·12	6·38	6·92	6·13	6·58	6·51	6·75	5·61

SUMMARY AND RESULTS

This test was commenced at the Central Experimental Farm on May 31 1922 with twelve pairs of hogs. Each pair was from individual breeders and were litter mates. These hogs were fed until finished when they were removed and slaughtered and the carcasses scored with regard to their adaptability to produce Wiltshire sides. It was necessary to carry some of the hogs for a longer period than would otherwise have been the case because of the fact that unforeseen circumstances prevented the slaughtering of the hogs when approximately the desired weight and finish had been obtained.

Six pairs of Yorkshires, three pairs of Tamworth and three pairs of Berkshires were placed on the test. The ages of these pigs at that time varied to some extent as will be observed from the chart. Eight hogs from these lots were considered finished when they had been 107 days on test, seven more were selected at the end of 128 days and the remainder were slaughtered after 162 days. This last lot was carried for a longer period than was necessary as previously mentioned. The first seventy-five pounds of meal fed, or roughly the meal ration for the first 18 days was composed of the following mixture: middlings, 2 parts; oat flour, 1 part; ground oats, 1 part; and tankage three per cent. This ration was fed in the form of a milk slop twice a day. For the remainder of the feeding period the ration was composed of middlings, 1 part; shorts, 1 part; ground barley, 1 part; ground oats, 1 part; and tankage 3 per cent. This was also fed with skim-milk. In addition to this meal ration an average of 51 pounds of ground corn was supplied each pair of pigs towards the latter part of the feeding period. When the hogs were placed in the runs a good stand of alfalfa was present but this was gradually consumed and the roots destroyed and it was found necessary to supply each pair of hogs with an additional amount of green feed totalling 120 pounds per pen.

No natural shelter was available so portable cabins were used. These cabins had a partition placed in the centre, longitudinally, and each pair of hogs had access to half a cabin with a yard about 15 by 24 feet.

Trouble was experienced with some of the hogs due to constitutional disturbances of one sort or another. This was more pronounced with a number of the Yorkshires and these failed to make as satisfactory gains as they otherwise would. One hog from Lot No. 4 died at the end of 88 days and a post-mortem examination showed congestion of the lungs.

The average number of days that these hogs were on test gives the following figures:—Berkshires, 121 days; Yorkshires, 130 days; and Tamworths, 147 days. One pen of Yorkshires was finished in 107 days from the commencement of the test, as was also one pen of Berkshires. These Yorkshires were approximately 6·3 months of age when slaughtered and averaged 215·5 pounds live weight. The pair of Berkshires which finished at the same time were eight days older and averaged 195.5 pounds when slaughtered. These figures suffice to show that bacon type hogs can be produced in a period of approximately six months from the time of birth.

Comparing the three breeds on the basis of cost of production the average cost per pound gain for the Yorkshires was 6·96 cents; for the Tamworths 6·54 cents; and for the Berkshires 6.29 cents. The pounds of feed eaten per pound of gain showed an average food consumption for the Yorkshires of 2.75 pounds of meal and 8·48 pounds of skim-milk; for the Tamworths 2·52 pounds of meal and 8·32 pounds of skim-milk; and for the Berkshires 2·39 pounds of meal and 8.01 pounds of skim-milk.

DRESSED CARCASSES

The dressed carcasses from these hogs were scored by experts procured by the Live Stock Branch, Department of Agriculture, Ottawa. When judged on their suitability to produce Wiltshire sides the following results were obtained: eleven Yorkshire carcasses scored an average of 92.2 points out of a possible 105 points, the six Tamworth carcasses ranking next with an average score of 89.7 points and these were followed by the six Berkshire carcasses scoring an average of 86.9 points. The highest individual score was made by a Yorkshire with 94.5 points. The lowest score made by a Yorkshire was 89.5 points. The scores of the Berkshire carcasses were very uniform there not being more than 1.6 points difference between the highest and lowest scores of these carcasses. The highest score for a Tamworth carcass was 91.9 points, while the lowest score was 84.5 points.

HOME-MIXED vs. COMMERCIAL FEED

OBJECTS OF EXPERIMENT

1. To compare Motherwell's Staminax Milk Hog Feed with a home-mixed ration.

PLAN OF EXPERIMENT

Lot	Breed	No. of hogs	How fed	Meal Ration Feed	Other Feeds
I	Yorkshire	3	Trough	Barley, 1 part Oats, 2 parts Shorts, 1 part Middlings, 1 part Oil meal, 5 p.c. Tankage, 3 p.c.	Skim-milk
IV	Yorkshire	4	Self-feeder	Motherwell's Staminax Milk Hog Feed.	Skim-milk*

* The skim-milk supplied Lot IV was fed in a trough.

WEIGHTS

Weights of all feed consumed were kept. The hogs were weighed individually when placed on the test, at the end of each thirty day period and at the end of the test.

HOUSING

The hogs were confined to pens in the main piggery without access to yards or runs at any time throughout the test.

PRICES CHARGED FOR FEEDS

Barley	per ton	$28 00
Oats	"	36 00
Shorts	"	30 00
Middlings	"	30 00
Oil meal	"	56 00
Tankage	"	55 00
Motherwell's Staminax Milk Hog Feed	"	65 00
Skim-milk	per cwt.	0 20

		Lot I Meal and Milk. Trough feed.	Lot IV Motherwell Feed. Self-fed.
Number of hogs in experiment	No.	3	4
Initial weight, gross	lbs.	135	255
Initial weight, average	"	45	63·7
Number of days in experiment	days	90	90
Finished weight, gross	lbs.	471	753
Finished weight, average	"	157	188·2
Total gain for period	"	336	498
Average daily gain per hog	"	1·25	1·38
Amount of meal eaten by group	"	584	1,156
Amount of skim-milk eaten by group	"	1,998	2,826
Pounds of meal eaten per lb. gain	"	1·73	2·32
Pounds milk eaten per lb. gain	"	5·94	5·67
Total cost of feed	$	13·23	43·22
Cost of feed per head	$	4·41	10·80
Cost of feed per head per day	cts.	4·9	12·00
Cost of feed to produce 1 lb. gain	"	3·9	8·6

DEDUCTIONS

It was suggested by the manufacturers of Motherwell's Staminax Milk Hog Feed that this feed be fed in self-feeders. This procedure was followed with the result that the lot fed in this way produced greater gains but made these gains with a greater feed consumption than the lot fed the home-mixed ration in troughs.

The daily gain for the former lot averaged 1·38 pounds while the latter averaged 1·25 pounds, or ·13 of a pound less.

The meal consumption for the former lot was 2·32 pounds per pound of gain and for the latter lot 1·73 pounds or ·59 of a pound less, while the milk consumption was 5·67 and 5·94 pounds respectively.

Compared in the final analysis of cost of feeds to produce a pound of gain the Motherwell's Staminax Meal fed lot cost 8·6 cents while the home-mixed meal fed lot cost 3·9 cents or an average of somewhat less than half the cost.

It may be deduced from this test: —

1. That home-mixed feeds when properly balanced are capable of producing more economical gains.

2. That self-fed hogs consume greater quantities of feed per pound of gain produced than trough-fed hogs.

3. That Motherwell's Staminax Milk Hog Feed is capable of producing greater daily gains when self-fed to hogs than a home-mixed ration which was trough-fed.

GROUND HULLESS OATS VS. GROUND OATS

OBJECTS OF EXPERIMENT

1. To compare ordinary oats with hulless oats as a feed for the growing hog.

2. To determine if hulless oats are capable of producing greater gains than ordinary oats.

3. To obtain information relative to the influence which hulless oats may exert in the ration.

PLAN OF EXPERIMENT

Lots	Breed	No. of hogs	Meal Ration	Other Feeds
1	Yorkshire	3	Barley, 1 part Oats, 2 parts Shorts, 1 part Middlings, 1 part Oil meal, 5 p.c. Tankage, 3 p.c.	Skim-milk
2	Yorkshires	4	Barley, 1 part Hulless oats, 2 parts Shorts, 1 part Middlings, 1 part Oil meal, 5 p.c. Tankage, 3 p.c.	Skim-milk

Both lots were trough-fed for the whole period of 90 days. The hogs were housed in pens without access to the open air, or yards of any kind.

The hogs were about 3 months of age when started on this test.

PRICES CHARGED FOR FEEDS

Barley	per ton	$28 00
Oats	"	36 00
Shorts	"	30 00
Middlings	"	30 00
Hulless oats	"	36 00
Oil meal	"	56 00
Tankage	"	55 00
Skim-milk	per cwt.	0 20

GROUND HULLESS OATS VS. GROUND OATS

		Lot I	Lot II
		Oats	Hulless Oats
Number of hogs in experiment	No.	3	4
Initial weight, gross	lbs.	135	202
Initial weight, average	"	45	50·5
Number of days on test	days	90	90
Finished weight, gross	lbs.	471	644
Finished weight, average	"	157	161
Total gain for period	"	336	442
Average daily gain per hog	"	1·25	1·22
Amount of meal eaten for period	"	584	843
Amount of milk eaten by group	"	1,998	2,505
Amount of meal eaten per lb. gain	"	1·73	1·90
Amount of skim-milk eaten per lb. gain	"	5·94	5·66
Total cost of feed	$	13·23	19·27
Cost of feed per head	$	4·41	4·82
Cost of feed per head daily	cts.	4·9	5·35
Feed cost to produce 1 lb. gain	"	3·9	4·36

DEDUCTIONS

The results obtained from this test resemble in some respect the results obtained from a similar test conducted the previous year. The greatest daily gain on this year's test is found with the ground-oat-fed lot, and this corresponds with the former year's results. There, however, is very little difference in this respect for this last year the hulless oat-fed lot only making ·03 pounds less gain per hog per day than the oat-fed lot.

The pounds of feed required to produce one pound of gain shows that the hulless oat lot required 1·90 pounds of meal and 5·66 pounds of milk while the oat-fed lot required 0·27 pounds of meal less and 0·28 pounds of milk more per pound of gain.

Compared on the basis of cost of feed required to produce one pound of gain in live weight, the oat-fed lot shows a cost of 3·9 cents while the hulless oat fed lot show a cost of 4·36 cents or 0·46 cents greater cost per pound of gain in live weight.

This last test shows hulless oats to considerably greater advantage than in the former test conducted during the previous year.

As noted last year the outstanding fact from this test is the remarkable economy of gain possible with an oat ration supplemented with the feeds used in this test. In this respect the meal consumption and also the milk consumption both show a decrease in the pounds of feed required to produce a pound of gain in live weight. The only difference in the rations between these two tests is the addition of one part of barley to this year's ration.

It was noted during the last year's test that the hogs on hulless oats showed a tendency to looseness of the bowels in the early stages of the test, but which later disappeared. This trouble was practically negligible in the present test.

MILK SUBSTITUTE EXPERIMENT

OBJECTS OF EXPERIMENT

1. To compare a ration composed of meal and skim-milk with a ration composed of meal and Pro-lac meal (dried buttermilk and meal feed).
2. To compare a ration composed of meal and skim-milk with a ration composed of meal and water.
3. To compare meal and Pro-lac with meal and water.

PLAN OF EXPERIMENT

Lot	Breed	Number of Hogs	How fed	Meal Rations	Other Feeds
I	Yorkshire	3	Trough	Oats, 2 parts Barley, 1 part Shorts, 1 part Middlings, 1 part Oil meal, 5% Tankage, 3%	Skim-milk Charcoal
III	Yorkshire	5	Trough	Oats, 2 parts Barely, 1 part Shorts, 1 part Middlings, 1 part Oil meal, 5% Tankage, 3%	Pro-lac Charcoal
IV	Yorkshire	4	Trough	Oats, 2 parts Barley, 1 part Shorts, 1 part Middlings, 1 part Oil meal, 5% Tankage, 3%	 Water Charcoal

PRICES CHARGED FOR FEEDS

Oats	per ton	$36 00
Shorts	"	30 00
Barley	"	28 00
Middlings	"	30 00
Oil meal	"	56 00
Tankage	"	55 00
Pro-lac	"	50 00
Skim-milk	per cwt.	0 20

The Pro-lac meal used in this test was manufactured by the Pro-lac Milling Company, DesMoines, Iowa, and is recommended as a substitute for skim-milk or buttermilk. The manufacturers recommend that it be mixed with water and allowed to stand from 12 to 24 hours in order to permit fermentation to begin. The amount of Pro-lac used as suggested by the manufacturers was one pound of Pro-lac to 65 pounds of water, or 6½ Imperial gallons. This is then added to the meal and the whole fed as a slop.

It is described as whole buttermilk reinforced with choice cereal and animal proteins and fats. Its guaranteed analysis calls for 27.45 per cent of protein, 4·75 per cent of fat, 3 per cent of fibre and 55 per cent of carbohydrates. Analysis of the sample used in this test showed that it failed to meet its guarantee in protein by more than 10 per cent and contained an excess of 2 per cent of fibre.

MILK SUBSTITUTE EXPERIMENT

		Lot I	Lot III	Lot IV
		Meal and Milk	Meal and Pro-lac	Meal and Water
Number of hogs in experiment	No.	3	5	4
Initial weight, gross	lbs.	135	247	295
Initial weight, average	"	45	49·4	73·7
Number of days in experiment	days	90	90	90
Finished weight, gross	lbs.	471	656	523
Finished weight, average	"	157	131·2	130·7
Total gain for period	"	336	409	228
Average daily gain per hog	"	1·25	0·90	0·63
Amount of meal eaten by group	"	584	1,130	927
Amount of skim-milk eaten by group	"	1,998	.....	.....
Amount of Pro-lac eaten by group	"	.....	50	.....
Pounds meal eaten per lb. gain	"	1·73	2·76	4·06
Pounds milk eaten per lb. gain	"	5·94	.....	.....
Pounds Pro-lac eaten per lb. gain	"	.....	0·12	.....
Total cost of feed	$	13·23	21·62	18·98
Cost of feed per head	$	4·41	4·32	4·74
Cost of feed per head per day	cts.	4·9	4·8	5·26
Cost of feed to produce 1 lb. gain	"	3·9	5·28	8·32

DEDUCTIONS

The results from this test would indicate that a meal and water ration is incapable of producing economical gains. This lot was included for the purpose of serving as a check for the other milk feeds. The required amount of meal to produce one pound of gain was 4·06 pounds for this lot, while the addition of about 4·4 per cent of Pro-lac reduced the meal consumption by 1·30 pounds and the addition of skim-milk to the ration showed the feed consumption to be 1·73 pounds of meal and 5·94 pounds of milk to produce one pound of gain. These results show that 5·94 pounds of skim-milk replaced 2·33 pounds of meal, which gives milk a very high value indeed, while with the Pro-lac lot the addition of 0·12 pounds of Pro-lac meal resulted in a reduction of 1·3 pounds of meal.

The cost of production per pound of gain showed 3·9 cents for the skim-milk fed lot, 5·28 cents, or 1·38 cents greater, for the Pro-lac fed lot, and 8·32 cents, or 4·42 cents greater, for the water fed lot.

These results would indicate that:—

1. Meal supplemented with water alone is incapable of producing economical gain.

2. Meal supplemented with Pro-lac meal is capable of producing greater gains than meal and water as well as more economical gains. This would seem

to indicate that Pro-lac meal can be given a place in the ration as a substitute for skim-milk when no milk is available but not when milk is available.

3. Meal and skim-milk are capable of producing considerably greater gains and also more economical gains with a lower feed consumption than are either of the other two rations tested.

4. Judging from this test Pro-lac seemed to exercise a beneficial influence on the health of the pigs, reducing losses from constitutional disturbances and parasitic infestations.

COMPARISON OF CORN vs BARLEY

Corn and barley feeding with Yorkshire and Berkshire pigs from three to six months of age.

OBJECTS OF EXPERIMENT

1. To determine the respective value of corn and barley for hogs from three to six months of age.

2. To determine the particular relationship existing between the age of the pigs and the adaptability of these feeds for bacon production.

3. To determine the quantities of barley or corn that should be fed to pigs of the above mentioned ages and its relation to the remainder of the ration.

4. To compare Yorkshire and Berkshire swine on similar rations, and fed and housed under similar conditions.

PLAN OF EXPERIMENT

PERIOD I

Lots	Period	Breed	Number of Pigs	Meal Ration Fed		Other Feeds
I.....	First 30 days	Yorkshire.....	9	Corn Oats Bran Shorts Oil meal Tankage	2 parts 2 parts 1 part 1 part 3 per cent 3 per cent	Skim-milk
II.....	First 30 days	Yorkshire.....	8	Barley Oats Bran Shorts Oil meal Tankage	2 parts 2 parts 1 part 1 part 3 per cent 3 per cent	Skim-milk
III.....	First 30 days	Berkshire.....	10	Similar to Lot I.....		Skim-milk
IV.....	First 30 days	Berkshire.....	10	Similar to Lot II.....		Skim-milk

PERIOD II

I.....	Second 30 days	Yorkshire.....	9	Corn Oats Bran Shorts Oil meal Tankage	4 parts 2 parts 1 part 1 part 3 per cent 3 per cent	Skim-milk
II.....	Second 30 days	Yorkshire.....	8	Barley Oats Bran Shorts Oil meal Tankage	4 parts 2 parts 1 part 1 part 3 per cent 3 per cent	Skim-milk
III.....	Second 30 days	Berkshire.....	10	Similar to Lot I.....		Skim-milk
IV.....	Second 30 days	Berkshire.....	10	Similar to Lot II.....		Skim-milk

PERIOD III

Lot	Period	Breed	Number of Pigs	Meal Ration Fed		Other Feeds
I.....	Third 30 days	Yorkshire.....	9	Corn Shorts Oats Oil meal Tankage	3 parts 1 part 1 part 3 per cent 3 per cent	Skim-milk
II.....	Third 30 days	Yorkshire.....	8	Barley Shorts Oats Oil meal Tankage	3 parts 1 part 1 part 3 per cent 3 per cent	Skim-milk
III.....	Third 30 days	Berkshire.....	10	Similar to Lot I.....		Skim-milk
IV.....	Third 30 days	Berkshire.....	10	Similar to Lot II.....		Skim-milk

WEIGHTS

All feeds were carefully weighed and mixed in the specified combinations by weight. Individual weights of the pigs were taken immediately before the commencement of experiment and at the end of each thirty day period.

HOUSING

All lots were trough-fed in enclosed pens provided with covered sleeping births and had free access to open air yards throughout the experiment. This test was conducted under winter conditions.

PRICES CHARGED FOR FEEDS

Corn	per ton	$30 00
Barley	"	28 00
Shorts	"	30 00
Bran	"	30 00
Oats	"	36 00
Oil meal	"	56 00
Tankage	"	55 00
Skim-milk	per cwt.	20c.

CORN vs. BARLEY EXPERIMENT

PERIOD I—FIRST 30 DAYS

—		Lot I Yorks. Corn	Lot II Yorks. Barley	Lot III Berks. Corn	Lot IV Berks. Barley
Number of hogs in test	No.	9	8	10	10
Initial weight gross	lbs.	558	497	591	532
Initial weight average	"	62	62·1	59·1	53·2
Number of days on test	days	30	30	30	30
Finished weight gross	lbs.	849	648	871	638
Finished weight average	"	94·3	77·1	87·1	63·8
Total gain for period	"	291	151	280	206
Average gain per hog	"	32·3	18·8	28	20·6
Average daily gain per hog	"	1·07	0·62	0·93	0·68
Amount of meal eaten for period	"	644	468	560	480
Amount of skim-milk eaten for period	"	1,620	1,296	1,800	1,000
Amount of meal per lb. gain	"	2·21	3·09	2·0	2·33
Amount of skim-milk per lb. gain	"	5·56	8·58	6·42	4·85
Total cost of feed	$	14·06	10·23	12 45	4·88
Cost of feed per head	$	1·56	1·28	1 24	0·99
Cost of feed per head per day	cts.	5·2	4·26	4·13	3·3
Cost of feed per lb. gain	"	4·76	6·77	4·44	4·31

PERIOD II—SECOND 30 DAYS

—		Lot I Corn	Lot II Barley	Lot III Corn	Lot IV Barley
Number of hogs on test	No.	9	8	10	10
Initial weight gross	lbs.	849	648	871	638
Initial weight average	"	94·3	77·1	87·1	63·8
Number of days on test	days	30	30	30	30
Finished weight gross	lbs.	1,157	955	1,191	929
Finished weight average	"	128·5	119·3	119·1	92·9
Total gain for period	"	308	307	321	291
Average gain per hog	"	34·2	38·3	32·1	29·1
Average daily gain per hog	"	1·14	1·27	1·07	0·97
Amount of meal eaten for period	"	785	756	840	720
Amount of skim-milk eaten for period	"	1,638	1,340	1,800	1,200
Amount of meal eaten per lb. gain	"	2·55	2·46	2·62	2·47
Amount of milk eaten per lb. gain	"	5·31	4·36	5·60	4·12
Total cost of feed	$	16·04	15·06	17·43	14·06
Cost of feed per head	$	1·78	1·88	1·74	1·40
Cost of feed per head per day	cts.	5·93	6·26	5·80	4·7
Cost of feed per lb. gain	"	5·20	4·90	5·43	4·83

PERIOD III—THIRD 30 DAYS

—		Lot I Corn	Lot II Barley
Number of hogs in test	No.	9	8
Initial weight, gross	lbs.	1,157	955
Initial weight, average	"	128·5	119·3
Number of days on test	days	30	30
Finished weight, gross	lbs.	1,580	1,316
Finished weight, average	"	175·5	164·5
Total gain for period	"	423	361
Average gain per hog	"	47	45·1
Average gain per hog per day	"	1·56	1·50
Amount of meal eaten for period	"	1,075	950
Amount of skim-milk eaten for period	"	1,620	1,440
Amount of meal eaten per lb. gain	"	2·54	2·63
Amount of skim-milk eaten per lb. gain	"	3·83	3·98
Total cost of feed	$	20·82	17·95
Cost of feed per head	$	2·31	2·23
Cost of feed per head per day	cts.	7·66	7·43
Cost of feed to produce 1 lb. gain	"	4·92	4·94

DEDUCTIONS

During the first period of 30 days as will be seen from the plan of experiment the meal ration included one-third barley or corn. A study of the table covering the first 30-day period shows that the corn-fed lots, both Yorkshire and Berkshire, made considerably greater gains than the barley-fed lots and also made these gains at a lower meal consumption per pound of gain, the lowest meal consumption being shown by the Berkshire lot on the corn ration, this followed in turn by the Yorkshire lot on corn, the Berkshire lot on barley and the Yorkshire lot on barley. This poor showing by the barley-fed pigs can at least be partly traced to the fact that both the Yorkshire and Berkshire lots on barley went off their feed during this period for a few days, this being more noticeable in the Yorkshires. Compared on the basis of the cost of feed to produce one pound of gain in live weight, both Berkshire lots produced pork more economically than the Yorkshire lots. The Berkshires on barley ranked first with a feed cost of 4·31 cents, the Berkshires on corn ranked next with a feed cost of 4.44 cents, followed by the Yorkshire lot on corn, and lastly the Yorkshire lot on barley.

For the 2nd period of 30 days the Yorkshire lots made greater daily gains than the Berkshire lots, the barley-fed Yorkshires leading the corn-feds by a greater average daily gain of 0·13 pounds per hog. The corn-fed Yorkshires led the corn-fed Berkshires by an average daily gain of 0·07 pounds per hog, and these were followed by the barley-fed Berkshires with 0·1 pounds of gain less per hog per day. This last lot, however, showed the lowest meal and milk consumption per pound of gain for the four groups, being closely followed by the barley-fed Yorkshires which lot as above noted made the greatest gains per day. The corn-fed Yorkshires ranked next in meal and milk consumption, followed by the corn-fed Berkshires.

Compared on the basis of cost of feed per pound of gain the barley-fed Berkshires lead with 4·83 cents, followed in turn by the barley-fed Yorkshires with a feed cost of 0·07 cents greater, the corn-fed Yorkshires with a feed cost of 0·37 cents greater and the corn-fed Berkshires with a feed cost of 0·6 cents greater than the barley-fed Berkshires.

The meal ration for the second period was composed of barley or corn in the proportion of 50 per cent of the whole meal ration.

It was observed throughout this latter period that the Berkshire lots were laying on fat too rapidly and were not developing the scale and type required for the bacon class of hog; the ration which they were receiving apparently tending to bring the hogs to maturity at too early an age rather than encouraging the development of the size and scale which it was desired to obtain. Many of the hogs particularly on the corn ration were rapidly developing into what is commonly known as shop hogs. This was equally true of the barley-fed lot but to a lesser extent because these hogs were not in as high condition as the corn-fed lot. Since this exemplified in so far as this test was concerned that the ration was apparently of too heavy a nature to develop Berkshires into bacon hogs, and as this was one of the objects of the test it was decided to remove the Berkshire lots from the experiment and supply them with a ration calculated to encourage more rapid growth rather than permit them to develop into small thick hogs of the shop hog type.

For the last 30-day period, therefore, the two Yorkshire lots only were fed. The gains in this period were considerably greater in both the corn-fed and barley-fed lots, the average daily gain per hog for the corn-feds being 1·56 pounds, and for the barley-feds 1·50 pounds. In this period the barley lot consumed an average of 0·09 pounds of meal and 0·15 pounds of milk more per pound of gain than the corn-fed lot. The feed cost per pound of gain for the barley-fed group was 0·02 cents greater than was the case with the corn-fed group.

Averaging the results for the three periods for the two Yorkshire groups it is shown that the corn-fed lot made gains at a feed cost of 4·77 pounds of skim-milk and 2·35 pounds of meal, at a cost of 4·98 cents per pound of gain as compared to an increased meal consumption of 0·3 pounds and milk consumption of 0·2 pounds and an increased cost of 0·28 cents per pound of gain for the barley-fed lot.

Because of the fact, however, that the first period was abnormal in that the barley-fed group went off their feed for a few days, figures from the latter 60 days might be considered as the more accurate. From a study of this period it is found that the corn-fed lot required an average of 2·54 pounds of meal and 4·45 pounds of milk per pound of gain while the barley-fed lot required 0·02 pounds more meal and 0·29 pounds less milk, these last being fed at a cost of 4·92 cents per pound of gain while the corn-fed lot cost 5·04 cents or 0·12 cents greater per pound of gain.

The total gain in live weight was moreover slightly greater for the barley-fed Yorkshires during the last 60 days but because of the poor gains made during the first period the barley-fed Yorkshires finished 11 pounds lighter, on the average, than did the corn-fed hogs.

The barley-fed Berkshires during the first 30 days suffered in a manner similar to the Yorkshires and this would seem to emphasize the fact that the quality of the feed was at fault. During the second 30 days this lot made considerably greater gains but not quite equal to the corn-fed lot the latter lot making one-tenth of a pound greater daily gains per hog.

The meal consumption for the barley-fed lot during the second period averaged 2·47 pounds per pound of gain while the corn-fed lot required 2.62 pounds of meal. The milk consumption was 4·12 pounds and 5·60 pounds respectively. It will be seen from this that while the daily gains were lower the consumption of feeds was also lower. Compared on the basis of cost of feed per pound of gain the barley-fed lot showed a cost of 4·83 cents or 0·6 cents less than the corn-fed lot.

Wisconsin Experimental Station found that a ration of barley and whey when fed to growing and fattening pigs was instrumental in producing slightly greater gains than corn and whey. The surprising part of the experiment was the fact that whey contained sufficient protein to adequately supplement the barley and corn.

The following deductions may be drawn:—

1. That barley compared favourably with the corn, producing slightly greater gains under normal conditions, with Yorkshire swine. With Berkshire swine corn produced greater gains. The cost of production, however, proved lower for the barley-fed lots with both breeds.

2. That Yorkshire swine were capable of successfully utilizing 33⅓ per cent of corn or barley at about three to four months of age, 50 per cent at about four to five months of age, and 60 per cent from five to six months of age, and that Berkshire swine were not capable of utilizing similar quantities of feeds at the same ages, to develop into bacon hogs.

3. That corn meal as compared with barley meal is capable of producing a hog, higher in condition and fit than will the same weight of barley. This is to be expected since corn is higher in carbohydrates, contains twice the per cent of fat but is lower in protein and ash than barley.

4. That a meal ration consisting of 30 to 50 per cent of corn or barley meal when fed to hogs ranging in age from three to five months, tends to produce a hog shorter in length of side and thicker in conformation than is desirable for bacon type hogs.

5. That a meal ration comprising 60 per cent of corn meal or barley meal can be successfully fed to Yorkshire hogs ranging in age from five to six months.

ORGANIC SUPPLEMENTS

Supplementing the ration with fish meal and packing house by-products fed in self-feeding hoppers.

OBJECTS OF EXPERIMENT

1. To determine if the addition of commercial organic supplements to the ration are capable of increasing the total gains.

2. To determine the amount of such meals as digester tankage, meat meal, fish meal and beef and bone meal that growing hogs will consume when these are supplied in self-feeding hoppers.

3. To determine whether the elimination of skim-milk from the ration of hogs of about five months of age when the foregoing supplements were supplied might result in a reduction of the daily gains for a given period.

PLAN OF EXPERIMENT

FIRST PERIOD

Lot	Period	Breed	Number of Hogs	Meal Ration Fed	Other Feeds
I.....	60 days	Yorkshire.....	3	Oats 2 parts Barley 1 part Shorts 1 part Middlings 1 part Oil meal 3 per cent	Skim-milk
II.....	60 days	Yorkshire.....	4	Same as for Lot I	Skim-milk Tankage
III.....	60 days	Yorkshire.....	3	Same as for Lot I	Skim-milk Meat meal
IV.....	60 days	Yorkshire.....	5	Same as for Lot I	Skim-milk Fish meal
V.....	60 days	Berkshire.....	5	Same as for Lot I	Skim-milk Beef and bone meal

SECOND PERIOD

This experiment during the second period was conducted with the same lots of hogs and in the same manner as during the first period with the exception that the skim-milk was eliminated from the rations of all lots.

It was originally the intention to conduct this experiment without milk but as the hogs were not considered to be far enough advanced it was decided to supplement the meal ration with milk for the initial part of the period.

It was arranged to supply the supplementary feeds in hoppers. These feeds were available for the hogs at all times and the hogs were given the opportunity of supplementing the ration supplied with these meals.

WEIGHTS

Records of all the meal and other feeds consumed were carefully kept. The weights of meal and mineral feeds utilized during the second period being kept separate from the feed consumed during the initial period.

The hogs were weighed individually at the commencement of the test, at the end of 30 days, at the end of the 60-day period, and at the end of the test.

HOUSING

All lots were housed inside the main piggery and were not given access to yards or runs of any kind throughout the duration of the test.

PRICES CHARGED FOR FEEDS

Barley	per ton	$28 00
Oats	"	36 00
Shorts	"	30 00
Middlings	"	30 00
Oil meal	"	56 00
Tankage	"	55 00
Meat meal	"	45 00
Fish meal	"	60 00
Beef and bone meal	"	80 00
Skim-milk	per cwt.	0 20

THE VALUE OF ORGANIC SUPPLEMENTS TO THE RATION

PERIOD I—60 DAYS

—		Lot I Yorks.	Lot II Yorks. Tankage	Lot III Yorks. Meat Meal	Lot IV Yorks. Fish Meal	Lot V Berks. Beef and Bone Meal
Number of hogs in test	No.	3	4	3	5	5
Initial weight, gross	lbs.	171	196	150	247	198
Initial weight, average	"	57	49	50	49·4	39·6
Number of days on test	days	60	60	60	60	60
Finished weight, gross	lbs.	388	493	385	623	509
Finished weight, average	"	129·3	123·2	128·3	124·6	101·8
Total gain per period	"	211	297	235	376	311
Average daily gain per lot	"	3·61	4·95	3·91	6·26	5·18
Average daily gain per hog	"	1·20	1·23	1·30	1·25	1·03
Amount of meal eaten by group	"	474	578	444	740	570
Amount of supplements eaten by group	"	.....	32	42	35	20
Amount of skim-milk	"	1,136	1,440	1,080	1,800	1,600
Amount of meal per lb. gain	"	2·29	1·94	1·89	1·96	1·83
Amount of supplement eaten per lb. gain	"	.....	0·10	0·17	0·09	0·06
Amount of skim-milk per lb. gain	"	5·38	4·84	4·63	4·78	5·14
Per cent of supplements consumed	per cent	.....	5·53	9·45	4·72	3·51
Total cost of feed	$	9·46	12·55	9·86	15·89	12·67
Cost of feed per head	$	3·15	3·13	3·29	3·18	2·53
Cost of feed per head per day	cts.	5·25	5·21	5·48	5·3	4·21
Cost of feed per lb. of gain	"	4·48	4·22	4·19	4·22	4·07

DEDUCTIONS

A study of this test for the first sixty days shows that with the exception of lot V, the hogs receiving the supplemental organic meals made greater gains than the hogs receiving the regular ration. The one exception noted was a pen of hogs which averaged about 10 pounds lighter than the other four pens when placed on the test and this may explain in part the reason that these hogs failed to make as great gains.

All lots receiving mineral meals made these gains with a meal consumption averaging from 0·35 to 0·47 pounds lower per pound of gain while the milk consumption averaged from 0·21 to 0·72 pounds lower than the check lot. The highest cost of production on the basis of cost of feed per pound of gain was shown by the lot receiving no supplementary meals.

The greatest gains were made by the lot receiving meat meal, this lot making an average daily gain of 1·3 pounds with a feed consumption of 1·89 pounds of meal, 4·63 pounds of milk, and 0·17 of a pound of meat meal, at a cost per pound of gain of 4.19 cents. The average consumption of meat meal was 9.45 per cent of the meal ration.

The lot fed fish meal showed the next largest gain with an average daily gain per hog of 1·25 pounds, with a feed consumption of 1·96 pounds of meal, 4·78 pounds of milk, and 0·09 pounds of fish meal, at a feed cost of 4·22 cents per pound of gain. The tankage fed lot ranked next in total gains with an average daily gain per hog of 1·23 pounds and a feed consumption of 1·94 pounds of meal 4.84 pounds of milk, and 0.10 pounds of tankage, at a feed cost of 4·22 cents per pound of gain. As will be seen from these figures these latter two lots were practically identical. The meal and milk lot (without the addition of any organic supplement) ranked next in total gains but these were made with a considerably greater meal consumption and also a greater milk consumption per pound of gain and at an increased cost per pound of gain over the tankage and fish meal fed lots of 0.26 cents per pound.

The lowest average daily gains were made by the hogs receiving beef and bone meal but as these gains were made with a lower meal consumption per pound of gain than shown by any other lot the cost of producing a pound of gain was 4·07 cents or 0·12 cents less than the meat meal fed hogs.

From these results the following deductions may be drawn for this test:—

1. That organic supplements tend to increase production when added to a meal and milk ration.

2. That organic supplements resulted in a reduction of a cost of bacon production.

3. That the feeding of organic supplements by the self-feeding method would seem to offer a practical method of supplying the required organic constituents to the ration of growing pigs.

THE VALUE OF ORGANIC SUPPLEMENTS IN THE RATION

SECOND PERIOD—30 DAYS

—		Lot I	Lot II Tankage	Lot III Meat Meal	Lot IV Fish Meal	Lot V Beef and Bone Meal
Number of hogs in test	No.	3	4	3	4	5
Initial weight of hogs, gross	lbs.	388	493	385	512	509
Initial weight of hogs, average	"	129·3	123·2	128·3	128	101·8
Number of days on test	days	30	30	30	30	30
Finished weight, gross	lbs.	472	648	470	615	601
Finished weight, average	"	157·3	162	156·6	153·7	120·2
Total gain for period	"	84	155	85	103	92
Average daily gain per lot	"	2·8	5·16	2·83	3·43	3·06
Average daily gain per hog	"	·93	1·29	·94	·86	·61
Amount of meal eaten by group	"	405	495	326	468	425
Amount of organic supplement eaten by group	"	.....	11	14	16	10
Percent of organic supplement eaten by group.	per cent	.....	2·26	4·29	3·41	2·35
Amount of meal per lb. gain	lbs.	4·8	3·12	3·83	4·54	4·61
Amount of organic supplement per lb. gain	"	.....	·07	·16	·15	·10
Total cost of feed	$	6·16	7·72	5·45	7·60	6·86
Cost of feed per head	$	2·05	1·93	1·82	1·90	1·37
Cost of feed per head per day	cts.	6·83	6·43	6·06	6·33	4·56
Cost of feed per lb. gain	"	7·33	4·98	6·53	7·37	7·45

A study of the second period when the skim-milk had been removed from the ration shows that all lots averaged considerably lower daily gains with the exception of the lot receiving tankage, which lot showed slightly greater daily gain than during the previous period when the ration included skim-milk. The meal consumption was in every instance increased by the elimination of the skim-milk and with the exception of the tankage fed lot was more than doubled, in which lot the increased meal consumption was about 60 per cent over that consumed when the milk was fed as compared to 109 per cent increase with Lot 1 where no supplementary meals were fed, 102 per cent with the meat meal fed lot, 131 per cent increase with the lot fed fish meal, and 153 per cent for the beef and bone meal fed lot.

These results seem to emphasize the high value of skim-milk as a supplement to the meal ration and also indicates very clearly the value of digester tankage as a substitute for skim-milk for shoats, this feed showing as superior to the meat meal in feeding value when no milk was fed.

PULPED ROOTS VS. BEET PULP FOR BROOD SOWS

OBJECT OF EXPERIMENT

To compare beet pulp and mangels with the object of determining whether either of these feeds are instrumental in influencing the numbers, health, size and condition of the litters when these feeds are supplied to the sows during the gestation period.

To compare the difference in the cost of rations to which beet pulp or mangels have been added.

PLAN OF EXPERIMENT

In order to obtain further information relative to the value of beet pulp and pulped mangels this test has been repeated again this year. The results from the last year's test showed mangels to be less expensive and the sows to which these were fed showed larger and more numerous litters.

For the purpose of obtaining a basis of comparison five Yorkshire sows were fed on pulped mangels and five were fed on beet pulp in addition to the meal ration, for the total gestation period.

The sows on beet pulp were given a daily ration of 1 pound of beet pulp (dry) and seven pounds of the meal mixture, while those on mangels were given a daily ration of five pounds of meal and five pounds of mangels.

The meal ration was composed of one part of oats, two parts of bran, two parts of shorts, 5 per cent of tankage and 2 per cent of bone meal.

WEIGHTS

The pigs were weighed immediately after the full litter had been farrowed and before they had been returned to the sow.

PRICES CHARGED FOR FEED

Shorts	per ton	$30 00
Oats	"	36 00
Bran	"	30 00
Tankage	"	55 00
Roots (mangels)	"	2 60
Best Pulp	"	25 50
Bone meal	"	55 00

PULPED ROOTS vs. BEET PULP FOR BROOD SOWS

FEEDING YORKSHIRE BROOD SOWS DURING GESTATION

Feeds		Lot I Beet Pulp and Meal	Lot II Pulped Roots and and Meal
Number of sows in experiment	No.	5	5
Number of days fed (average)	days	114	115
Quantity of meal eaten by group	lbs.	3,990	2,875
Quantity of roots or beet pulp eaten by group	"	560	2,875
Quantity of meal eaten per animal	"	798	575
Quantity of roots or beet pulp per animal	"	114	575
Condition of sows at farrowing		good	good
Total cost of feed	$	68·14	49·05
Cost of feed per sow	$	13·63	9·81

RESULTS AT FARROWING

Total number of pigs farrowed	No.	53	63
Average number of pigs per litter	"	10·6	12·6
Total number of good pigs	"	48	52
Total number of small and weak pigs	"	4	9
Total number of pigs born dead	"	1	2
Per cent of good pigs	per cent	90·5	82·5
Per cent of small and weak pigs	"	7·5	14·2
Per cent of dead pigs	"	1·9	3·17
Total weight of litters at birth	lbs.	123	159
Average weight of litters	"	24·6	31·8
Average weight per pig	"	2·32	2·52
Average feed cost per pig at farrowing	cts.	128·6	77·8

DEDUCTIONS

The results obtained from this test are in accord with those obtained from a similar test conducted last year, the sows which were fed pulped roots averaging larger and heavier pigs and also litters. While the factor of heredity enters into this test and doubtless will exercise an influence on the litters, still the results of these two years' tests indicated that pulped mangels are the more suitable for the feeding of brood sows although both these feeds rank high as sources of succulence for the ration of pregnant sows.

The mangel fed sows during the previous year averaged 2·5 more pigs per litter while this year the average was 2·6 more pigs per litter, than the sows fed beet pulp. The percentage of small and weak pigs and also of dead pigs was greater with the mangel fed sows, this condition being the reverse of the previous year.

COST OF PRODUCTION OF BACON HOGS

Raising Berkshire hogs from two months of age to finishing (at about 175 pounds).

OBJECT OF EXPERIMENT

To obtain cost of production figures relating to the raising of bacon hogs.

PLAN OF EXPERIMENT

Five Berkshire hogs farrowed on March 1 were placed on this experiment starting April 28 and fed for a period of 153 days or until seven months of age.

For the first 30 days the ration was composed of two parts each of middlings, shorts, and oats, one part of corn, and 3 per cent of tankage. After 30 days the corn was increased to two parts. Skim-milk was fed for the whole period.

WEIGHTS

All feeds used were weighed, and records kept. The hogs were weighed when placed on the experiment, and also at the end of the test. Individual weights were taken.

COST OF PRODUCTION—WEANING TO FINISHING

Number of hogs in experiment	No.	5
Weight at 2 months	lbs.	147
Weight, average	"	29·4
Number days on test	days	153
Finished weight, gross, at 7 months	lbs.	873
Finished weight, average	"	174·6
Total gain for period	"	726
Average daily gain per animal	"	·94
Amount of meal eaten by group	"	1,163
Amount of skim-milk eaten by group	"	3,932
Amount of meal eaten per lb. gain	"	1·6
Amount of skim-milk eaten per lb. gain	"	5·4
Total cost of feed	$	26 96
Cost of feed per head	$	5 39
Cost of feed per head per day	cts.	3·52
Feed cost to produce 1 lb. gain	"	3·71

The outstanding feature of this feeeding test is the remarkable economy of production, the feed required to produce a pound of gain averaging 1·6 pounds of meal and 5·4 pounds of skim-milk with a total feed cost of 3·71 cents per pound of gain.

COST OF RAISING PIGS TO TEN WEEKS

(1) Service of boar	$ 1 00	$ 1 00
(2) Feed cost of dam during gestation—		
575 lbs. meal at $33.60 per ton	2 71	
(Bran 2, shorts 2, Oats 1; 3 per cent tankage, 2 per cent bone meal)		
600 lbs. pulped mangels at $4	1 20	
50 lbs. mixed clover hay at $7	17	
		11 08
(3) Farrowing to weaning—		
245 lbs. of meal at $32.10 per ton	$ 3 94	
(Shorts, oats, middlings, equal parts; bone meal 2 per cent)		
400 lbs. of skim-milk at $0.20 per cwt	80	
		4 74
(4) Feed Cost of weaned litter from 7 to 10 weeks of age (including meal eaten by pigs while with sow)—		
84 lbs. of meal (middlings, oat flour and oil meal) at $34 per ton	1 43	
480 lbs. of skim-milk at $0.20 per cwt	96	
		2 39

SUMMARY

Feed cost of sow (breeding to weaning)	$15 92
Feed cost of pigs at ten weeks	2 39
Services of boar	1 00
Total cost of 7 pigs at 10 weeks	$19 21
Average cost per pig	2 74

COMPARISON OF YORKSHIRE AND BERKSHIRE FARROWING AND WEANING RECORDS, 1922 AND 1923

Breed	Total number of sows farrowed.	Total number of pigs in litters	Average number of pigs per litter.	Total number of dead pigs at birth.	Per cent of dead pigs at birth.	Total number of small and weak pigs at birth.	Per cent of small and weak pigs.	Total number of normal and living pigs at birth.	Per cent of normal and living pigs at birth.	Total number of living pigs at eight weeks.	Total losses during the first eight weeks.	Per cent of losses during first eight weeks.	Average number of pigs per litter at birth.	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 for feeding purposes.
Yorkshire	30	327	10·9	12	3·6	39	11·9	276	84·4	205	122	37·3	10·9	6·83	62·6	153	75	52	25
Berkshire	15	128	8·53	1	0·8	12	9·4	115	89·8	96	32	25·0	8·53	6·4	75·0	63	65·5	33	34·5
1921-1922																			
Yorkshire	29	335	11·5	28	8·38	54	16·11	253	75·5	195	140	41·7	11·5	6·72	58·2	141	72·3	54	27·6
Berkshire	15	133	9·2	3	2·1	18	13·04	117	34·78	95	43	31·15	9·20	6·3	68·4	64	67·3	31	32·6

RECORDS OF YORKSHIRE AND BERKSHIRE HERDS

Comparison of Farrowing and Weaning Records

An analysis of the results obtained from these two breeds shows that the average number of pigs farrowed per litter is 0·6 less for the Yorkshires and 0·67 less for the Berkshires than were farrowed the previous year. The per cent of dead pigs at birth is less than half of what it was for the last year while the small and weak pigs showed a decrease with the Yorkshire breed of 26 per cent the Berkshire breed showing a decrease of 27 per cent. This resulted in the number of pigs raised to eight weeks also showing a substantial increase over the last year, the Yorkshires showing an increase of 4·4 per cent while the Berkshires showed an increase of 6.6 per cent. Even with this improvement the losses are still very heavy.

It is a fact worthy of note that the Berkshire herd for the last two years has shown a somewhat lower mortality at birth, a lower percentage of small and weak pigs, and a considerably higher percentage of pigs raised to eight weeks of age than the Yorkshire herd.

SHEEP

Flocks of Leicester and Shropshire sheep are maintained on the Farm. There are at the close of the fiscal year 298 sheep in the flock, made up as follows:—

Leicesters—		Shropshires—	
Breeding stock	86	Breeding stock	82
Spring lambs	70	Spring lambs	60
			298

LEICESTERS

The Leicester flock has had some setbacks during the year. Special mention must be made of the loss at various times during the winter season of eleven of the breeding ewes from a very insidious form of infectious pneumonia. This trouble developed in some of the strongest of the ewes, running a very rapid course, treatment being of little or no use as no symptoms of trouble would be evident until the disease had progressed so far that treatment was useless. Acknowledgment is here made to the Biological Laboratory of the Health of Animals Branch for assistance in tracing the cause of the trouble. They were, however, unable to do more than diagnose the disease, as pneumonia is difficult to treat in any patient and particularly in sheep.

SHROPSHIRES

The Shropshire flock is keeping in good shape and holding up well in numbers. Unfortunately here again an outstanding loss is to be reported, the aged imported ram "Buttar 223" dying shortly after being put out with the ewes in the fall. This loss was regretted very much as he was an outstanding breeding ram.

During the summer of 1922, the sheep were pastured on the Connaught rifle ranges as in previous years. They had abundance of range and good pasture on it during the season and came off in good shape in the fall.

The lambs were weaned early and the ewes flushed on fresh grass preparatory to breeding. As the flocks had become too large to breed and carry all as pure-breds, it was decided to try some cross-breeding work. The ewes of each breed were thoroughly culled out and all the better ones bred to a pure-bred ram of the same breed. The remainder of each flock was bred to a ram of the opposite breed. This will give a chance to compare pure-bred Shropshires, pure-bred Leicesters, the Leicester ewe Shropshire ram cross and the Shropshire ewe Leicester ram cross.

THE 1923 SPRING LAMB CROP FROM DIFFERENT CLASSES OF EWES

—	Number Ewes Bred	Number Ewes Lambed	Number Lambs Born	Number Lambs Raised	Per cent Raised
Pure-bred Leicesters	48	36	58	49	136
Pure-bred Shropshires	39	38	58	40	105
Leicester Ewe-Shropshire Ram, cross	22	17	28	21	123
Shropshire Ewe-Leicester Ram, cross	20	17	23	20	118

From the above it will be seen that the Leicester ewes whether bred as straight pure-breds or crossed with a Shropshire ram produced the most lambs and raised the most lambs. In other words, they make the best mothers.

This experiment is being carried on to determine the relative gains of the pure-breds and cross-breds as well as the relative gains of the different classes of cross-breds.

The 1922 wool clip yielded 1,359 pounds. This was sold co-operatively through the Canadian Co-operative Wool Growers and on a graded basis brought from 18 cents to 25 cents per pound. The majority of the Leicester wool grading "Low Combing (Lustre)" sold for 18 cents per pound and the majority of the Shropshire wool grading "Medium Combing" sold for 25 cents per pound. These prices were considerably in advance of those received last year, showing that the wool industry is recovering from the slump occurring during the years immediately after the war.

THE DAIRY

The output from the Dairy during the past year has considerably exceeded that of the previous fiscal year and in spite of lowered prices generally the gross return from this source has amounted to $13,384.12 as compared to $10,850.01.

Meilleur cheese in the curing cellar at the Central Experimental Farm.

The work of this department might briefly be classified as follows:

1. Care of milk and manufacture of butter and various kinds of cheese.
2. Distribution of milk and dairy products generally to farm and local trade.
3. Distribution of butter and cheese to private and shop trade in Ottawa.
4. Experimental work; testing new varieties of cheese, origination of new varieties; testing new methods and appliances.
5. Milk testing, both with reference to the regular herd requirements, Record of Merit testing (all of which is done by the dairyman), and free testing of milk and cream for farmers and dairymen.

EXPERIMENTAL WORK

MEILLEUR CHEESE

Readers are referred to the report of the Dominion Animal Husbandman for the year 1922 where complete details of manufacture are given concerning Meilleur cheese, and also to Pamphlet No. 27—New Series.

During the past year considerable time has been spent in perfecting this product. Due to the fact that high relative humidity is required in the curing of this product, changes and improvements in the curing room were necessary. These changes have resulted in an improved product—finer and more tender in texture, showing the very minimum of rind or crust, a reduction in time required to cure and a more uniform product generally.

Having brought this cheese to a relatively high state of perfection, it was deemed advisable to introduce it to the public as far as necessarily limited production would permit. Accordingly samples have been forwarded to a number of expert cheese manufacturers, dairy instructors and connoisseurs of cheese in general. Reports have been uniformingly gratifying. Further, this product has been sold to several of the Ottawa grocers, selecting specially those firms making a specialty of fancy cheese. The demand has been instant and the comparatively small quantity manufactured is entirely inadequate to supply even these few dealers.

The possibilities of this cheese have been investigated by several large firms and it is about to be produced by one of the largest fancy cheese manufacturing concerns in America.

Meilleur cheese is a full flavoured product and the appetite for it grows; it is sold in a convenient and attractive sized form; it ships well and retains its desirable qualities well after it is cured. It would seem that this product might have a secure place in the Canadian market provided proper manufacturing conditions are followed. Two main requirements have been indicated unmistakably, first, clean milk, fresh, sweet and free from odour; second, provision for high relative humidity in curing quarters.

BUTTERMILK AND SKIM-MILK CHEESES

For details of other soft cheeses manufactured at this Farm, readers are referred to Circulars 62 and 22, Cream Cheese and Coulommier Cheese, respectively. During the past year efforts have been directed toward the reclamation of skim-milk and buttermilk through conversion into cheese. Realizing, of course, that cheese has long been made from these sources, it was still apparent that no such product was marketed to any great extent, and the aim has been to produce a cheese appealing to the market which has been built up in Ottawa for cream cheese.

SKIM-MILK CHEESE

While some time has been spent with this by-product, little result has been attained. Skim-milk cheese is, at best, a rather dry, tasteless, insipid product, and so far best efforts here have failed to overcome these objections. Much better results have been attained with buttermilk as a base.

BUTTERMILK CHEESE

When first experimenting with this product, results somewhat similar to those with skim-milk cheese were obtained. The resulting curd was too dry and crumbly, would not spread readily and lacked smoothness and palatability, sometimes actually showing a gritty or granular texture.

Adding Cream to Improve Texture.—To overcome this, cream was added to the buttermilk in varying quantities. Without entering into details in this connection, suffice to say that, as would be expected, the more cream added, the better the resultant product—incidentally the greater the cost and the farther away from the original aim of reclaiming buttermilk in a more profitable way than heretofore.

Lowering Cooking Temperature.—Lowering the cooking temperature slightly was next tried and found to give the desired result, giving a finished product smooth in texture, relatively moist, firm and holding its form perfectly, yet sufficiently plastic to spread. Maintaining the right cooking temperature is undoubtedly the most important point in the manufacture of this cheese. (See later).

Market Possibilities.—Before taking up details, it may be stated that, as in the case of Meilleur cheese, this buttermilk cheese was subject to trial and criticism by experts and householders prior to being offered for sale. Satisfactory reports were obtained and the product is now being disposed of to the trade in limited quantities. It apparently meets with practically the same demand as cream cheese and to the less discriminating cannot be identified from the latter. Naturally, however, it lacks the smoothness and creamy texture of well made cream cheese. Compared with the latter, it has certain points of superiority, aside from lessened cost of making. (1) Will keep for several days after sale; cream cheese must be sold promptly after making and deteriorates rapidly once the package is opened and the cheese exposed to the air; (2) is more readily digestible, being composed of concentrated buttermilk and retaining in solid form the desirable qualities of this fluid; it is therefore particularly desirable for children, where the consumption of cheese, in most forms, is not considered advisable.

Returns to be Expected.—One hundred pounds of buttermilk will make about 12 pounds of cheese. Where made into cheeses of 6 ounces in weight and retailed at 12 to 15 cents each, buttermilk might be made to realize say from $3.50 to $4 per cwt., including, of course, time, cost of materials, paper, cartons, etc. This product might readily be sold to retailers at a considerably less price and still made to realize a high value on buttermilk.

When considering the manufacture of this and similar products, it must be remembered that in most cases it is necessary to build up a market or outlet. Once acquired, such a market may be held only by supplying a *uniform product.* One bad batch of cheese may permanently destroy the appetite for the product and the confidence in the producer.

Necessity for High Quality Buttermilk.—Mention should be particularly made that all and every kind of buttermilk can not be expected to produce uniformity good cheese. The quality of the latter depends on the quality of the former. Once again may be stressed this point—uniformly good manufactured dairy products depend upon *clean milking and milk that is clean and well cared for.* Buttermilk too highly acid produces a sour, disagreeably acid cheese; off-flavours in the milk reflect themselves correspondingly in the product; only fresh buttermilk, resulting from clean milk and butter making methods, need be expected to produce a high quality cheese.

DETAILS OF MAKING

Quality.—As above mentioned, use fresh, high quality buttermilk.

Quantity.—One hundred pounds of buttermilk will make approximately 12 pounds of cheese, the quantity varying with the amount of moisture left in the curd.

Heating or Cooking.—Heat the milk to 140° F. and maintain this temperature for one and a half hours. While cooking, stir only sufficiently often to insure uniform heating. One very satisfactory method is to set the container in a larger receptacle containing water of the desired temperature. Uniform coagulation of the solids will result.

Straining.—When the cooking process is complete, pour the contents into a cheese cloth strainer, suspend, and allow to drain for one hour. Straining in a warm room will hasten the process.

Salting and Pressing.—When thoroughly drained, the curd may be salted at the rate of one ounce of salt to every three or four pounds of curd (this rate may vary according to taste and also the degree of saltiness of the buttermilk). Mix and knead thoroughly. The degree of pressure and the length of time required will be indicated by the condition of the curd when salted. A soft curd requires more and longer pressure, for example, than would one of fairly dry texture. It must be borne in mind, however, that a too dry curd produces a mealy, crumbly, and, therefore, undesirable cheese. Three or four bricks (depending, of course, on the quantity of curd) placed upon a short board and the whole upon the cheese cloth containing the curd will form a sufficient and easily procured source of pressure. Press for an hour or so.

Moulding.—When pressure is complete, change the curd to a fresh, dry cloth and knead with the hands for a few minutes to ensure uniform texture. Moulding is the next step. Readers are here referred to Exhibition Circular No. 62, "Cream Cheese." Briefly, a satisfactory mould is in the form of a cylinder from 1 to 1½ inches deep and about 3 inches in diameter. Such a mould holds a cheese weighing from 5 to 6 ounces. When moulding the cheese should be pressed with a wet parchment paper which will serve as a cover or protector for the cheese, keeping it firm. Cheese cloth cut in small squares may also be used, but the wet parchment is equally satisfactory, cheaper and more convenient.

Marketing.—Such cheese should be marketed in a small, attractive carton, large enough to snugly hold the wrapped cheese. It should be marketed promptly and, as a rule, is at its best when not more than three days old. Store in a refrigerator, cool room or clean cellar.

While the foregoing has reference more to cases where fairly large quantities are made, the same principles may be applied or improvised to home manufacture where the product will be found popular and inexpensive.

OTHER WORK

Besides routine and experimental work, an increasing amount of milk testing has been necessitated owing to a greater number of cows in the herd being entered in Record of Merit test, and by the necessity of milk testing in connection with feeding trials. An increasing amount of work of this kind has been done for farmers and dairymen in eastern Ontario.

The Dairyman has given general assistance to farmers and dairymen in the district; has personally started and supervised the first manufacture of various forms of soft cheese in several commercial concerns, and visited several fairs in the vicinity as judge of dairy products.

MISCELLANEOUS

The Dominion Animal Husbandman has visited all Farms and Stations in the system at least once during the past year. Members of the Division have visited an increasing number of exhibitions, fairs, demonstrations, short courses, etc., in connection with judging, lecturing, demonstrating, etc. Increased interest has been shown this year in the live stock work of the Central Experimental Farm by thousands of excursionists and numerous impromptu short courses have been put on from time to time. A very successful three-day short course was held on the occasion of the visit of the Eastern Ontario Departmental Judges.

During the year, Ayrshire and Holstein cattle, Yorkshire and Berkshire swine and Shropshire and Leicester rams from the Central Farm have been exhibited at the first Royal Agricultural Show in Toronto with excellent results. A smaller showing was made at the Ottawa Winter Fair.

In company with the Director, Experimental Farms, the Dominion Animal Husbandman had the opportunity of visiting Great Britain during the winter of 1923 in connection with the selection and taking over of the Shire horses, the gift of the Shire Horse Society to the Dominion of Canada. A small but select lot of Ayrshire cattle was imported from Scotland for the Central Experimental Farm, Ottawa, while purchases of Large White (Yorkshire) swine and Shropshire, Leicester and Cheviot sheep were made for distribution over the Branch Farm System generally.

Cattle barns have been completed at the Experimental Stations at Rosthern, Sask., and Scott, Sask., while an excellent dairy barn is partially completed at the Experimental Station, Cap Rouge, Que., and will be completed during the summer of 1923. Other construction work of lesser nature in connection with live stock has been carried on at Charlottetown, P.E.I.; Fredericton, N.B.; Ste. Anne de la Pocatiere, P.Q.; Kapuskasing, Ont.; Swift Current, Sask.

The distribution of blue-prints of farm buildings to prospective builders has been continued as in the past.