DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

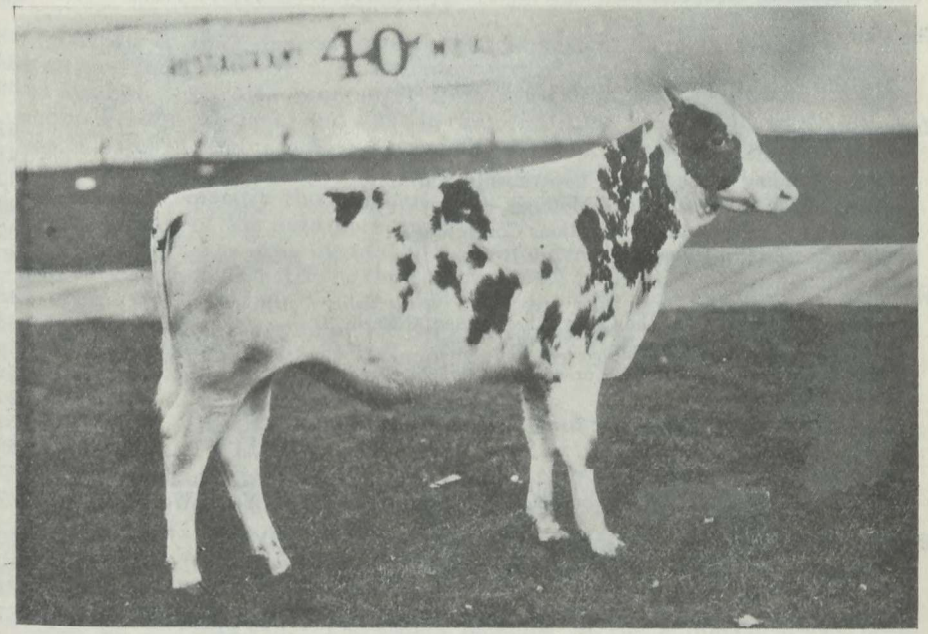
DOMINION EXPERIMENTAL FARMS

ANIMAL HUSBANDRY DIVISION

REPORT OF THE DOMINION ANIMAL HUSBANDMAN

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

FOR THE YEAR ENDING MARCH 31, 1926



OTTAWA SUPREME 15TH—94145

First-prize Junior calf, Junior and Reserve Grand Champion Ayrshire bull, Royal Winter Fair, 1925.

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REPORT OF THE ANIMAL HUSBANDRY DIVISION

BEEF CATTLE*

As in the past, no breeding beef cattle are maintained on the Central Experimental Farm, Ottawa, work in this line being confined to steer-feeding and experimental shipments of store cattle to Great Britain.

During the year, two experimental shipments of store cattle to Great Britain were made, one from Halifax to Manchester in April, 1925, and one from Montreal to Avonmouth in October, 1925. A report of the April, 1925, shipment has been published in the latter part of Bulletin No. 62, New Series, entitled "Shipping Cattle to Britain," which is a compilation of the results of a number of such shipments and which is available, free of charge, at the Publications Branch, Department of Agriculture, Ottawa. However, it has been considered advisable to reprint the report of the April, 1925 shipment in this report of the year's work with beef cattle, and to include as well a report of the October, 1925 shipment, as both of these shipments provided interesting data on the overseas cattle-shipping industry.

SHIPMENT OF STORE CATTLE TO GREAT BRITAIN, APRIL, 1925

On April 8, 1925, per ss. *Manchester Importer*, there was shipped from Halifax to Manchester by the Dominion Experimental Farms, a consignment of 114 head of store cattle originating from five Dominion Experimental Farms, three in Western Canada and two in the Maritime Provinces, consigned to Messrs. Chapman and Everett, Fakenham, Norfolk, England. This shipment was not accompanied overseas by any representative of the Department of Agriculture, consequently the Department is indebted to Messrs. Chapman and Everett for much of the data here reported.

The shipment was experimental in nature and was a continuation of experimental work in that all cattle in the shipment had been utilized for feeding test work during the previous winter. In addition, one lot (Lethbridge) was a follow-up shipment on a similar lot shipped in October, 1924, to check relative profit of fall shipping as against holding, winter stall-feeding, then shipping in spring.

OBJECTS OF THIS SHIPMENT.—1. To determine relative cost of shipping from Montreal and Halifax.

2. To determine whether the extra cost of shipping via Halifax, if any, would be offset by a higher price in Great Britain, due to getting on the market earlier than would be possible after waiting for the port of Montreal to open.

3. To obtain further data on the cost of shipment, shrinkage in transit, and other phases of export cattle-shipping business.

PLAN OF EXPERIMENT.—The steers included in the shipment were those used in winter feeding experiments at the Lethbridge, Alberta; Scott, Sask.; Swift Current, Sask.; Kentville, Nova Scotia, Experimental Stations, and Nap-

* The sections on Beef and Dairy Cattle have been prepared by Mr. G. W. Muir, Chief Assistant, with the aid of Mr. Robert Cunningham, Assistant.
The sections on Sheep and Swine have been prepared by Mr. S. J. Chagnon, Assistant.
Mr. W. G. Dunsmore, Assistant, who has charge of projects along with other duties, has been of assistance in connection with the preparation of various sections of the report.

pan, Nova Scotia Experimental Farm. They were fairly representative of the cattle available for the overseas trade in the districts from which they came. At the same time, there was sufficient difference between the respective lots and between groups within lots to make some interesting comparisons. The following gives the source of the cattle and the grouping into lots for sale purposes.

Lot 1.—Thirty-four stores—16 stores, 2-year-olds, black, from Experimental Station, Lethbridge, Alberta. Short-keeps or choice butcher cattle.

18 stores, 2-year-olds, red, from Experimental Station, Lethbridge, Alberta. Long-keeps or choice feeder cattle.

Lot 2.—Twenty stores, 2-year-olds, red, from Experimental Station, Scott, Sask. Good butchers.

Lot 3.—Twenty stores, 2-year-olds, red, from Experimental Station, Swift Current, Sask. Handy-weight butcher cattle.

Lot 4.—Twenty stores, 2-year-olds, red, from Experimental Farm, Nappan, Nova Scotia. Fair butcher cattle.

Lot 5.—Twenty stores, 2-year-olds, red, from Experimental Station, Kentville, Nova Scotia. Medium to fair butcher cattle.

COST OF SHIPPING

The cost of shipping cattle to Halifax varies according to the point from which the shipment originates. This information is given in table 1.

It will be seen that the cost of shipping to Halifax in this instance is approximately proportionate to the distance shipped. In the case of the animals from Lethbridge, Alberta, and Scott, Sask., the average charges are $6.62 per head higher than on cattle shipped from the same points to Montreal in May, 1924. (See report of this shipment.)

SHRINKAGE

Table 1 gives the shrinkage in rail and ocean shipping of the respective lots.

TABLE 1.—STATEMENT OF EXPENSES SHIPPING 114 HEAD OF CATTLE FROM EXPERIMENTAL STATIONS MENTIONED TO HALIFAX

Experimental Station		Lethbridge, Alta.	Scott, Sask.	Swift Current, Sask.	Nappan, N.S.	Kentville, N.S.
Number of steers	No.	34	20	20	20	20
Freight and other rail charges to Halifax	$	757 20	364 90	404 66	73 24	84 65
Attendants' charges (pro rated)	$	34 00	20 00	20 00	3 00	5 00
Cost per head at Halifax	$	23 27	19 25	21 23	3 81	4 48

TABLE 2.—STATEMENT OF SHRINKAGE IN CATTLE IN RAIL AND OCEAN SHIPPING

—		Lot 1 Lethbridge, Alta.	Lot 2 Scott, Sask.	Lot 3 Swift Current, Sask.	Lot 4 Nappan, N.S.	Lot 5 Kentville, N.S.
Average weight at feed lot	lb.	1,333·6	1,277·5	1,322·5	1,244·5	1,194·5
Average weight at Winnipeg	"	1,235·6	1,225·0	1,257·5	.....	.....
Shrink to Winnipeg	%	7·35	4·10	4·91	.....	.....
Average weight at Montreal	lb.	1,220·6	1,200·00	1,200·00	.....	.....
Shrink to Montreal	%	8·47	6·07	9·26	.....	.....
Average weight at Manchester	lb.	1,209·6	1,159·2	1,198·4	1,160·6	1,122·8
Shrink to Manchester	%	9·14	9·26	9·38	6·74	6·00

Unfortunately, it was impossible to get the weights of the cattle off cars and going on board ship at Halifax. Weights were obtained off ship at Manchester, however, making it possible to calculate the total shrinkage from feed lot to market in Great Britain. This, it will be noted, amounts to 9.29 per cent on the average for the western steers and 6.37 per cent on the average for the Maritime Province steers. In the case of the western cattle, this is 1.48 per cent higher than the average shrink on the western cattle in the May, 1924, shipment. In the case of the maritime cattle, it is 2.47 per cent higher than the shrink on the Lennoxville, Que., cattle in the May, 1924, shipment, in which Lennoxville cattle had practically the same length of rail haul as this year's maritime cattle.

The increase in percentage shrink in the western cattle this year is no doubt due in part to the lengthened freight haul, though it may be due in part to the quality of attendance on board ship, owing to the fact that no representative of the department was in charge. That the latter is probably the strongest factor in the case is borne out by the fact that the eastern steers shrank much more this year than last, though otherwise conditions were much the same. This points to the necessity of having a fully qualified man in charge of the shipment, as has been emphasized in other reports of shipments of this nature.

In all, 114 head were shipped and the average cost of shipping these cattle to Great Britain from their respective starting points via Halifax is given in table 3.

RETURNS FROM SHIPMENT

The cattle were split into five lots for sale in Great Britain. Table 4 gives the results obtained.

TABLE 3.—STATEMENT OF EXPENSES SHIPPING 114 STORE CATTLE TO ENGLAND VIA HALIFAX

Experimental Station	Lethbridge, Alberta	Scott, Sask.	Swift Current, Sask.	Nappan, N.S.	Kentville, N.S.
Number of steers	34	20	20	20	20
Total charges from station to Halifax $	791 20	384 90	424 66	76 24	89 65
Tags and tagging, 5c. each $	1 70	1 00	1 00	1 00	1 00
Ropes, roping, and foreman's wages $	30 20	17 77	17 77	17 78	17 78
Handling and loading $	23 80	14 00	14 00	14 00	14 00
Insurance at $130 each—$9,620 at ¼% $	27 63	16 25	16 25	16 25	16 25
Ocean feed $	190 60	112 20	112 20	112 14	112 14
Cattlemen's supplies, board, etc $	8 30	4 88	4 88	4 89	4 89
Excise stamps $	0 40	0 23	0 23	0 18	0 16
Ocean freight $	680 00	400 00	400 00	400 00	400 00
Total $	1,753 83	951 23	990 99	642 48	655 87
Less demurrage (one day at Halifax) $	17 00	10 00	10 00	10 00	10 00
Total cost to port of debarkation $	1,736 83	941 23	980 99	632 48	645 87
Average per head to port of debarkation $	51 08	47 06	49 05	31 62	32 29

TABLE 4.—RETURNS FROM SHIPMENT

——	Lot 1 Lethbridge, Alberta	Lot 2 Scott, Sask.	Lot 3 Swift Current, Sask.	Lot 4 Nappan, N.S.	Lot 5 Kentville, N.S.
Total charges to port of debarkation $	1,736 83	941 23	980 99	632 48	645 87
Overseas charges at 17/6 each at $4.80 to the £ $	142 80	84 00	84 00	84 00	84 00
Total charges $	1,879 63	1,025 23	1,064 99	716 48	729 87
Total return, exchange at $4.80 $	4,845 60	2,779 20	2,884 80	2,659 20	2,719 20
Net return $	2,965 97	1,753 97	1,819 81	1,942 72	1,989 33
Gross return per 100 pound at Manchester $	11 68	11 98	12 03	11 45	12 10
Net return per 100 pound at Manchester $	7 15	7 56	7 58	8 37	8 85
Net return per 100 pound at Farm or Station (3% shrink allowance) $	6 75	7 07	7 09	8 05	8 58
Appraised value at Farm $	6 25	6 25	6 75	6 35	6 25

35192—2½

REMARKS REGARDING VARIOUS LOTS

Lot 1—Consisting of 34 steers from Lethbridge, Alberta, was made up of 16 blacks and 18 reds, and were grouped in this way for sale. The 16 blacks were a very uniform group, showing breediness and good, even fleshing. They sold for an average of £30 9s. 9d. each, nine of the best for grazing at £32 each, and seven smaller ones for slaughter at £28 10s. each. The 18 reds were not so breedy or uniform a lot and were sold for slaughter at £29 each. Of these, Messrs. Chapman & Everett have the following to say: "A good well-bred black will always realize top price here for either keeping purposes or for slaughter. The reds were sold to a Manchester butcher to be killed, being just the size (average weight, Manchester, 1,209 pounds) and condition suitable for the Manchester requirements."

Lot 2—Consisting of 20 steers from Scott, Sask., very uniform, smooth and evenly fleshed. A few steers showing lack of depth, but well fleshed on the loin. An attractive lot. These sold for an average of £28 19s. for grazing purposes. Of these, Chapman & Everett stated: "An exceptionally good lot of short-keep cattle, full of quality, well bred, nicely selected, short-legged animals, and, when properly finished, are sure to command good prices here. They will not get coarse and heavy, but will make just nice weights suitable for either London or provincial markets."

Lot 3—Twenty steers of Hereford breeding from Swift Current, Sask., was fairly uniform in size and colour, with considerable breed type, but showing a tendency to roughness. Loins generally fairly well fleshed, but some bare, pinched-in backs noticeable. These sold for an average of £30 1s. each for grazing purposes. Chapman & Everett describe them as "handy-weight butcher cattle, having plenty of length, condition and quality, and will pay for two months' keep on early grasses."

Lot 4—Consisting of 20 good eastern steers from Nappan, N.S., were very uniform in size, fleshing and colour, lacking in breediness compared with the previous lots, with four lacking badly in beef type. They sold for an average of £27 14s. for slaughter. Of these, Chapman & Everett remark: "Very much on the plain side, leggy, some badly shaped ones amongst them, and not too well bred. This class makes, when finished off in this country, what we term carcassing animals; that is to say, suitable for wholesale trade purposes—the cheaper class meat."

Lot 5—From Kentville, N.S. This lot of 20 steers was somewhat mixed, some being of Hereford breeding, while others showed traces of dairy blood. They, therefore, lacked uniformity of size and colour. They were, however, fairly well fleshed, and sold for an average of £28 6s. 6d. each for slaughter purposes. Comment by Chapman & Everett: "Just passable everyday cattle."

PROFIT AND LOSS STATEMENT

In table 5 will be found figures giving the actual profit over feed made on these cattle from time of purchase for feeding experimental work in the fall of 1924 until sold on the Manchester market, April 22, 1925. From this table it will be noted that all lots realized a fair profit, more than would have been obtained had they been sold on the respective local markets. Regarding relative profits, this is affected materially by the cost of feeding at the different Farms as well as by the quality of the cattle fed and length of rail shipment.

In the case of the western cattle, those from Scott, Sask., show the greatest profit through having considerably the lowest feed cost.

Those from Swift Current, Sask., though not of quite as good quality from a Canadian standpoint as those from Scott or Lethbridge, nevertheless brought the highest price per head of any lot, and the second highest profit per head of the western lots.

Those from Lethbridge, while good quality cattle that sold for the second highest price per head, returned the lowest profit of any of the western cattle, this being due to an unusually high feed cost.

In the case of the maritime cattle, which were of much poorer quality than the western cattle, practically equal profit is shown. This is due to the fact that they had a very low freight charge. Also being sold for immediate slaughter, they made a somewhat higher return per head than their quality would have warranted had they been sold for grazing purposes.

FALL VS. SUCCEEDING SPRING SHIPMENT OF SIMILAR CATTLE PURCHASED AT THE SAME TIME

In the latter part of September, 1924, there was purchased at Calgary, Alberta, eighty head of steers, average weight 1,060 pounds, at an average cost of $44.31 per steer loaded on cars ready for shipment. Forty of these were shipped overseas immediately for sale as stores, (reported on in the report of the October, 1924, shipment). The remaining forty were shipped to Lethbridge for experimental feeding purposes and to be shipped to Great Britain the following spring to determine whether it is more profitable to ship cattle of this class in the early fall or to hold them, winter stall feed them, and ship in the spring. Through one cause and another only thirty-four of the forty cattle held over were available for shipment in April, 1925.

Table 6 gives the results of this phase of the shipment. It will be noted that the actual profit per animal was $7.69 in the case of those shipped in the fall of 1924 and $4.90 in the case of those shipped in the spring of 1925. However, owing to the fact that there was considerable difference in the value of the pound sterling at the respective times of shipment, and also to the fact that there was an extra rail freight charge against the 1925 shipment owing to being routed via Halifax instead of Montreal certain adjustments had to be made. These are noted in the table. As a result the fall shipment shows a profit of $12.26 per steer, while the spring shipment shows a profit of $11.52 per steer, or a difference of 74 cents per steer in favour of the fall shipment. It is to be noted that the cattle in the fall shipment when they reached Montreal averaged under 1,000 pounds per head, therefore, were shipped at the reduced ocean freight of $18 per head i.e. $2 less per head than the cattle in the April, 1925, shipment, so that they had every advantage it was possible to give them.

Manchester weights of the cattle in the fall shipment were not obtained, consequently it was taken for granted that they would shrink 9 per cent between Calgary and Manchester (a fair charge since the shrink on finished cattle in the April, 1925, shipment was only 9.29 per cent). On this basis the 1924 shipment realized $10.57 per 100 pounds and the 1925 shipment $11.68 per 100 pounds at Manchester showing a spread in price of $1.11 per 100 pounds live weight between fall and spring prices. This spread, however, was not sufficient to cover the cost of feeding over winter in this particular instance. It is to be noted, however, that the cost of feeding at Lethbridge during the winter of 1925 was unusually high. Had the cost of feed per steer been nearer the lower average cost prevailing at Scott or Swift Current, the Lethbridge steers in the 1925 shipment would have shown a profit sufficient to have made winter feeding and shipping in the spring more profitable than fall shipping of light stores. It would seem, therefore, that when an abundance of relatively cheap feed was available it would be profitable to hold steers for winter feeding and early spring shipment.

TABLE 5.—PROFIT AND LOSS STATEMENT ON VARIOUS LOTS

—		Lethbridge, Alberta	Scott, Sask.	Swift Current, Sask.	Nappan, N.S.	Kentville, N.S.
Date of shipment		April, 1925	April, 1925	April, 1925	April, 1925	April, 1925
Number of steers	No.	34	20	20	20	20
Cost of steers per head, fall, 1924	$	44 31	44 42	51 90	50 87	52 17
Total cost of steers, fall, 1924	$	1,506 78	888 40	1,038 04	1,017 50	1,043 43
Cost of feed per head to carry over	$	38 02	24 78	28 81	31 49	34 47
Total cost of feed to carry steers over	$	1,292 68	495 60	576 28	629 85	689 44
Cost of transportation to and selling in Great Britain	$	1,879 63	1,025 23	1,064 99	716 48	729 87
Total cost	$	4,679 09	2,409 23	2,679 31	2,363 83	2,462 74
Total return	$	4,845 60	2,779 20	2,884 80	2,659 20	2,719 20
Total profit per lot	$	166 51	369 97	205 49	295 37	256 46
Total profit per steer	$	4,90	18 50	10 27	14 77	12 82

TABLE 6.—PROFIT AND LOSS STATEMENT ON OCTOBER, 1924, VS. APRIL, 1925, SHIPMENT OF STEERS FROM LETHBRIDGE

		Oct., 1924	April, 1925
Date of shipment			
Number of steers		40	34
Original cost of steers	$	1,772 68	1,506 78
Cost of feed to carry over winter	$	.....	1,292 68
Cost of transportation to and selling charges in Great Britain	$	1,761 68	1,879 63
Total cost	$	3,534 36	4,679 09
Total return	$	3,842 00	4,845 60
Total profit per lot	$	307 64	166 51
Total profit per steer	$	7 69	4 90
Adjustments			
Rebate on freight due to extra haul to Halifax of $6.62 per steer	$	.....	225 08
Rebate on exchange, difference between £ at $4.52 in October, 1924, and $4.80 in April, 1925	$	182 84	.....
Adjusted total profit	$	490 48	391 59
Adjusted total profit per steer	$	12 26	11 52
Gross return per steer at Manchester all figured at $4.80 to £	$	102 00	142 50
Gross return per 100 lbs. at Manchester	$	10 57	11 68
Spread in price per 100 lbs. in favour of winter feeding and early spring shipment	$	.....	1 11

DEDUCTIONS

1. That the cost of shipping cattle from such western points as Lethbridge, Alberta, and Scott, Sask., to Great Britain via Montreal and Halifax shows a difference of $6.62 per head in favour of shipment via Montreal, this extra charge being made up almost entirely of increased rail freight charges.

2. The advantage of getting the cattle on the British market earlier by shipping via Halifax, i.e., before the port of Montreal opened, has in this case at least more than offset the increased rail freight charges and made it possible for the April, 1925, shipment to realize a fair profit on all lots of steers, but particularly on the steers from the Maritime.

3. For the first time in this series of experimental shipment of store cattle it has been possible to show the total cost price per lot of animals delivered in Great Britain and thus show the profit to be derived from the business of raising or buying cattle, feeding them, and disposing of them on the British market. The profits shown should prove encouraging to the western breeder, feeder and shipper, and more than encouraging to the maritime breeder, feeder and shipper, particularly if the latter can improve the quality of the animals shipped. The advantage that the maritime feeder and shipper has in low rail freight charges and possibility of early shipment giving him an outlet for his animals at approximately 1½ cents per pound over local prices can hardly be overestimated.

SHIPMENT OF STORE CATTLE TO GREAT BRITAIN, OCTOBER, 1925.

On October 4, 1925, per ss. *Parthenia*, there was shipped from Montreal, Canada, to Avonmouth, England, by the Dominion Experimental Farms, a consignment of 131 head of store cattle, originating from the Experimental Station at Lethbridge, Alta., and the Central Experimental Farm, Ottawa, Ont. This shipment was consigned to Messrs. Chapman and Everett, Fakenham, Norfolk, England, and was in charge of Mr. S. A. Hilton, Assistant Superintendent at the Experimental Farm, Nappan, N.S., who is responsible for much of the information tabulated herein, as well as many observations on the various markets and cattle-trade conditions in Great Britain.

The shipment was experimental in nature, being a continuation of previous experimental shipments concerning which reports have already been made. The reader should become familar with the results of previous shipments to thoroughly understand the results of this one.

OBJECTS OF THIS SHIPMENT.—1. To try out the port of Avonmouth as a shipping point and market-place for Canadian store cattle.

2. To obtain further information *re* the relative economy of shipping long-keep stores in fall vs. holding, winter stall-feeding, then shipping as short-keep stores in spring.

3. To obtain further data on cost of shipping, shrinkage in transit, most profitable weight cattle to ship, etc.

PLAN OF SHIPMENT.—The steers in this shipment included 40 from Lethbridge, Alta, purchased locally and shipped immediately to Montreal. The remaining 91 head came from Ottawa, being part of a lot of 134 purchased in Winnipeg earlier in the season for grazing purposes. At both Lethbridge, Alta., and the Central Experimental Farm, Ottawa, groups of similar cattle are being held over and fed for export in early and late spring as checks on the lots in this shipment. Following is a description of the cattle as grouped for export:—

Lot 1—Lethbridge, 20 Herefords, 10 heavy steers, 10 lighter steers, all of good type and would class as good butchers in Canada, suitable for short-keep stores in Great Britain.

Lot 2—Lethbridge, 20 steers, medium butcher cattle, mixed lot made up of 7 Blacks, 7 Shorthorns and 6 Herefords, a breedy lot but lacking uniformity in colour and type. Suitable for long-keep stores in Great Britain.

Lot 3—Ottawa, 33 Blacks, light-weight butcher cattle, of good uniform type and quality throughout. Suitable for long-keep stores.

Lot 4—Ottawa, 23 heavy steers, good butchers, mostly of Shorthorn breeding, showing good type and uniformity. Would make good short-keep stores in Great Britain.

Lot 5—Ottawa, 35 medium to light-weight steers, handy-weight butcher cattle, mixed as regards breeding, but of fair, good type. Suitable for fairly long-keep stores in Great Britain. This lot to be used to check up the lot being fed in Canada to be shipped in the spring of 1926.

Table 7 gives the cost of shipping to Montreal and table 8 the shrinkage in transit from various points of shipment to Avonmouth. It will be noted in connection with the latter table that the shrinkage in rail transit in the case of the western steers is very light. This is due to the fact that they had a short rail journey before being weighed the first time, consequently not all the shrink is recorded. It will also be noted that the shrink on board ship is practically negligible where the animals are well cared for.

Table 9 gives the expenses in connection with shipping from the various points to Avonmouth; table 10 the returns from the shipment and table 11 the profit-and-loss statement on this shipment. This last statement is probably the one that will prove the most interesting to the reader.

It will be seen that only one lot, No. 3, returned any profit, and that a very meagre one indeed. There are a number of legitimate reasons for the low returns. First and foremost amongst these is the fact that Avonmouth is not a large cattle-shipping port. The shipment probably would not have been shipped to Avonmouth had it not been that space to other ports was not available. In any event, the shipment proved fairly conclusively that the port of Avonmouth had poor facilities for handling stock as compared to other ports such as Glasgow, Liverpool and Manchester. In addition, according to Mr. W. A. Wilson, Canadian Agricultural Products Representative in England, "Avonmouth or the West of England generally is not a well developed market section for Canadian bullocks. Dairy farming has gradually extended throughout that area largely because of the demand from London and other cities for fresh milk and cream, and relatively, feeding operations have weakened." What feeding is done is generally on a limited scale and Irish stores are still more popular than Canadians. As a consequence, local buyers were not numerous and the cattle were practically all sold to Norwich buyers.

In addition, the cattle met a depressed market generally, which made sales even to Norwich buyers slow. The depression in the market was due in part to feeders being well supplied, but the fact of fresh outbreaks of foot-and-mouth disease also had a retarding influence. However, in spite of the general depression in the market, the officer of the Department who accompanied the shipment was quite decided in his opinion that had these animals been shipped to some one of the other prominent ports they would have made profitable returns, for, during the same week, supposedly similar cattle were bringing £22 to £26 per head at Glasgow. Prices at Birkenhead did not rule very much over prices at Avonmouth, but the Birkenhead market was adversely affected by the outbreak of foot-and-mouth disease in adjacent counties.

TABLE 7.—STATEMENT OF EXPENSES: SHIPPING 131 HEAD OF CATTLE FROM EXPERIMENTAL STATIONS TO MONTREAL

—		Lethbridge	Lethbridge	Ottawa	Ottawa	Ottawa
Number of steers	No.	20	20	33	23	35
Freight and other rail charges to Montreal	$	288 39	288 39	73 11	50 95	77 54
Average cost per head to land steers in Montreal from place named	$	14 42	14 42	2 21	2 21	2 21

N.B.—Lethbridge cattle originated at Dunmore, Alberta, approximately 100 miles east of Lethbridge and were first weighed at Moose Jaw, Sask.

TABLE 8.—SHRINKAGE IN TRANSIT FROM VARIOUS POINTS TO AVONMOUTH

—		Lethbridge	Lethbridge	Ottawa	Ottawa	Ottawa
Average weight at Moose Jaw, Sask	lb.	1,103·25	1·103·25	.....	.....	.....
Average weight at Montreal	"	1,058·50	1,058·50	.....	1,033	.....
Percentage shrink to Montreal	%	4·10	4·10	.....	.....	.....
Average regrouped recovery weights at Montreal	lb.	1,121·0	1,053·0	1,020	1,160	1,010·0
Average weight at Avonmouth	"	1,085·8	1,025·3	1,001	1,160	1,028·5

TABLE 9.—STATEMENT OF EXPENSES SHIPPING 131 HEAD OF CATTLE VIA MONTREAL TO AVONMOUTH

——		Lethbridge	Lethbridge	Ottawa	Ottawa	Ottawa
Number of steers	No.	20	20	33	23	35
Total charges from Station to Montreal	$	288 39	288 39	73 11	50 95	77 54
Feed at Montreal	$	34 67	34 68	36 30	26 16	38 50
Tagging and handling	$	11 00	11 00	18 15	12 65	19 25
Ropes, roping, men, etc	$	9 48	9 48	15 64	10 90	16 59
Insurance at $125 per head ($16,375 at §)	$	15 62	15 62	25 78	17 97	27 34
Switching and wharfage	$	11 20	11 20	18 48	12 85	19 60
Ocean feed	$	69 72	69 72	115 03	80 18	122 01
Ocean freight	$	400 00	400 00	660 00	460 00	700 00
Excise stamps	$	0 25	0 25	0 41	0 29	0 44
Total cost to port of debarkation	$	840 33	840 34	962 90	671 95	1,021 27
Average per head to port of debarkation	$	42 02	42 02	29 18	29 21	29 18

TABLE 10.—RETURNS FROM SHIPMENT

——		Lot number				
		1	2	3	4	5
Total charges to port of debarkation	$	840 33	840 34	962 90	671 95	1,021 27
Overseas charges at 17/6 each at $4.80 to £	$	84 00	84 00	138 60	96 60	147 00
Total charges	$	924 33	924 34	1,101 50	768 55	1,168 27
Total return	$	2,010 40	1,976 40	3,351 48	2,484 00	3,415 10
Net return	$	1,086 07	1,052 06	2,249 98	1,715 45	2,246 83
Gross return per 100 lb. at Avonmouth	$	9 25	9 61	10 14	9 27	9 49
Net return per 100 lb. at Avonmouth	$	5 00	5 12	6 81	6 43	6 24
Net return per 100 lb. on Montreal regrouped outgoing weights	$	4 84	4 99	6 68	6 43	6 36

N.B.—An extra lairage charge of 3 shillings per steer was levied, due to boat arriving too late on a Thursday for the cattle to be sold on the following Friday, consequently they had to be held over till the Monday. This charge is not included above.

TABLE 11.—PROFIT AND LOSS STATEMENT ON VARIOUS LOTS

Lot		1	2	3	4	5
Source of Lot		Lethbridge, Alberta	Lethbridge, Alberta	Ottawa, Ont.	Ottawa, Ont.	Ottawa, Ont.
Date of shipment		Oct., 1925	Oct., 1925	Oct., 1925	Oct., 1925	Oct., 1925
Number of steers	No.	20	20	33	23	35
Average cost of steers per head	$	60 68	60 67	65 00	74 45	64 30
Total cost of steers	$	1,213 58	1,214 57	2,145 00	1,712 35	2,250 50
Cost of feed previous to shipment from Farms*	$	.....	.....	99 00	69 00	105 00
Cost of transportation to and selling in Great Britain at Avonmouth	$	924 33	924 34	1,101 50	768 55	1,168 27
Total cost	$	2,137 91	2,137 91	3,345 50	2,549 90	3,523 77
Total return	$	2,010 40	1,976 40	3,351 48	2,484 00	3,415 10
Total profit or loss per lot	$	−127 51	−161 51	+ 5 98	− 65 90	− 108 67

*Range pasture for three months at $1 per month per head.

REMARKS ON VARIOUS GROUPS

Lot 1, from Lethbridge, Alta., consisted of 20 Herefords of good uniform type. Ten of these were heavy cattle and 10 were lighter-weight steers. The heavier steers sold for an average of £21 10s. 0d., while the lighter ones sold for an average of £20 7s. 10d., or an average of £20 18s. 11d. for the lot. The comments of Messrs. Chapman and Everett on this lot were as follows:—

"Uniform in colour and type, a few in the group somewhat heavier than others. Good quality, but Herefords are not taking as well among Eastern County feeders as the Blacks, Shorthorns or Cross-breds at this season of the year (late October). Butchers discriminate against this breed, claiming that there is more waste than with Blacks or Shorthorns. For grazing on the best grasses, well-bred Herefords are in good demand in March and April, but the demand is poor for box-feeding.

Lot 2, from Lethbridge, Alta., consisted of 20 cattle, 7 Blacks, 7 Shorthorns and 6 Herefords. The Shorthorns and Herefords brought an average of £20 10s. 0d, while the good Blacks brought an average of £21 5s. 0d, two poorer-type Blacks only bringing an average of £19 10s. 0d, making an average for all of £20 11s. 9d. On these, the following comments were made:—

"The quality of the lot is fair, but the uniformity poor. Two small undersized steers,—one Angus, one Galloway. Remarks as to breeds in Lot 1 apply here also."

Lot 3, from Ottawa, Ont., consisted of 33 Black steers, average weight, 1,001 pounds. Very uniform in type and finish. A breedy-looking lot. Twenty-nine were sold to one party at an average of £21 5s. 0d. each, and the remaining 4 at an average of £20 10s. 0d. each, or an average of £21 3s. 2d. each for the lot. Comment:—

"Very good quality but a little smaller than the buyers wanted at this season of the year. They prefer steers about 100 pounds heavier for box-feeding. This type of steer is in good demand, however, and will go to the yards to be finished off for early sale.

Lot 4, from Ottawa, Ont., consisted of 23 steers of Shorthorn breeding with good type and size, average weight being 1,160 pounds. This lot was all sold to the one party at an average price of £22 10s. 0d. Comment:—

"Nineteen of these exceptionally good breeding steers. Four smaller but good type. This size and type of steer in good demand for box-feeding."

Lot 5, from Ottawa, Ont., consisted of 35 Shorthorns and Herefords of fair good type, average weight being 1,028 pounds. Twelve of these sold at £21; 14 at £21 7s. 6d.; 8 at £19 10s. 0d.; and 1 that had done very poorly at £15, an average of £20 4s. 8d. per head. Comment:—

"A breedy lot, very suitable for feeding on roots to finish off in February. (Long-keep stores). One steer in bad condition; apparently had done poorly on trip."

TABLE 12.—SUMMARY LOTS 1 - 5.

Farm	Lot No.	Class of Steers	Average Montreal outgoing weights	Average Avonmouth weights	Average selling price Avonmouth per head	Gross price per cwt. Avonmouth	Appraised value at Farm	Net price secured at Farm	Net profit or loss per steer
			lb.	lb.	£	$	$	$	$
Lethbridge, Alta.	1	20 good butcher cattle, uniform breed and type	1,121	1,085	20-18-11	9 25	5 50	4 84	−6 38
"	2	20 good butcher cattle, mixed breeding	1,053	1,025	20-11- 9	9 61	5 50	4 99	−8 07
Ottawa, Ont.	3	33 light weight, butcher cattle, uniform in breed, colour and type	1,020	1,001	21- 5- 0	10 14	6 50	6 68	+0·18
"	4	23 heavy, good butcher cattle, uniform breeding	1,160	1,160	22-10 -0	9 27	7 00	6 43	−3 86
"	5	35 light medium quality butcher cattle, mixed breeding	1,010	1,028	20- 4- 8	9 49	6 50	6 36	−3 05

In the case of lots 1 and 2 in table 12, it should be stated that the 40 cattle were bought on a flat rate of $5.50 per cwt. and later regrouped into the lots mentioned. Had they been bought as they were grouped, it is quite possible that lot 1 would have cost $5.75 and lot 2 only $5.25 per cwt., which would have made the results on these two lots more nearly equal than they show. In the case of the cattle from Ottawa, it is interesting to note that the lightest cattle, which, incidentally, were the most uniform and the best type and quality, gave the best returns, showing that light-weight steers, if of sufficiently good quality, can be shipped profitably.

OBSERVATIONS RE TRADE

At the various shipping-markets and feeding-centres visited by Mr. Hilton, who accompanied this shipment, there was evident a quite pronounced change of attitude on the part of the commission men and farmers in favour of Canadian store cattle. Formerly they took the attitude that the cattle were there and they might as well handle them if there was anything to be gotten out of it. This attitude, particularly on the part of the grazers and feeders, did not tend to benefit the Canadian shipper, as there was an absence of spirited bidding for the animals. Now they have found that Canadian animals are exceptionally good doers on British pastures and in British feed-lots, commission men at Glasgow and Birkenhead and grazers from the Norfolk district even went so far as to say that Canadian cattle will do as much in six weeks as Irish cattle will in ten weeks, because Canadian cattle start feeding immediately they are put in the pastures or feed lots, while Irish cattle, to use a local expression, "lose their insides" and take about four weeks to recover, so that they can make full use of their feed.

It was also stated that one reason the Irish cattle are beaten and bruised so much is that they are "dead", *i.e.* lack life and vigour, consequently have to be beaten along. On the other hand, Canadian cattle are full of life and vigour and ready to go right ahead and do well as soon as put in the pasture or feed lot.

It is not surprising, therefore, to have Birkenhead firms, such as G. J. Jackson & Co., Swift Agents, and Stephenson & Large, all commission men and butchers in a large way, state that Canadian cattle are very healthy, not more than one in one thousand being diseased sufficiently to cause loss, while Irish cattle show at least one per cent loss with some shipments running higher.

Not only were these statements made to the Experimental Farms representative, but they are appearing in the Irish Press. The *Irish Times* of October

15, in a special agricultural edition, devoted largely to a report of an Irish Agricultural Delegation to Denmark, finds space to touch on the effect of Canadian cattle trade on Irish exports of cattle. Speaking of the falling off in Irish cattle exports for the first six months of 1925 as compared to the first six months of 1924, which amounted to over 27 per cent, the following comments are made:—

" It will be sufficient for the moment merely to set out the principal reasons to which exporters attribute this falling away. They are: (1) That last year's abnormally high exports denuded Ireland of exportable animals for this year; (2) that Canadian, Argentine and Continental exporters have succeeded in capturing British markets as against Irish exporters; and (3) that financial stringency and increasing unemployment in Great Britain have reduced the total British demand."

Speaking of the Canadian cattle trade, a Liverpool correspondent states:—

"Since the raising of the embargo on the importation of Canadian live cattle into Great Britain, there has been a steady increase in the number of such animals imported. Speaking with particular reference to Birkenhead, the number of beasts from the Dominion has become both an important and firmly established section of the large wholesale business carried on at the Woodside lairages.

"In fact, four firms in a big way of business at the Woodside lairages have found the Canadian cattle trade such an excellent line that they have largely transferred their operations from Irish cattle, which formerly provided the bulk of their dealings, and are now and have been for some time past mainly devoting their activities to imports from the Dominion. Indeed, we could often do with more Canadian stock than is coming along.

Not only do Canadian sides command a readier sale on the part of retail butchers than Irish beef, but the prices realized are, generally speaking, better, the former making roughly about a half penny per pound more than the latter, while for exceptional quality of Canadian beef, as much as three farthings or even a penny per pound more is sometimes obtained."

A Manchester correspondent makes very similar comments in comparing the Irish and Canadian cattle trade. A Manchester Market Department official, speaking of the one hundred per cent increase in the Canadian cattle trade for the past twelve months, states: "We anticipate that the increase will be maintained—there is every prospect for the near future of its being maintained."

In another column, we find the following:—

"At a recent meeting of the Irish Cattle Breeders' and Stock Owners' Association, a letter was read from a commission man from Merkland's Wharf, Glasgow, stating that the writer felt strongly and positively that the Irish beef trade was doomed unless the Irish men bestirred themselves in two matters—first, the delivery of all beef cattle; and second, the procuring of proper and reasonable treatment for their cattle during transit, especially during loading in wagons, transfers, putting on boat, and also when on boat."

The writer adds: "The whole remedy lies in the hands of those interested in the Irish cattle trade, and the situation seems to me to clamour for immediate drastic and united effort. If we could inspire the buying public here with faith in the reasonable expectation of the Irish cattle furnishing sound carcasses of beef, there would be a big increased circle of buyers, and at a moderate estimate, an increased value of two pounds per animal. If we can not do so, there is every indication of the Canadian surely and not very slowly crushing the Irishmen out."

It is possibly not generally known on this side of the water that a comparatively small number of the animals shipped as stores find their way to

the pastures or feed lots in Great Britain. For instance, in 1923, there were 39,690 Canadian cattle shipped to Birkenhead, of which 18,325 were stores, of which latter number only 2,163 were removed alive. In 1924, the figures were 52,193, 22,925, and 9,877, respectively, a 356 per cent increase of store cattle sales. Figures are not available for the year 1925, but it is reasonable to suppose, and, in fact, it is well known that still larger numbers are being taken inland for feeding purposes. That larger numbers were not bought for feeding purposes in the early stages of the development of the trade is not surprising, considering the very conservative attitude of the British farmer, the prejudice against Canadian cattle, and the consequent uphill fight which they had to become established in any shape or form on this the greatest meat market in the world.

From the foregoing observations and quotations, it will readily be seen that Canadian store cattle are rapidly gaining favour and instead of the dull, disinterested market that they first enjoyed, they may very shortly be confidently expected to be in keen demand and enjoying the premium prices that go therewith.

PRICES FOR BY-PRODUCTS FROM CANADIAN CATTLE

Following are some figures supplied by the Birkenhead firm of Stephenson & Large on the comparative prices obtained for what might be termed the by-products of the killing process.

	Irish		Canadian	
	s.	d.	s.	d.
Fat		3¾ per lb.		3¾ per lb.
Red offal*	16	0 each	19	0 each
Tripes†	6	0 "	6	6 "
Ropes	3	6 "	3	6 "
Bloods		5		5

Irish		Canadian	
	d.		d.
Hides—1st ox, 80–90 lb.	9¼ per lb	1st ox	7¾ per lb.
70–80 lb.	8½ "	2nd ox	6¾ "
60–70 lb.	7¾ "	Brands	6¼ "
50–60 lb.	6¼		

*Red offal—Head, tongue, liver, lungs, spleen, heart, skirt (diaphragm) and tail.
†Tripes—Tripe, wesand (esophagus.) and tail.

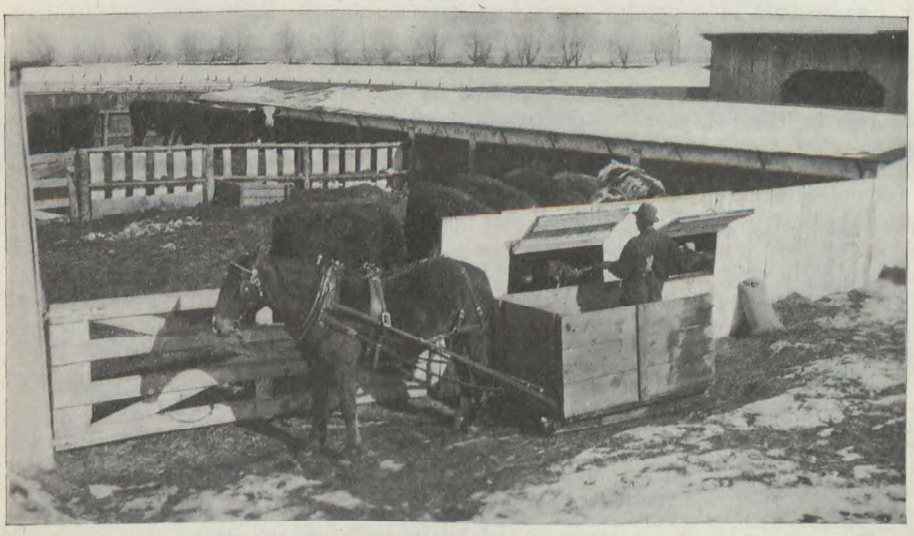
From the foregoing tabulation, it will be seen that in the case of all parts except hides, the by-products from Canadian cattle bring as high or higher prices than those from Irish cattle. In fact, in the case of "red offal", in which are included the vital organs, a considerably higher price is obtained for that from Canadian cattle than for that from Irish cattle. This is rather significant in that it bears out previous statements with regard to the health of the two classes of cattle, for, if any diseases are present, they would manifest themselves quite noticeably in these vital organs and thus lower their value.

The most important point in the foregoing tabulation is the disparity between the prices for Canadian and Irish hides. It will be noted that Irish hides are all classed as "1st ox", and divided into four grades, according to weight; while Canadian hides are classed as "1st ox", "2nd ox", and "Brands", with no grades on weights within the first two classes. In addition to lower grading, the Canadian hides are quoted at a much lower price. It is difficult to believe that there are not some Canadian hides of the 1st ox class that could be graded according to weight as in the case of Irish hides. It is also difficult to believe that Canadian hides, particularly in view of the better handling facilities for Canadian cattle, are not as good as Irish hides, with the possible excep-

tion of branded hides, and therefore worth just as much pound for pound. It would seem as though it would be advisable to investigate this phase of the trade and endeavour to ascertain why these differences exist, correct the cause, if possible, or, if there is no legitimate reason for the disparity in grading and prices, then take steps to have the quality and value of Canadian hides recognized and thus give a further impetus to our already steadily improving store cattle trade.

WINTER STEER-FEEDING

Forty-two steers, remaining after selection for the foregoing shipments, were brought in from the range at South March, Ont., on November 30, 1925. These were subjected to the intradermal tuberculin test and three steers or 7.14 per cent reacted, a fairly low percentage even for western steers. Tubercular lesions were found in all three carcasses, but not in sufficient quantity to condemn the carcasses.



Export steers in winter feeding quarters. These steers did exceptionally well. Note convenient feeding arrangements.

On December 11, the remaining 39 steers were sorted, weighed and put in pens for winter feeding.

Pen 1 consisted of 10 white-faced steers and 10 all red steers, all of good type, weighing a total of 22,140 pounds, or an average of 1,107 pounds each.

Pen 2 consisted of 19 steers, comprising a mixed lot as regards colour, breeding and type, but their weight approximated closely that of pen 1, being 20,980 pounds or an average of 1,104 pounds each.

All steers received the same daily ration, which consisted of the following:—

Corn silage	30 lb. to Jan. 11, 1926; 27 to finish.
Range hay	10 "
Grain mixture—	
Bran	200 "
Oats (ground)	200 "
Corn (ground)	100 "
Oil cake meal	100 "

This grain mixture was fed at the rate of 2 pounds per day starting December 14, 1925, and increasing 1 pound per week after the second week until a maximum of 6 pounds per day was reached on January 18, this rate being continued until the animals were disposed of. They were housed in open-front sheds with yards and feed racks across from the sheds. They were watered twice daily from a tank in the yard during the cold weather, and, when weather permitted, had water before them at all times.

Lot 1 was shipped for overseas via St. John, New Brunswick, on March 25. Up to that time, they had made an average daily gain of 1.85 pounds at a cost per pound gain of 11.02 cents, and a total feed cost for the period of $21.03 each.

The object in feeding these steers was to market considerable rough feed on hand and to check up the possible profit from buying western steers in the spring, grazing them, and shipping in the fall as against winter-feeding them and shipping them in the spring early and late.

The project not being completed at the end of the fiscal year, the final report will of necessity have to be held over for inclusion in the next report of this division.

DAIRY CATTLE

The breeding of dairy cattle and allied work in connection therewith forms one of the major subdivisions of the live stock work conducted by the Animal Husbandry Division at the Central Experimental Farm. At the close of the fiscal year, March 31, 1926, there were on hand 169 head of dairy cattle, made up as follows:—

PURE-BRED BREEDING CATTLE

—	Milch cows	Heifers	Bulls	Total
Ayrshires	33	25	19	77
Holsteins	30	23	12	65
Jerseys	13	10	4	27
Total				169

The number is 15 head less than was being carried at the same time the previous year.

AYRSHIRES

The Ayrshire herd shows continual improvement and is the admiration of the numerous visitors to the barns, owing to its well developed, uniform and milky appearance. Size consistent with good quality has been one of the objects in developing this herd and it has been fairly well attained. The home-bred bull "Ottawa Lord Kyle 2nd"—77050—and the imported bull "Shewalton Mains Supreme"—83930—were the sires used in getting the calves dropped during the year. The former sired 22 and the latter 11 of the 33 calves born during the year. The type and quality of the calves from each was good, and it only remains to be seen which prove the best producers. A small selection from the herd was shown at the Royal Winter Fair, Toronto, in November, 1925, and was successful in capturing a fair share of the prizes. A notable feature of the winnings was the success of the animals sired by "Shewalton Mains Supreme." Four animals, all under 15 months of age, were shown, and won one Junior Championship, two firsts, and three seconds, including second prize get of sire with sixteen entries competing, many of them being made up of

mature animals, thus stamping "Supreme" as one of the outstanding breeding bulls of the day. The Experimental Stations at Charlottetown, P.E.I., Fredericton, N.B., Ste. Anne de la Pocatière, P.Q., Lennoxville, P.Q., Kapuskasing, Ont., and Morden, Man., have been supplied during the year with herd sires sired by "Supreme" and out of the best cows in the herd, so that the influence of this good bull should be far reaching. No animals have been added to the herd by purchase during the year. Unfortunately one of the best cows in the herd died of septic metritis, but not before she had dropped two useful bull calves, sired by "Supreme".

SHEWALTON MAINS SUPREME (IMP.)—83930—ADVANCED REGISTRATION No. 16, CLASS AA.

Record of dam—12,780 pounds 4 per cent milk in forty-three weeks. Record of sire's dam—11,990 pounds milk, 470 pounds fat. Sire has standing equal to Canadian R. O. P. requirements.

The production of the herd has been well maintained during the year. The yearly average of the five best cows, 11,093 pounds milk, testing 4.07 per cent fat, is slightly lower than that of the 5 best cows of the previous year, but the average of the herd of 32 cows, which is the best basis on which to judge improvement within a breed, is 7,879 pounds of milk, testing 3.98 per cent fat, a quite notable increase over the previous year. Comparing the three breeds, taking the average production of the herd as a basis, Ayrshires take second place in economy of milk production, third place in the economy of fat production, and third place in profit over feed consumed.

HOLSTEINS

The Holstein herd is also showing rapid improvement, the poor producing and undesirable-type cows being eliminated and their places being taken by young cows for the most part of good, straight, deep, milky type, and showing a tendency to a higher percentage of fat in the milk. The two-year-old dry heifers were a particularly striking lot at the close of the year. Bulls used

during the year were "Maplecrest DeKol Korndyke Boy"—40541—, "May Echo Perfect"—52577—, and "Agassiz Sir Pietje"—51064—. They sired 7, 9, and 13 calves, respectively, of the 29 dropped during the year. Generally speaking, the quality of the calves and young stock is improving, those from the "Perfect" and "Agassiz" bulls being superior in type to those from the "Maplecrest" bull.

No additions to the herd by purchase have been made during the year and there have been no outstanding losses. One draft of 13 pure-bred and 4 grade Holsteins was shipped, 8 to the Experimental Station at Swift Current, Sask., and 9 to the Experimental Station at Lethbridge, Alta.

The production of the herd has been exceptionally good throughout the year, the yearly average of the 5 best cows being 19,275 pounds of milk testing 3.5 per cent butter-fat, which, while not being up to the 21,000-pound average of the previous year, is still very creditable. The average production of the herd of 21 cows was 11,596 pounds of milk, testing 3.49 per cent butter-fat, at an average age of 5.2 years. This is slightly lower than the previous year's average, but is also quite a creditable performance. A comparison of breeds on the same basis as in the case of Ayrshires places Holsteins first in the economy of milk production, second in economy of fat production, and first in profit over feed consumed.

JERSEYS

From the standpoint of increase in numbers and quality over the previous year, the Jersey herd has probably made the most rapid strides, possibly because in this herd there was the greatest room for improvement. The herd sire, "Castlehill Sybil's Gamboge" (imp.)—12271—is still proving his value by siring an exceptionally good lot of calves. A little trouble was experienced with weak calves, some dying at birth, but the exact cause of this trouble was not ascertained.

The production of the herd has not been extremely high, the records of a number of the best cows not being completed in time for inclusion in this year's report. Nevertheless, the yearly average of 6,868 pounds of milk, 4.93 per cent butter-fat for the five best cows is higher than was attained the previous year, as also was the yearly average of 6,169 pounds of milk, testing 4.95 per cent fat, made by the whole herd of 9 cows, at an average age of only 4.7 years. In a comparison with the previously mentioned breeds, the Jerseys stand third in economy of milk production, first in economy of fat production, and second in profit over feed consumed.

RELATIVE EFFECT OF TYPE OF FARMING ON BREEDS

In studying the foregoing comparisons of the three breeds maintained, the effect of the unusual conditions at the Central Experimental Farm must not be lost sight of. The conditions are these: The farm is comparatively small, some 475 acres in all, of which only some 185 acres may be considered as being used for the regular production of crops for live stock feeding. This area is under a three-year rotation of crops and produces large yields of grain, hay, silage, root and soiling crops, but comparatively little pasture. These crops are hauled in and either fed to the cows direct or stored for later feeding. That is, an intensive system of farming is followed, the feed being brought to the cows for consumption, rather than letting the cows go to the fields to gather their own feed, as is the case on most farms during a large part of the season at least. These are conditions that do not prevail on the average farm throughout the country, particularly in newly settled and rough areas, and yet they are conditions to which the Holstein as a breed is admirably adapted. The are big cows and will consume large quantities of roughages and turn them to good

account, but if they are obliged to forage for their feed over large areas of scanty pasture, they are at a disadvantage. The Ayrshire, on the other hand, is an exceptionally good forager, coming by this attribute honestly through having been originated in the hilly pastures in Scotland. On this account, Ayrshires will make a good living where Holsteins might fail. Being comparatively easy keepers, the Ayrshires are possibly inclined to lay on a little too much body fat when subjected to the intensive farming conditions so suitable to the Holstein. The Jersey breed follows the Ayrshire fairly closely as regards the effect of type of farming on the relative amount and economy of production. These points should be kept in mind when comparing the relative economy of production and profit over feed as discussed in the foregoing sections.

ADVANCED REGISTRATION OF DAIRY BULLS

Early in May, 1925, the Advanced Registration of dairy bulls was inaugurated under the auspices of a Dairy Cattle Committee composed of Ayrshire, Jersey, Guernsey, French-Canadian and Red Polled breed representatives and Federal and Provincial Government officials, an officer of the Federal Live Stock Branch, Ottawa, Ont. being named Supervisor. Holstein breeders did not co-operate, but elected to run their own system of Advanced Registration. It is not the intention to here elaborate the rules and regulations governing the admission of bulls to this Advanced Registration system other than to say that before a bull is eligible for Advanced Registration, he must be at least 8 months old so that his future size and type can be fairly well judged; he must score at least 75 per cent of the scale of points for the breed to which he belongs; and his sire and dam must have R.O.P. milk record qualifications of a fairly high standard. There are two Sections at present, Class A and Class AA., the latter requiring a considerably higher standard as regards both type and production than the former. All inspection is done by a fully qualified disinterested inspector appointed for the purpose by the Committee.

The object of the Advanced Registration is to put a premium on bulls of the right type with good record backing so as to effect more rapid improvement and also to facilitate the sale of such bulls by correspondence, as the intending buyer will know that when he gets a Class A. or Class A.A. certificate with a bull that he is a worthy specimen of the breed.

Recognizing the possibilities in this system of Advanced Registration, the Animal Husbandry Division took it up at once and had all the herd sires entered. Two Ayrshires passed in Class A.; 3 Holsteins passed, 2 in Class A. and 1 in Class A.A.; and one Jersey passed in Class A. In addition to the above, young bulls not sold before 8 months of age have been entered for Advanced Registration, with the result that 10 Ayrshires, 2 Holsteins and 1 Jersey have been recorded. Naturally application is made only for those with the necessary record qualifications, and of these only two, 1 Ayrshire and 1 Holstein, were rejected as not being of sufficiently good type.

It has been found that the publicity thus obtained has increased the enquiry for good young bulls and it has been much more satisfactory to make sales by correspondence when it has been possible to state that an Advanced Registration certificate would accompany the animal. All intending purchasers of dairy herd sires are hereby advised to stipulate that they have Advanced Registration standing.

SALES OF BREEDING STOCK

The policy of the Division in regard to sales of breeding stock from the dairy herds, i.e. to sell high-class bulls and an occasional female at very reasonable prices and preferably to parties purchasing pure-bred sires for the first time, has been adhered to during the year. This policy has a tendency to develop the breeding of high-grade dairy cattle in outlying districts, and, at the same

time, does not interfere materially with sales by private breeders, but rather opens up new markets for their pure-bred breeding stock, both male and female. During the year, there were sold 9 Ayrshire bulls, 9 Holstein bulls and 1 Jersey bull. In addition, 5 Ayrshire and 2 Holstein bulls were supplied to Branch Experimental Farms. Of this total of 26 head, 6 Ayrshires and 2 Holsteins were Advanced Registry bulls, many of the others being too young at time of sale to be eligible for inspection.

TUBERCULOSIS ERADICATION AND THE BANG HERD

The health of the herd from a tuberculosis standpoint has been exceptionally good. The last definite reactors, two in number, were removed from the herd in September, 1924. In January, 1925, two supposedly tuberculosis-free cows, slaughtered under inspection at a packing plant, were thought to have harboured tubercular lesions. However, an immediate check test, a sixty day retest and the regular annual test in October, 1925, failed to disclose any reactors, so that the herd at the close of the year had a health standing equivalent to that of an Accredited Herd. Owing to the fact that a Bang herd of tubercular cows is maintained on an adjoining farm and there is of necessity a certain, even though limited, amount of intercourse between the two herds, it has been deemed advisable not to issue an Accredited Herd Certificate until such time as the Bang herd is closed out, which accounts for the fact that the main herd has not received its accredited herd certificate ere this.

There have been no additions to the Bang herd during the year, and 1 Ayrshire and 2 Holstein cows have been removed as they had outlived their usefulness in the herd or were succumbing to the ravages of tuberculosis. In November, 1925, it was found necessary to reduce the main herd, consequently 1 Ayrshire and 3 Holstein tuberculosis-free cows from the main herd were introduced into the Bang herd. In making this introduction, two objects were in mind: 1, to study the rapidity of infection in these animals due to association with tubercular animals; and 2 to provide sufficient milk for the feeding of groups of calves that were being used in testing out a tuberculosis vaccine.

Both of these experiments are being conducted by the Pathological Division of the Health of Animals Branch with whom we are co-operating. The experiments give promise, especially in the case of the calves, of yielding some very interesting data.

During the year there were 4 Ayrshire and 5 Holstein calves dropped in the Bang herd, of which 7 were normal, and consequently were removed to the main farm, isolated, tested and retested in sixty days, before being admitted to the main herd. Up to the close of the period covered by this report, none of these calves had reacted to the tuberculin test.

In addition to the calves dropped in the Bang herd, there were a number of calves, 9 in all, dropped in the main herd that were sired by the good breeding Ayrshire bull in the Bang herd, so that the Bang herd has been a potent factor in the upbuilding of the main herd of dairy cattle. In fact, the animal depicted on the outer cover of this report, a Junior and Reserve Grand Champion at seven months of age and slated for the future herd sire at Ottawa, is a product of the Bang herd. Incidentally, it has been decided to close out the Bang herd at the close of the next fiscal year, at which time a final report on the project will be published.

SUMMER FEEDING

The heifers of all three dairy breeds were pastured on the vacant land in the vicinity of the Connaught Rifle Ranges again during the season of 1925. The pasture season was a fairly good one and the area being ample for their needs resulted in these heifers being stabled in excellent condition in the fall. The

general health of the animals during the year was good, not an animal being lost or on the sick list.

As outlined previously in this report, when discussing the relative effect of the type of farming on breeds, the milch cows in the main herd receive a very limited amount of pasture. This consists of approximately 7 acres of new meadow, the seeding mixture for which consisted of alfalfa, alsike, red clover and timothy. On this area there is pastured an average of 50 cows, so that it can readily be seen that after the first month or six weeks there is very little pasture. The milch cows are therefore charged up with only one or two months' pasture depending on how long they are on this area and the nature of the season. Corn silage of the previous year's crop forms the bulk of the roughage fed during the summer months. The remainder is made up of soiling crops when available or else hay. Grain is fed throughout the summer, the mixture consisting of bran, oats, brewers' or distillers' grains and cotton-seed or oilcake meal. In early spring and late fall the cows are turned out during the day but in the heat of the summer and fly season. they are housed during the day and turned out during the night only. They are sprayed regularly for protection from flies. The cows in the Bang (tuberculosis) herd, which is maintained on a separate farm, have more pasture available. This during the season of 1925 was made up of sweet clover and regular mixture pasture and an experiment was conducted with these two crops, the results of which are reported elsewhere in this report. The dry cows of the main herd are given a separate pasture. They are usually in sufficiently high condition at the end of their lactation periods that grain feeding while dry is not necessary.

WINTER FEEDING

The roughage used during the past winter season consisted for the most part of those valuable and economical home-grown roughages-corn silage, roots, and mixed clover and alfalfa hay. Other feeds of various kinds were fed at various times, but not in sufficient quantities to consider them as standard feeds. Owing to the limited area of land yielding crops for live stock feeding and to the very heavy stock carried, insufficient grain for the feeding of the various classes of stock is grown, consequently much of the grain fed for the dairy cattle must be purchased. The prices of mill feeds remained practically on the same level as in 1924, consequently the average cost of the meal mixture was the same. Bran always forms the basis of the meal mixture and is supplemented by such feeds as ground oats, brewers' grains, distillers' grains, oilcake meal and beet pulp, the latter being used as supplement for extra heavy producing cows only. One per cent of iodized salt and two per cent of bone char are added to the grain ration. Latterly, prepared iodized salt for live stock feeding has been put upon the market, and the Farm being situated in the known goitre-belt of the Ottawa valley, it is considered advisable to feed this iodized salt at all times, particularly as the iodized salt costs very little more than the regular salt. Results justify the practice, for where formerly there were quite a number of goitred calves, now they are very rare and such cases as there are have been only slightly affected with no resultant deaths due to strangulation. The bone char has replaced the edible steamed bone meal and charcoal previously fed, because the former is cheaper, and supplies both charcoal and minerals equivalent to those obtaining in the bone meal. This bone char is a by-product of the sugar refining industry and is available at sugar refineries at fairly reasonable prices.

The average rate of feeding the cows is from 25 to 35 pounds of corn silage and from 8 to 10 pounds of hay daily. The grain ration is fed at an average rate of 1 pound for every 3½ pounds of milk produced, the fresh cows getting slightly more and those getting on in their lactation slightly less. The dry cows

receive a light grain ration if needed to put them in good condition for calving. Dry two-year-olds and yearling heifers were cheaply wintered on silage and range hay, which was sufficient to keep them in good growing condition. Younger heifers received a light grain ration to keep them growing well while the cheapest gains can be made.

The calves are taken from their dams as soon as born and hand fed on whole milk for the first six weeks to two months, then gradually changed over to skim-milk and a home-mixed calf-meal. As soon as they can be started feeding, they receive a dry grain mixture, all the alfalfa and clover hay they will eat. At about 4 or 5 months of age they are started on corn silage in small quantities, which is gradually increased as the skim-milk is reduced.

During the year, particularly in the middle of the winter, some trouble was experienced with white scours in the calves. While it was found impossible to immediately eliminate the trouble, it was kept well checked and only one or two calves lost thereby. Treatment consisted in reducing the milk diet to a minimum of one pound or so at a feed and dosing the calf with castor oil, followed by milder stomach correctives, such as milk of magnesia. In very bad cases, rectal injections of approximately one quart of tepid normal salt solution, i.e., 1 ounce salt to 1 gallon water, were found beneficial in that they helped to remove the bacteria-loaded faeces from the bowels.

EXPERIMENTAL FEEDING WITH MILCH COWS

SWEET CLOVER PASTURE EXPERIMENT

As a check on a preliminary trial conducted in the season of 1924, a further trial was made in 1925 to determine the comparative value of sweet clover pasture. Two acres of sweet clover pasture and a similar area of pasture resulting from the sowing of a mixture of red clover, 8 pounds, timothy, 6 pounds, and alsike, 2 pounds per acre, all of the previous year's seeding, were set aside for this work. Growth was early in the spring, so that the cattle were turned in on the sweet clover on May 27 and on the mixture on June 3. At the time of turning the cows into the pastures, the sweet clover was well advanced, being from 12 to 14 inches high and a thick stand. The mixed pasture was not so well advanced, consequently the cows were kept off it a week longer.

Six head of large, extra-heavy-milking cows were placed in each enclosure, of which 5 were milking and 1 dry at the start. Each lot was subdivided, 3 cows remaining on one pasture throughout the duration of the test and the other 3 alternating from one pasture to the other at the end of every three weeks (at the end of the second week in the case of the lot on mixed pasture at the start). The experiment was continued for 12 weeks, giving four separate periods of three weeks each. The cows that were milking received supplementary grain which was constant in quality and quantity throughout the whole experiment. The average daily grain ration amounted to 12 pounds of mixed grain per day.

As was the case in the previous year, four comparative sets of results were obtained, i.e.:—

1. Results from cows on mixed pasture continually.
2. Results from cows on sweet clover pasture throughout.
3. Results from cows on mixed pasture, and sweet clover pasture alternated.
4. Results from cows on sweet clover pasture and mixed pasture alternated.

MILK AND FAT PRODUCTION ON MIXED AND SWEET CLOVER PASTURE

Lot	Factors	Period 1	Period 2	Period 3	Period 4	Average Periods 1 and 3	Average Periods 2 and 4
1	Pasture	Mixed	Mixed	Mixed	Mixed	Mixed	Mixed
	No. cows..... No.	2	2	2	2	2	2
	Milk produced..... lb.	832·5	751·0	676·0	591·0	754·25	671·00
	Fat per cent..... %	3·20	3·43	3·78	3·47	3·49	3·63
	Total fat..... lb.	26·60	25·80	25·57	20·51	26·08	25·82
2	Pasture	Sweet Clover	Sweet Clover	Sweet Clover	Sweet Clover	Sweet Clover	Sweet Clover
	No. cows..... No.	2	2	2	2	2	2
	Milk produced..... lb.	828·0	786·0	716·5	610·5	772·5	698·25
	Fat per cent..... %	3·42	3·36	3·90	3·66	3·66	3·51
	Total fat..... lb.	28·37	25·32	27·97	22·38	28·18	23·85
3	Pasture	Mixed	Sweet Clover	Mixed	Sweet Clover	Mixed	Sweet Clover
	No. cows..... No.	2	2	2	2	2	2
	Milk produced..... lb.	806·5	798·5	689·0	571·0	747·7	685·0
	Fat per cent..... %	3·21	2·70	3·56	3·04	3·38	2·87
	Total fat..... lb.	25·89	21·46	24·55	17·34	25·22	19·41
4	Pasture	Sweet Clover	Mixed	Sweet Clover	Mixed	Sweet Clover	Mixed
	No. cows..... No.	3	3	3	3	3	3
	Milk produced..... lb.	1,031·5	927·0	891·5	703·5	961·5	815·2
	Fat per cent..... %	3·00	3·40	3·08	3·27	3·04	3·33
	Total fat..... lb.	30·99	31·57	27·45	23·04	29·22	27·30

From the data it will be noted that only 9 cows milked throughout all four periods, so that data from these only is taken. Those cows on mixed and sweet clover pasture continually show considerable equality in both milk and fat production in that both decline considerably in period 2, hold up in milk and increase in fat in period 3, and drop off rather sharply in both milk and fat in period 4. These two phases of the experiment serve to show the effect of pasturing continually on the same pasture and also act as a check on the alternating groups.

The two alternating groups show some rather interesting results. In the first place, it will be noticed that in every case the same cows gave milk testing lower in percentage of fat when on the sweet clover pasture than when on the mixed pasture. Though the percentage of fat was lower, there was shown a greater tendency for increased milk production when changed from mixed to sweet clover pasture than vice versa. By averaging the results in periods 1 and 3, and comparing with period 2, and periods 2 and 4 and comparing with period 3, in both lots 3 and 4, four separate comparisons of mixed and sweet clover pasture are obtained. The averaged results of these four tests are as follows:—

	Mixed Pasture	Sweet Clover Pasture
Average milk produced	794.7 lb.	834 lb.
Average fat produced	27.13 "	24.38 "

It appears as though sweet clover as a pasture was capable of producing more milk but that the sweet clover had the effect of lowering the per cent fat in the milk. These production results are more outstanding than those of the previous year.

As regards the carrying properties of the two pastures, here again a change is noted. In 1924 the mixed pasture (regular pasture) held out best. This year (1925) the sweet clover pasture lasted considerably the longest. One notable difference in the mixed pasture in 1924 as compared to 1925, however, was that the latter contained no alfalfa and the seeding amounted to only 16 pounds per acre, while in 1924 the seeding contained 6 pounds of alfalfa per acre and the total seeding amounted to 22 pounds per acre. In both years the sweet clover pasture seeding amounted to 20 pounds per acre. Had the mixed pasture been of the same mixture and sown at the same rate as that used in the previous year, it would possibly have made a better showing as regards carrying power.

In 1924, which was a comparatively dry, poor pasture season, 2.25 head of milch cows were pastured per acre and the pasture lasted for only a little over two months. This season (1925), which was a comparatively good pasture season, 3 head of milch cows were pastured per acre and the pasture lasted well over three months, particularly in the case of the sweet clover.

It will be noted that the sweet clover was first pastured May 27, which was over two weeks earlier than the previous year. Had it been pastured even earlier in 1925 and the first growth kept well eaten off so that the second growth would be more profuse, it is probable that the sweet clover would have carried the three cows per acre (with supplementary grain feed) throughout the whole season.

An endeavour is being made to repeat this work on a strictly comparable basis again in the season of 1926.

WHOLE VS. GROUND ROUGHAGE FOR DAIRY COWS

During the winter of 1925, an experiment on the advantage and economy of grinding roughages was conducted. This was reported in the report for the year ending March 31, 1925. A somewhat similar experiment was conducted in the winter of 1926. One row of Ayrshire and one row of Holstein cows were used for this experiment. These were subdivided into groups A and B. The experiment was divided into three periods of two weeks each, the last week in each period only being used for computation, the deductions being made from an average of the results of periods one and three compared to period two, thus eliminating the effect of natural decline in milk flow. The following was the plan of the experiment:—

PLAN OF EXPERIMENT—CORN SILAGE AND MIXED HAY VS CORN FODDER AND MIXED HAY

	Material Fed			
	Groups	Grain	Succulent or Semi-succulent roughage	Dry roughage
Period 1—				
Jan. 4–Jan. 18 incl....	A & B	Regular mixture....	Corn silage.....	Mixed hay.
Period 2—				
Jan. 19–Feb. 1 incl....	A	Regular mixture....	Cut corn fodder.....	Mixed hay.
	B	Regular mixture....	Cut and ground corn fodder.	Cut and ground mixed hay.
Period 3—				
Feb. 2–Feb. 15.....	A & B	Regular mixture....	Corn silage.....	Mixed hay.

The roughage feed was weighed out to the cows and the grain ration was kept constant in quality and quantity throughout the experiment. Composite samples of milk were taken during the final week of each period to note the effect, if any,

of the different feeds on the butter-fat content of the milk. The following data were obtained from the experiment:—

TABLE I.—CORN SILAGE AND MIXED HAY VS. CUT CORN FODDER AND MIXED HAY

Experimental Ration		Period 1	Period 2	Period 3	Average Periods 1 and 3
		Corn Silage	Cut Corn Fodder	Corn Silage	Corn Silage
Number cows on test	No.	9	9	9	9
Duration of test	Days	7	7	7	7
Pounds of milk produced	lb.	2,020·5	1,840·5	1,751·5	1,886·00
Average per cent fat	%	3·75	3·87	3·82	3·78
Total fat produced	lb.	75·88	71·19	66·96	71·42
Total meal consumed	"	660·00	660·00	660·00	660·00
Total hay consumed	"	560·00	560·00	560·00	560·00
Total silage consumed	"	2,030·00	.....	2,030·00	2,030·00
Total cut corn fodder consumed	"	.....	2,345·00	....	....
Corn silage consumed per 100 lbs. milk produced	"	100·00	.....	116·00	108·00
Corn fodder consumed per 100 lbs. milks produced	"	.....	127·00	....	....

TABLE 2.—CORN SILAGE AND MIXED HAY (LONG) VS. CORN FODDER AND MIXED HAY, CUT AND GROUND

Experimental Ration		Period 1	Period 2	Period 3	Average Periods 1 and 3
		Corn Silage	Cut and Ground Corn Fodder and Clover Hay	Corn Silage	Corn Silage
Number cows on test	No.	9	9	9	9
Duration of test	Days.	7	7	7	7
Pounds of milk produced	lb.	1,673·5	1,515·00	1,420·00	1,547·00
Average per cent fat	%	3·56	4·00	4·19	3·85
Total fat produced	lb.	59·63	60·72	59·58	59·60
Total meal consumed	"	558·00	558·00	558·00	558·00
Total hay consumed	"	560·00	.....	560·00	560·00
Total silage consumed	"	2,030·00	.....	2,030·00	2,030·00
Total cut and ground corn fodder and hay consumed	"	.....	2,675·00	.....	....
Total hay consumed per 100 lbs. milk produced	"	34·00	.....	39·00	36·50
Corn silage consumed per 100 lbs. milk produced	"	121·00	.....	143·00	132·00
Cut and ground corn fodder and hay consumed per 100 lbs. milk produced	"	.....	176·50	....	....

The data in table 1 presents the results of a comparison of corn silage and cut corn fodder. The cut corn fodder contained on the average 32.36 per cent dry matter, while the corn silage contained only some 23 per cent dry matter. As a consequence, the cows received more nutritive material in the cut corn fodder than in the corn silage. In spite of this, however, the corn fodder ration was not of as high value for milk production as the corn silage ration. Based on the amount of feed required to produce 100 pounds of milk, the cut corn fodder is 17.5 per cent less efficient than the corn silage. This difference in value must be considered when noting the results of the second phase of the experiment.

The data in table 2 presents the results of the second phase of the experiment in which the corn fodder and mixed hay were both cut and ground and fed in comparison to silage and the same mixed hay, not cut or ground. It will be

noted that the milk production was higher in the average of the two corn silage periods, than when the cut and ground corn fodder and mixed hay were fed. Keeping in mind, however, that approximately four-fifths of the ground ration was corn fodder and that the corn fodder proved in the first phase of this experiment to be 17.5 per cent less efficient than the corn silage, a fairly good showing is made by the ground feed; for basing a comparison on the amount of feed required to produce 100 pounds of milk, the ground feed proved to be only some 5 per cent less efficient than the unground feed for milk production. The percentage of fat did not vary sufficiently to make it a factor for consideration during either phase of the test.

It would appear, therefore, that the grinding of the rough feed did not add materially, if at all, to its feeding value. On the other hand, the extra labour of cutting and grinding the feed does add materially to the cost. It can safely be said, therefore, that under normal conditions, it would not be economical to grind rough feed, at least for dairy cows, particularly as there is no class of stock better adapted to grinding its own feed.

MILKING-MACHINES

In almost every branch of farm work, modern machinery has increased the efficiency and lowered the cost of production. If the milking-machine will assist the farmer in a similar way, it should naturally be adopted along with other labour-saving machinery. If, however, lower cost of production when a milking-machine is used is at the expense of quality in the milk, then the advisability of installing a machine is not so evident. Physically clean and bacteriologically pure milk is in greater demand throughout Canada each year, consequently in discussing the milking-machine problem, the factors of economical efficiency and the production of a high-quality product must receive equal attention.

HISTORY OF MILKING-MACHINES

During the past fifty years, over two hundred patents on different makes of milking-machines have been taken out. America has done more for the perfection of the milking-machine than any of the European countries, but Australia and New Zealand have outstripped America, unless possibility in the matter of bacteriological study of machine-milking. Machines evolved during these fifty years might be classified as operating on three distinct principles, which are briefly as follows:—

1. That of milk tubes being inserted in the teats. In the light of present day knowledge of a cow's udder, it will readily be appreciated that this principle was not long-lived.

2. That of imitation of hand-milking by pressure. This principle met with fair success in a few machines, but was so cumbersome that it was finally discarded.

3. That of suction; in some cases combined with pressure applied either directly or by means of a vacuum. It is on this principle and modifications of it that most modern milking-machines are constructed.

CLASSIFICATION OF MODERN MACHINES

After a careful study of different types of milkers, most of which have been on the market in Canada at one time or another, it would seem that modern machines should be classified rather differently from the classification com-

monly used. This classification is based, first, on the source of power, and secondly, on the action of the teat, and is as follows:—

Mechanical Power Milkers—

(*a*) Those milking by intermittent suction only with no vacuum in the pail.
(*b*) Those milking by intermittent suction only with vacuum in the pail.
(*c*) Those milking largely by pressure, the pressure being caused by vacuum in the pail.
(*d*) Those milking by intermittent suction, pulsation, and pressure on teats with vacuum in the pail.

Hand- and Foot-Power Machines—

Mostly milking by intermittent suction with no squeeze to the teat and no vacuum in the can.

In the case of the power milkers, the plant for the most part consists of the power plant, vacuum-pump, vacuum-tank, pipe-lines, and milk-units with pulsators. In at least one case, a pressure-tank is used; in another, no pipe-line is required. In the case of most foot-or hand-power machines, the milker is a unit in itself, no pipe-lines or vacuum-tank being required.

DISCUSSION OF MACHINES OF CLASS 1A AND 1B

Classes 1a and 1b were represented by the Hinman and B.L.K. machines, respectively, and the important difference between these two is that the first operates without vacuum in either tank, pipe-lines, or pail, this being confined to a trap in the lid of the pail, while the latter has all of these accessories. Both use metal teat-cups with rubber collars or mouthpieces, but they do not have rubber inflations in the teat-cups. This makes for simplicity and cheapness in the construction of the parts. Theoretically, it also makes for more sanitary conditions, in that there is that much less rubber with which the milk will come in contact. As stated previously, these machines are operated by intermittent suction only, there being no applied or atmospheric pressure on the teat between suctions. Experience has shown that while this type of machine milked fairly satisfactorily on easily milked cows which were giving a fairly large flow of milk, it did not prove as satisfactory on cows that were somewhat tough to milk or well on in their lactation periods. and consequently not giving such large quantities. This was particularly true of the Hinman, where the body of vacuum was so small that the action on the teat was not strong or continued enough to be as effective as where a large reserve of vacuum is used. This same principle applies to hand-power machines and will be discussed later. While possibly not the most efficient machines, they enjoyed considerable popularity on account of their simplicity and low initial cost. Our experience in this connection has been that the ultra-simple machine has not proven more practical than the extremely intricate one.

DISCUSSION OF MACHINES OF CLASS 1C

The only representative of Class 1c was the Calf Way Milker. This machine had an all-rubber teat-cup, with an inner rubber sleeve which had a hole in the bottom, and fitted over the teat like a glove. One side of the outer rubber wall was collapsible so that when the vacuum was applied, the wall of the teat-cup collapsed and applied pressure to the teat from the base downwards. This type of machine did not prove at all satisfactory as it would neither adhere to the teats nor draw the milk properly, even if it were held on by means of a surcingle. In addition, it was not practical from a sanitary standpoint as there was a space between the inner and outer rubber walls of the teat-cup that could not be kept sanitary in any practical way.

DISCUSSION OF MACHINES OF CLASS 1D

The great majority of the milking-machines on the market and experimented with at the Central Experimental Farm fall into Class 1D, that is, those machines milking by intermittent suction, pulsation, and pressure on teats with vacuum in can. This type is represented by such machines as the De Laval, Empire, Lister, McCartney, Nu-Way, Omega, Perfection, Sharples, etc. In all of these machines, metal teat-cups with rubber inflations are used. The drawing of the milk is accomplished by, first, a suction stroke, then a release or cutting off of the suction, and the application of pressure to the air-space between the rubber inflation and the metal teat-cup. This causes the rubber inflation to press against the teat and massage it. The action of the teat-cups is controlled by different types and styles of pulsators in the different makes of machines. The pulsator is really the heart of the machine, and unless it is a reliable, smooth-working piece of machinery, the machine is doomed to failure, and, in fact, the poor quality of the pulsator has been the cause of more than one failure; on the other hand, the continued improvement in the pulsators in other machines has kept them on the market. The machines with teat-cups of the type just described were found to be much more positive in their action and to be more efficient on hard-milking cows or cows well on in their lactation periods. It is true that the rubber inflations need rather frequent replacing to keep them in proper condition, but this drawback is more than offset by the more positive action in milking. In the machines where the inflations are not set in too rigidly so that they have some play at the ends, the inflations seem to last longer.

FOOT- AND HAND-POWER MACHINES

As regards machines of the foot- or hand-power type, our experience with these has been limited to one foot-power machine and a few trials of a hand-power machine during the time of its early development. This was sufficient, however, to supply convincing proof that this type of machine was not practical. In the first place, the operator can not help but find it difficult to supply the power and put on the teat-cups at the same time. Secondly, when the teat-cups are attached and the machine going, the operator is then tied up to it and unable to do anything else. With power machines, after starting one machine, the operator can leave it to start another machine or strip cows already milked. Thirdly, due to the lack of vacuum in anything but a very small chamber, as in the case of a machine already mentioned, the milking action is not any too efficient; and lastly, the machine must of necessity be idle when the operator is emptying milk already drawn. In the face of these drawbacks, it is difficult to see where anything is to be gained by the use of a hand- or foot-power machine when the initial cost, the trouble of getting the machine ready, and possibility of lower quality product are taken into consideration.

CONCLUSION AS REGARDS TYPES

As a result of experience and experiments with the various classes and types of milkers mentioned, the opinion has been formed that the most practical and most efficient type of milking-machine is the power milker that milks by combination of suction, pulsation and pressure, using teat-cups with rubber inflations, and a reserve of vacuum in the pail, pipe-line and vacuum-tank. Taking hand-milking to be 100 per cent efficient in milking clean, milking machines of this type have been found to be from 85 to 90 per cent efficient in milking clean. Where the average time to milk by hand was 9 minutes, the machines took from 7.5 to 11.5 minutes. It is interesting to note that the percentage in milking clean and time to milk per cow bear an inverse ratio to one another. That is,

if the machines are made to do as much stripping as possible, the percentage efficiency is increased and the speed of milking decreased. If, however, the milking-machine is taken off as soon as the rush flow of milk is over, the percentage efficiency in milking clean is decreased, but the speed of milking is increased. The latter system of handling the machines is usually followed.

There are a number of machines of Class 1d on the market, but space will not permit discussing the details of their merits and demerits at the present time. Suffice to say the better class of these machines, properly installed, *intelligently operated* and *kept in repair,* and *thoroughly cleaned after each milking* will give good results.

EFFECT OF MILKING-MACHINES ON THE COWS

After many years' experience with milking-machines in general, the opinion has been formed that the better class of milking-machine, properly operated by an *intelligent* and *observant* operator, does not have any serious detrimental effect on the cows. In fact, some excellent records have been made on cows milked by a milking-machine. It is believed, however, that where every last pound of milk that a cow can be made to produce is desired, it is not advisable to use a milking-machine. On the other hand, where a machine is poorly handled, the stripping not properly looked after, etc., it can be a source of much trouble, developing bad udders, causing early drying off, etc.

WHEN TO INSTALL

Owing to the acute labour shortage during the war a farmer often found it economical to install a machine for a herd of 20 cows, and in cases such as where no family help was available for milking, machines were installed for herds of 15 or even 12 cows. At the present time, however, the Division of Animal Husbandry advises that except under very unusual circumstances, milking-machines be not installed for herds of less than 20 to 25 cows. It follows of course that the larger the herd the more economical and the more practical the installation becomes.

IMPORTANCE OF THE OPERATOR

The intelligent operator has been and is to-day, one of the most important factors in the success of a milking-machine. No mere man-made machine can be endowed with the powers of observation and reasoning, and it is safe to say that the successful handling of milking-machines requires in the operator just a little higher degree of these powers than possibly for any other piece of machinery commonly used on the farm. The matter of proper installation can be overlooked as the companies usually see to that, but the matter of intelligent operation cannot be overlooked. The claim that has been made by "high-powered" salesmen to the effect that any child could operate their machine has done more to complicate the milking-machine problem than any other factor. If they had told the truth and stressed the fact that ability in the operator was of the utmost importance in successful operation, the situation would be much better to-day, since lack of success with many machines has been due not to the mechanical imperfections of the machines, but to the lack of careful attention on the part of the operator. The operator must be somewhat of a mechanic, and at the same time, be a good herdsman, and have, also an appreciation of the part bacteria play in milk spoilage.

MILKING MACHINES AND BACTERIAL CONTAMINATION

The question of sanitary milk production is receiving more attention to-day than ever before. With the advent of the milking-machine it was confidently expected by its promoters that along with economic advantages in con-

nection with this new method the quality of the milk obtained would be superior to that obtained under ordinary conditions of hand-milking. Contamination from such sources as stable air and dirt falling from the coat of the animal would be expected to be eliminated with the introduction of the closed system from the udder to the pail.

It was seen in the course of time that the milk obtained by machine could be found under ordinarily sanitary conditions of operation to be much more infected with bacteria than milk obtained by hand. The use of machines, while obviating certain sources of contamination, introduced new sources of possible infection which are among the most serious with which the dairyman has to contend.

A series of experiments in connection with the milking-machine as affecting the sanitary quality of the milk is at present in progress at the Central Experimental Farm, conducted by the Division of Bacteriology, and a few observations may be made from the results obtained in the preliminary experiments. In the work, four representative makes of machines are used, the object being to compare the different types with each other and with hand-milking, to test various methods of keeping the machine clean, and to note the different sources of contamination.

Preliminary tests were conducted extending for one month, in which daily determinations of the bacteriological content of the milk were made and in which rotation was made so that each of ten cows was tested with each machine and also hand-milked. These showed that even under apparently clean conditions, the machines, while varying among themselves, all produced a more highly contaminated milk than when hand-milking was used, figures being as follows:

Machine A average	188,000	per cubic centimeter
" B "	1,550,000	" "
" C "	950,000	" "
" D "	290,000	" "
Hand-milking	20,000	" "

The contamination of milk when a machine is employed is not confined to the milk of the first cow on which it is used, but is spread over successive cows. Average tests of four successive cows were as follows, figures being averages of all four machines:

Milk from first cow	930,000
Milk from second cow	775,000
Milk from third cow	560,000
Milk from fourth cow	480,000

These figures may well represent what may be expected with the average producer, unless care is taken to have the machine and all connections bacteriologically as well as apparently clean. This does not mean that it is impossible to get good milk from machines, but that it requires care on the part of the producer who must really take trouble to effect a proper sterilization, not only of the metal parts of the machine, but also of the rubber tubes, which appear to be the most prolific source of infection. *It is found possible to obtain regular bacterial counts of less than ten thousand by exercising great care.* Such milk, however, can only be obtained if the operator is willing to spend time and trouble in keeping things clean.

Under conditions of hand-milking, it was found that the chief sources of contamination are imperfectly sterilized pails, and dirt falling directly into the pail from the animal. Contamination from the air is relatively very small. The milking-machine will eliminate contamination from the air and the coat of the animal. It introduces contamination from the tubes, while the pail is still a source of infection. For the latter, steam sterilization is the only effective way of cleaning, while for the tubes, steaming (also hot water) and chemical disinfection are both advocated.

Concerning the latter, chloride of lime is most widely advised, but it will be effective only in as far as the free chlorine is kept up to the required amount by frequent changes of the solution. If not kept up to strength, such a solution may be actually a bad source of infection, doing more harm than good. The strength of the solution inside the tubes when they are immersed, diminished rapidly and it was found advisable to dip the tubes occasionally to get fresh liquid inside them and to drive out all air.

It can not be denied that the reputation of the milking-machine has suffered considerably of late, and that milk dealers, especially those engaged in the fresh milk trade, are becoming more and more skeptical of their utility unless due care is used in operation. This attitude is undoubtedly justified considering how machines in general are handled, partly as a result of over-emphasis being laid on the economic and mechanical side of the machines, and lack of attention to the consideration of its effect on the bacteriological content of the milk. If the machines are to gain in repute, this latter factor is the one to be stressed. It is possible for machines to produce a high-grade milk, but only in the hands of competent operators, and the crying need at present appears to be a strong educative campaign to assist machine-users to understand and guard against bacteriological contamination.

In conclusion, then, it may be said that the milking-machine prablem is no longer one of mechanical perfection, as a fairly high standard in that line has been reached. Rather it has become a matter of more careful operation mechanically, special attention being paid to detail, together with greater care in cleaning from a bacteriological rather than from a visible-dirt standpoint. The average dairy farmer, the farmer with the small herd, should endeavour to get along without a milking-machine and curtail his capital expenditure to that extent at least. Keeping in mind the present demand for high-quality products, the fact that milk is an excellent media for bacteria, that milk spoiled by the presence of bacteria cannot make high quality products and that milking-machines, unless carefully handled, are a prolific source of bacteria in milk, it should be quite evident that to be successful with a milking-machine it will be necessary to spend considerable capital in a good machine and considerable time and capital in its care and upkeep.

DAIRY HERD RECORDS OF PRODUCTION

On the following pages will be found tables giving the milk and fat production and feed-consumption records for all cows and heifers which have finished a normal lactation period during the year ending March 31, 1926, as well as the average production of the five best cows in each breed and the total herd of each breed for the same period.

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

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

Pasture per month	$ 2 00	
Meal and other concentrates	32 00	per ton
Hay	6 60	" "
Roots	4 10	" "
Silage (corn)	3 45	" "
Green feed	6 75	" "

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

In calculating the value of products, the actual cash values were used, which amounted to 45 cents per pound for butter and 30 cents per hundredweight for skim-milk.

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

Name and Breed of Cow	Age at commencement of lactation period	Date of dropping calf	No. of days in lactation period	Total pounds of milk for period	Daily average yield of milk	Average p.c. fat in milk	Pounds of butter produced in period	Value of butter at 45c. per pound	Value of skim milk at 30c. per cwt.
				lb.	lb.	p.c.	lb.	$ cts.	$ cts.
Sarah Ann Pontiac.....H.	7	Dec. 12, 1924	383	25,782·0	66·28	3·41	1,093·23	491·95	74 70
Lady Segis Jewel.....H.	8	Mar. 8, 1925	363	23,119·0	63·68	3·38	919·05	413 57	67 01
Grace Allen Ormsby.....H.	12	June 17, 1924	464	17,521·0	37·76	3·55	733·27	329 97	50 69
Johanna Helena Keyes.....H.	5	Mar. 9, 1925	303	17,771·0	58·64	3·14	658·22	296 19	51 63
Auchenbay Mina 5th.....A.	7	Nov. 13, 1924	319	11,511·5	36·10	4·05	549·49	247 27	33 13
Morningside Bessie.....A.	4	Jan. 12, 1925	280	10,231·0	36·53	4·15	499·60	224 82	29 42
Korndyke Posch Canary.....H.	5	Apr. 2, 1925	310	12,183·0	39·30	3·97	570·21	256 59	35 69
Hardcraft Dewdrop 3rd.....A.	9	Feb. 11, 1925	353	10,228·5	28·97	4·30	517·98	233 09	29 36
Helena Keyes Posch.....H.	12	Mar. 24, 1925	232	13,295·5	58·60	3·23	517·92	233 06	39 46
Maud of Fernbrook 4th.....A.	10	Aug. 29, 1924	578	11,691·5	20·22	4·10	564·09	253 84	33 63
Brampton Bangle.....J.	6	Oct. 27, 1924	349	8,482·5	24·30	4·60	464·00	208 80	24 26
Auchlochan Emerald.....A.	11	May 16, 1924	472	11,805·0	25·01	3·81	529·46	238 26	34 06
Korndyke Bessie Ann.....H.	3	Nov. 14, 1924	373	9,753·0	26·14	4·33	497·01	223 65	27 99
Flavia 8th of Ottawa.....A.	4	Nov. 7, 1924	312	9,910·0	31·76	4·30	501·47	225 66	28 45
Lyon Segis Bessie Ann.....H.	4	Dec. 21, 1924	391	14,775·0	37·78	3·08	536·62	241 47	42 95
Ottawa Tilly.....A.	4	July 2, 1924	348	10,318·0	29·65	3·90	472·95	212 83	29 75
Zorra Hengerveld.....H.	4	Feb. 12, 1925	306	10,781·0	35·23	3·89	493·62	222 12	30 86
Ottawa Maud.....A.	3	Oct. 5, 1924	346	9,934·5	28·71	4·04	461·07	207 48	28 60
Grace Fayne Aaggie.....H.	9	Feb. 10, 1925	355	11,034·5	31·09	3·78	490·90	220 90	31 85
Old Hall Maggie 9th.....A.	13	Mar. 12, 1925	304	9,682·5	31·85	4·00	456·29	205 33	27 88
Ottawa Beauty Maid 2nd.....J.	4	Jan. 1, 1925	372	7,653·0	20·57	4·83	435·66	196 04	21 84
Ottawa Kyle Maggie.....A.	3	Dec. 22, 1924	420	8,377·0	19·94	4·49	442·75	199 24	24 00
Castlehill Strawberry.....A.	10	Mar. 3, 1925	264	8,498·0	32·18	3·77	377·54	169 89	24 53
Johanna Canary Maid.....H.	3	Jan. 15, 1925	405	11,192·0	27·43	3·37	444·68	200 11	32 44
Lady Hartog Burke.....H.	5	1924	375	10,074·0	26·86	3·33	394·55	177 54	29 04
Ottawa Burma Lady 2nd.....J.	6	Jan. 5, 1925	305	6,606·0	21·65	4·73	367·78	165 50	18 87
Johanna Woodcrest Lyn.....H.	3	May 31, 1925	272	9,034·0	33·21	3·51	373·83	168 22	26 15
Ottawa Starlight.....A.	3	Dec. 12, 1924	312	7,351·0	23·56	4·50	390·02	175 51	21 06
Ottawa Burma Lady 3rd.....J.	3	Oct. 2, 1924	386	5,507·5	14·26	5·81	376·74	169 52	15 56
Ottawa Leoni.....J.	3	Feb. 6, 1925	281	6,093·0	21·68	4·88	350·10	157 54	17 38
Sweet Echo.....H.	4	Dec. 19, 1924	393	9,583·5	24·38	3·60	406·74	183 03	27 71
Maud of Fernbrook.....A.	13	Sept. 13, 1924	292	8,228·0	28·18	3·32	320·91	144 41	23 87
Ottawa Flo.....A.	4	Jan. 12, 1925	347	6,879·5	19·82	4·51	365·19	164 34	19 71
Dalfibble Orange Blossom.....A.	2	Nov. 13, 1924	304	8,193·5	26·95	3·77	364·33	163 95	23 65
Ottawa Culcraigie Dot.....A.	3	Nov. 27, 1924	312	6,681·0	21·41	4·14	326·15	146 77	19 21
Merry Christmas.....A.	9	Nov. 29, 1924	306	7,684·5	25·11	3·87	350·27	157 62	22 16
Ottawa Elsie.....J.	5	Nov. 13, 1924	307	5,343·5	17·40	5·17	325·38	146 42	15 20
Ottawa Blossom.....A.	4	Nov. 8, 1924	371	7,676·0	20·69	3·74	337·96	152 08	22 17
Dunlop Stellite.....A.	4	Jan. 14, 1925	249	7,888·0	31·69	3·70	348·58	156 86	22 78
St. Valentines Pet.....A.	11	Sept. 14, 1924	338	7,395·0	21·88	3·99	347·55	156 40	21 30
Relief Lucy.....A.	2	Dec. 3, 1924	302	7,459·0	24·70	3·72	327·01	147 15	21 54
Ottawa Lou.....J.	3	Oct. 22, 1924	335	5,674·5	16·93	4·61	308·04	138 61	16 23
Francy Olivia DeKol.....H.	3	Apr. 13, 1924	383	8,225·5	21·48	3·44	333·17	149 92	23 82
Fanny of Oban.....A.	5	Apr. 25, 1925	279	6,778·0	24·29	3·99	318·48	143 32	19 52
Brampton Vinnies Beth.....J.	7	Jan. 24, 1925	286	5,122·5	17·91	5·04	304·02	136 80	14 59
Ottawa Francy Bos DeKol.....H.	4	Jan. 22, 1925	309	7,670·0	24·82	3·56	321·25	144 56	22 19
Fairy's Fern.....J.	6	Dec. 29, 1924	260	5,032·5	19·35	5·19	307·32	138 29	14 31
Ottawa Dignity Dot.....A.	4	Nov. 11, 1924	350	7,199·0	20·56	3·95	334·60	150 57	20 74
Marjorie of Ottawa 10th.....A.	4	Aug. 28, 1924	304	5,565·8	18·31	4·22	276·18	124 28	15 99
Ottawa Lady 2nd.....A.	5	Jan. 12, 1925	281	5,929·5	21·10	4·18	291·96	131 38	17 04
Catlin's Barbara.....A.	10	Mar. 28, 1925	284	6,639·5	23·37	3·49	272·78	122 75	19 41
Allancroft Betsy 2nd.....A.	7	Sept. 19, 1924	259	7,061·5	27·26	3·63	301·58	135 71	20 42
Johanna Butter Maid.....H.	4	Nov. 14, 1924	278	7,552·0	27·17	3·10	275·72	124 07	21 95
Ottawa Victorine.....A.	3	Oct. 30, 1924	280	5,228·0	18·67	4·32	265·71	119 57	15 61
Lillian of Oban.....A.	6	Aug. 2, 1924	273	5,461·0	20·00	4·03	259·05	116 57	15 72
Ottawa Bess Hengerveld.....H.	4	Nov. 23, 1924	281	6,308·5	22·45	3·36	250·00	112 50	18 28
Francy Leila Posch.....H.	3	Sept. 1, 1924	238	5,635·0	23·68	3·37	223·43	100 54	16 33
Ottawa March Francy.....H.	3	Apr. 2, 1925	266	6,753·0	25·38	3·21	255·14	114 81	19 64
Allancroft Ada.....A.	10	Jan. 1, 1925	304	5,898·5	19·40	3·84	266·80	120 06	17 02
Ottawa March Korndyke.....H.	4	Jan. 4, 1925	261	5,491·5	21·04	3·69	238·64	107 38	15 86
Belle of Oban.....A.	13	Jan. 2, 1925	248	5,192·5	20·93	3·69	225·58	101 51	15 00
Ottawa Valentine.....A.	3	Mar. 28, 1925	229	3,557·5	15·53	4·08	171·15	77·01	10 23
Total for herd (62 cows).....	354	.....	20,042	551,182·5	.....	.....	25,100·77	11,295 30	1,591 44
Average for herd (62 cows)....	5·70	.....	323·25	8,890·04	27·50	3·87	404·85	182 18	25 66

AVERAGE PRODUCTION OF FIVE BEST COWS AND HOL

Sarah Ann Pontiac.....H.	7	Dec. 12, 1924	383	25,782·0	66·28	3·41	1,093·23	491 95	74 70
Lady Segis Jewel.....H.	8	Mar. 8, 1925	363	23,119·0	63·68	3·38	919·05	413 57	67 01
Grace Allen Ormsby.....H.	12	June 17, 1924	464	17,521·0	37·76	3·55	733·27	329 97	50 69
Johanna Helena Keyes.....H.	5	Mar. 9, 1925	303	17,771·0	58·64	3·14	658·22	296 19	51 63
Korndyke Posch Canary.....H.	5	Apr. 2, 1925	310	12,183·0	39·30	3·97	570·21	256 59	35 69
Average of best 5 cows.....	7·4	.....	364·6	19,275·2	52·85	3·50	794·79	357 65	55 94
Average of herd (21 cows).....	5·2	.....	330·5	11,596·8	35·08	3·49	477·48	214 86	33 63

COMPLETED DURING THE YEAR

Total value of product	Amount of meal eaten at $32 per ton	Amount of roots at $4.10 per ton and silage at $3.45 per ton	Amount of hay eaten at $6.60 per ton	Amount of green feed eaten at $6.75 per ton	Months on pasture at $2 per month	Total cost of feed between calvings	Cost to produce 100 lbs. of milk	Cost to produce one pound of butter skim-milk neglected	Profit on one pound of butter skim-milk neglected	Profit on cow between calvings, labour and calf neglected
$ cts.	lb.	lb.	lb.	lb.	mos.	$ cts.	$ cts.	cts.	cts.	$ cts.
566 65	7,390	12,740	2,912	.....	2	153 82	0 59	14·0	31·0	412 83
480 58	6,860	12,670	2,896	.....	2	145 16	0 62	15·7	29·3	335 42
380 66	5,590	18,020	3,073	600	3	138 68	0 79	18·9	26·1	241 98
347 82	6,298	11,690	2,612	.....	2	133 53	0 75	20·2	24·8	214 29
280 40	2,475	13,630	1,880	600	2	76 29	0 66	13·8	31·2	204 11
254 24	2,882	7,260	1,876	.....	2	68 82	0 67	13·7	31·3	185 42
292 28	4,466	14,490	2,478	600	2	110 63	0 90	19·4	25·6	181 65
262 45	3,244	14,730	2,620	600	2	92 39	0 90	17·8	27·2	170 06
272 52	4,820	8,800	2,024	.....	2	102 97	0 75	19·8	25·2	169 55
287 47	4,648	17,070	3,470	600	2	121 27	1 03	21·4	23·6	166 20
233 06	2,572	10,200	1,850	600	2	70 87	0 83	15·2	29·8	162 19
272 32	4,234	15,970	2,819	600	2	110 60	0 93	20·8	24·2	161 72
251 64	3,308	14,405	2,124	600	2	91 08	0 93	18·3	26·7	160 56
254 11	3,454	14,850	2,180	600	2	95 06	0 95	18·9	26·1	159 05
284 42	4,624	20,530	2,806	600	2	125 83	0 85	23·4	21·6	158 59
242 58	3,266	11,550	2,397	.....	3	86 08	0 83	18·2	26·8	156 50
252 98	3,640	15,390	2,192	600	2	98 64	0 91	19·9	25·1	154 34
236 08	3,124	14,510	2,124	600	2	88 98	0 89	19·2	25·8	147 10
252 75	4,206	15,776	2,450	600	2	109 26	0 99	22·2	22·8	143 49
233 21	3,882	10,020	2,612	.....	2	92 00	0 95	20·1	24·9	141 21
217 88	2,618	13,410	2,620	600	2	79 67	1 04	18·2	26·8	138 21
223 24	3,232	17,550	3,030	600	2	98 75	1 17	22·3	22·7	124 49
194 42	2,494	10,740	1,524	600	2	71 86	0 84	19·0	26·0	122 56
232 55	3,880	18,700	2,844	600	2	110 50	0 98	24·8	20·2	122 05
206 58	3,592	9,435	2,130	.....	3	86 76	0 86	21·9	23·1	119 82
184 37	2,152	10,650	1,944	600	2	65 23	0 98	17·7	27·3	119 14
194 37	2,724	11,340	1,938	600	2	75 55	0 83	20·2	24·8	118 82
196 57	2,484	13,610	1,944	600	3	78 73	1 07	20·1	24·9	117 84
185 08	2,370	11,580	2,130	600	2	70 93	1 28	18·8	26·2	114 15
174 92	2,004	12,630	1,944	600	2	66 91	1 09	19·1	25·9	108 01
210 74	3,364	19,400	2,986	600	2	103 72	1 08	25·5	19·5	107 02
168 28	2,588	8,040	1,680	.....	1	62 80	0 76	19·5	25·5	105 48
184 05	2,622	13,480	2,372	600	2	79 36	1 15	21·7	23·3	104 69
187 60	2,770	12,325	2,022	600	4	82 92	1 01	22·7	22·3	104 68
165 98	2,284	13,950	2,310	600	2	65 21	0 97	19·9	25·9	100 77
179 78	2,512	14,570	1,944	600	2	79 02	1 02	22·5	22·5	100 76
161 62	1,972	10,650	1,944	600	2	62 35	1 16	19·1	25·9	99 27
174 25	2,582	12,045	2,223	600	2	75 46	0 98	22·3	22·7	98 79
179 64	2,928	13,140	2,370	.....	2	81 94	1 03	23·5	21·5	97 70
177 70	2,718	11,580	2,161	600	4	80 60	1 08	23·1	21·9	97 10
168 69	2,614	12,830	1,758	600	2	76 91	1 03	23·5	21·5	91 78
154 84	2,034	11,400	2,124	600	2	65 17	1 14	21·1	23·9	89 67
173 74	3,250	13,640	2,639	.....	.....	84 22	1 02	25·2	19·8	89 52
162 84	2,380	12,510	2,494	600	2	73 90	1 09	23·2	21·8	88 94
151 39	2,116	10,650	1,758	600	2	64 32	1 25	21·1	23·9	87 07
166 75	2,898	12,425	1,944	600	2	80 23	1 04	24·9	20·1	86 52
152 60	2,128	11,400	2,124	600	2	66 72	1 32	21·7	23·3	85 88
171 31	3,038	13,410	2,310	600	3	87 70	1 21	26·2	18·8	83 61
140 27	2,283	8,970	1,850	.....	2	62 09	1 11	22·4	22·6	78 18
148 42	2,340	13,200	2,130	600	2	74 01	1 24	25·3	19·7	74 41
142 16	2,879	8,130	2,014	.....	2	70 72	1 06	25·9	19·1	71 44
156 13	2,237	15,244	4,955	486	2	85 03	1 20	28·1	16·9	71 10
146 02	2,846	10,290	1,578	600	3	76 50	1 01	27·7	17·3	69 52
135 18	2,278	10,650	1,938	600	2	67 22	1 28	25·2	19·8	67 96
132 29	1,967	13,350	2,731	.....	2	67 50	1 23	26·0	19·0	64 79
130 78	2,260	11,375	1,764	600	2	67 62	1 07	27·0	18·0	63 16
116 87	2,090	9,322	1,452	.....	.....	54 77	0 97	24·5	20·5	62 10
134 45	2,742	12,525	2,006	600	2	78 10	1 15	30·6	14·4	56 35
137 08	2,674	14,560	2,186	600	2	82 08	1 39	30·7	14·3	55 00
123 24	2,338	12,900	1,578	600	2	71 72	1 30	30·0	15·0	51 52
115 51	2,894	13,750	2,036	600	2	83 70	1 61	37·1	7·9	32 81
87 24	1,683	11,110	2,037	600	2	58 82	1 65	34·3	10·7	28 42
12,886 74	192,842	796,767	140,861	28,086	129	5,289 28	.....	.....	.....	7,597 36
207 85	31,103	12,851	2,271·9	453	2·08	85 31	0 96	21·0	24·0	122 54

OF THE TOTAL HERD IN EACH BREED

STEINS

566 65	7,390	12,740	2,912	.....	2	153 82	0 59	14·0	31·0	412 83
480 58	6,860	12,670	2,896	.....	2	145 16	0 62	15·7	29·3	335 42
380 66	5,590	18,020	3,073	600	3	138 68	0 79	18·9	26·1	241 98
347 82	6,298	11,690	2,612	.....	2	133 53	0 75	20·2	24·8	214 29
292 28	4,466	14,490	2,478	600	2	110 63	0 90	19·4	25·6	181 65
413 59	6,120·8	13,922	2,794·2	240	2·2	136 36	0 707	17·1	27·9	277 23
248 49	3,961·2	13,612·5	2,306	400	1·95	99 96	0 862	20·9	24·1	148 53

AVERAGE PRODUCTION OF FIVE BEST COWS AND

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Name and Breed of Cow	Age at commencement of lactation period	Date of dropping calf	No. of days in lactation period	Total pounds of milk for period	Daily average yield of milk	Average p.c. fat in milk	Pounds of butter produced in period	Value of butter at 45c. per pound	Value of skim milk at 30c. per cwt.
				lb.	lb.	p.c.	lb.	$ cts.	$ cts.
Auchinbay Mina 5th.....A.	7	Nov. 13, 1924	319	11,511·5	36·10	4·05	549·49	247 27	33 13
Morningside Bessie.....A.	4	Jan. 12, 1925	280	10,231·0	36·53	4·15	499·60	224 82	29 42
Hardcroft Dewdrop 3rd.....A.	9	Feb. 11, 1925	353	10,228·5	28·97	4·30	517·98	233 09	29 36
Maud of Fernbrook 4th.....A.	10	Aug. 29, 1924	578	11,691·5	20·22	4·10	564·09	253 84	33 63
Auchlochan Emerald.....A.	11	May 16, 1924	472	11,805·0	25·01	3·81	529·46	238 26	34 06
Average of best 5 cows.....	8·2	.....	400·5	11,093·5	27·70	4·07	532·12	239 45	31 92
Average of herd (32 cows).....	6·6	.....	319·3	7,879·1	24·67	3·98	369·83	166 42	22 72

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Brampton Bangle.....J.	6	Oct. 27, 1924	349	8,482·5	24·30	4·60	464·00	208 80	24 26
Ottawa Beauty Maid 2nd.....J.	4	Jan. 1, 1925	372	7,653·0	20·57	4·83	435·66	196 04	21 84
Ottawa Burma Lady 2nd.....J.	6	Jan. 5, 1925	305	6,606·0	21·65	4·73	367·78	165 50	18 87
Ottawa Burma Lady 3rd.....J.	3	Oct. 2, 1924	386	5,507·5	14·26	5·81	376·74	169 52	15 56
Ottawa Leoni.....J.	3	Feb. 6, 1925	281	6,093·0	21·68	4·88	350·10	157 54	17 38
Average of best 5 cows.....	4·4	.....	338·6	6,868·5	20·28	4·93	398·85	179 48	19 58
Average of herd (9 cows).....	4·7	.....	320·1	6,169·4	19·26	4·95	359·87	161 94	17 58

OFFICIAL RECORDS

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

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

HOLSTEIN RECORD OF MERIT TESTS ON CENTRAL EXPERIMENTAL FARM, APRIL 1, 1925, TO MARCH, 31, 1926

Name and Number of cow	Age at commencement of test			Number of days on test	Pounds milk	Pounds fat	Pounds 80 per cent butter
	Years	Month	Days				
Johanna Butter Maid—80456.....	5	4	7	30	1,945·5	60·73	75·92
				7	492·5	15·47	19·35
Korndyke Bessie Ann—93035.....	4	3	25	30	2,031·0	73·39	91·74
				7	468·5	17·60	22·01
Lyons Segis Bessie Ann—64286.....	7	1	17	7	739·5	18·28	22·85
Ottawa Grace DeKol—106492.....	3	0	23	30	1,479·0	61·69	77·12
				7	367·0	15·71	19·64
Ottawa Lula Posch—80940.....	4	8	7	7	390·5	19·77	24·72

OF THE TOTAL HERD IN EACH BREED—*Continued*

SHIRES

Total value of product	Amount of meal eaten at $32 per ton	Amount of roots at $4.10 per ton and silage at $3.45 per ton	Amount of hay eaten at $6.60 per ton	Amount of green feed eaten at $6.75 per ton	Months on pasture at $2 per month	Total cost of feed between calvings	Cost to produce 100 lb. 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.	lb.	lb.	lb.	lb.	mos.	$ cts.	$ cts.	cts.	cts.	$ cts.
280 40	2,475	13,630	1,880	600	2	76 29	0 66	13·8	31·2	204 11
254 24	2,882	7,260	1,876	.....	2	68 82	0 67	13·7	31·3	185 42
262 45	3,244	14,730	2,620	600	2	92 39	0 90	17·8	27·2	170 06
287 47	4,648	17,070	3,470	600	2	121 27	1 03	21·4	23·6	166 20
272 32	4,234	15,970	2,819	600	2	110 60	0 93	20·8	24·2	161 72
271 37	3,496·6	13,732	2,533	480	2	93 87	0 846	17·6	27·4	177 50
189 14	2,802 8	12,760	2,312·4	446·4	2·18	80 56	1 022	21·7	24·3	108 58

SEYS

233 06	2,572	10,200	1,850	600	2	70 87	0 83	15·2	29·8	162 19
217 88	2,618	13,410	2,620	600	2	79 67	1 04	18·2	26·8	138 21
184 37	2,152	10,650	1,944	600	2	65 23	0 98	17·7	27·3	119 14
185 08	2,370	11,580	2,130	600	2	70 93	1 28	18·8	26·2	114 15
174 92	2,004	12,630	1,944	600	2	66 91	1 09	19·1	25·9	108 01
199 06	2,343·2	11,694	2,097·6	600	2	70 72	1 029	17·7	27·3	128 36
179 52	2,218·4	11,396·6	2,048·6	600	2	68 01	1 102	18·8	26·2	111 51

CANADIAN RECORD OF PERFORMANCE TESTS ON CENTRAL EXPERIMENTAL FARM, APRIL 1, 1925 TO MARCH 31, 1926

Name and Number of Cow	Breed	Age at commencement of test	Number of days milking	Pounds milk	Pounds fat	Average per cent fat
Auchinbay Mina 5th—70080.....	Ayrshire	7	305	11,174	461	4·13
Auchlochan Emerald—70083.....	"	11	365	10,723	410	3·82
Dalfibble Orange Blossom—83935....	"	2	305	8,194	334	4·08
Flavia of Ottawa 8th—63210.....	"	5	305	9,896	454	4·59
Hardcroft Dewdrop 3rd—70084.....	"	9	355	10,229	452	4·42
Morningside Bessie (Bang)—69567....	"	4	280	10,231	437	4·27
Oldhall Maggie 9th (Bang)—70088....	"	13	305	9,683	395	4·08
Ottawa Auchinbay Mina—77136.....	"	3	365	9,415	398	4·23
Ottawa Culcaigrie Dot—77700.....	"	3	305	6,668	275	4·12
Ottawa Starlight—77779.....	"	3	305	7,345	326	4·44
Ottawa Tilly—66552.....	"	4	349	10,318	411	3·98
Relief Lucy—83933.....	"	2	302	7,459	280	3·75
Grace Allen Ormsby—22333.....	Holstein	12	365	16,397	528	3·22
Helena Keyes Posch (Bang) —21376..	"	12	232	13,596	444	3·27
Johanna Canary Maid—94258.....	"	3	365	10,960	377	3·44
Korndyke Bessie Ann—93055.....	"	3	305	9,062	377	4·16
Lady Segis Jewel (Bang)—51243.....	"	8	305	22,039	781	3·54
Leila Posch Mechthilde—39673.....	"	9	271	11,657	414	3·55
Lyons Segis Bessie Ann—64286.....	"	5	365	14,530	446	3·07
Sarah Ann Pontiac (Bang)—58345.....	"	7	365	25,357	886	3·49
Zorra Hengerveld—77746.....	"	4	305	10,768	392	3·64
Brampton Bangle—19737.....	Jersey	6	305	8,826	452	5·12
Ottawa Beauty Maid 2nd—14668.....	"	4	305	6,823	340	4·98

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:—

1. Month-long daily milk-record forms, suitable for herds numbering up to twenty-two cows.
2. Week-long daily milk-record forms, suitable for herds numbering up to sixteen cows.
3. Week-long daily record forms, suitable for herds numbering up to twenty-four cows.
4. Monthly summary forms.
5. Yearly summary forms.
6. 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 now conducted by the Live Stock Branch of the Department of Agriculture, but rather to encourage individual farmers in outlying districts that have not cow-testing associations, to start a good work.

THE DAIRY

The regular volume of work has been accomplished by the dairy during the past year. All milk produced by the herds at the Central Experimental Farm is cared for, distributed and manufactured by the Farm dairy .

During the year 605,171 pounds of milk were delivered to the dairy from which the main return has been through the manufacture of butter, sold fresh and slightly salted to a city trade. Of this product, 19,005 pounds were produced in the past year together with 735 pounds of cheese.

The manufacture of Cheddar, Meilleur, Buttermilk and Cream cheese has been continued in quantities necessarily limited. There is a steady demand for a well cured ten-pound Cheddar and for the other varieties made. In the case of soft cheese, and special varieties, the objective has been to standardize and improve methods of manufacture, but, this done, not to continue such manufacture indefinitely. It is desired, rather, that the commercial end be taken up by others. In this connection it is of interest to note that a splendid quality of Meilleur cheese is being manufactured in a small plant near Ottawa. This product was originated in the Farm dairy.

CLEAN MILK

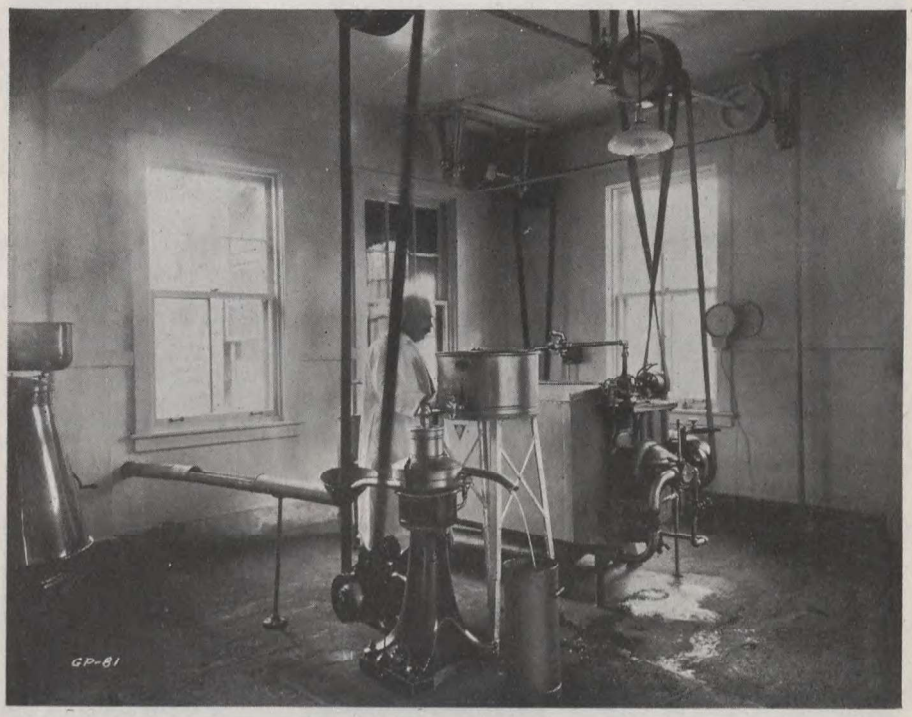
Special effort is maintained in the production of clean milk and the accompanying photographs show some of the dairy machinery and appliances that assist in the production of a " low-count " milk. In this connection much assistance is secured from the Dominion Bacteriologist. A specially equipped bacteriological laboratory adjoins the dairy workroom in the dairy.

In adhering to a schedule permitting of clean milk production the two most important items as observed are " Clean Cows " and " Clean Men ".

1. Cows are brushed and udders cleaned with a clean damp cloth.
2. Milking-machines are subject to special care in cleaning and sterilization. Where hand-milking is employed, or in stripping after the machines, hooded or partially covered pails only are used.
3. Milk is removed at once from stables to milk-room and from thence to dairy.
4. All milk is pasteurized in a modern discontinuous type pasteurizer and immediately cooled, the night milk being held over and reheated to

separating temperature. Milk is pumped from the pasteurizer to a supply tank when it runs by gravity to the separator. Temperature charts are collected daily.

5. All utensils are rinsed, washed in hot water, steamed and sterilized in a special sterilizer or autoclave. (See illustrations).
6. Adequate provision for cooling and holding is provided by large cement ice-water tanks and cold rooms. (Air circulated through large ice-chamber).



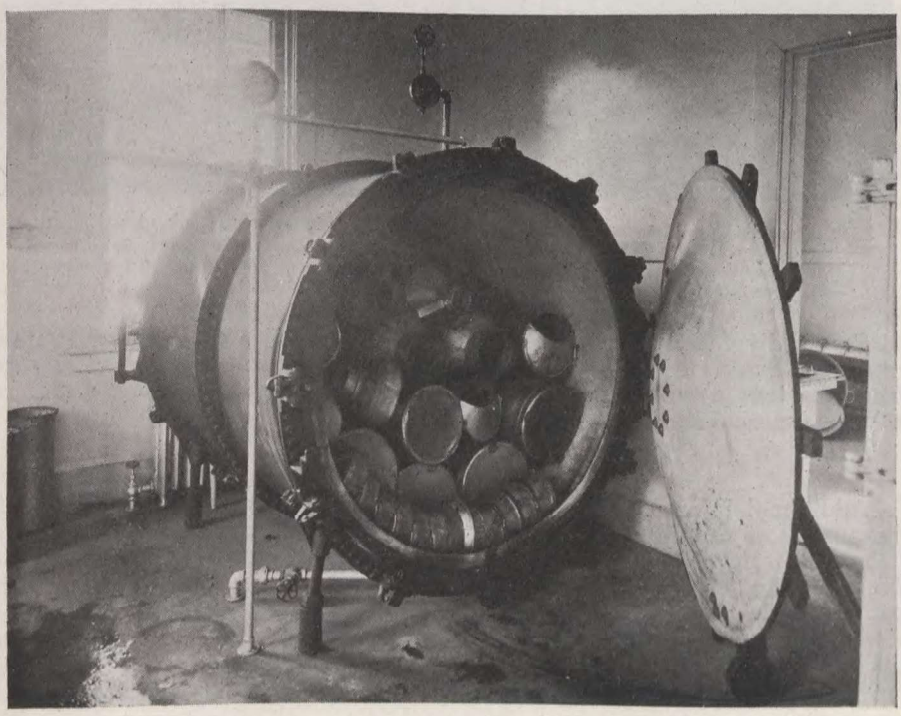
Milk is pumped from the pasteurizer to a supply-tank and from thence falls by gravity to the separator. Skim-milk is conducted outside the building where it is collected for swine-feeding. The cream-ripening vat and combined churn and butter-worker, not shown, are in line immediately to the left of the picture.

By rigidly following a system where cleanliness is a major consideration, a standard quality of milk and cream is being produced, which is turn ensures standardization in the finished product, butter or cheese, and provides a uniform basis for experimental test and comparative work.

MEILLEUR CHEESE

Additional information has been secured concerning Meilleur cheese. (1) The quality of this product is greatly affected by the percentage of butter-fat of the milk from which it is manufactured. Cheese was made from separate lots of milk testing 3.8 per cent, 4.2 per cent and 5.6 per cent. All were of excellent quality and flavour. With the increased percentage of fat the quality improved, as would be expected. The flavour of the cheese made from the higher-testing milk was particularly pleasing, having a richness and delicacy sufficient to indicate the desirability of utilizing a high-testing milk to obtain the very highest

Washing and steaming utensils prior to sterilization in the large autoclave to the right.



All utensils after rinsing, washing and steaming, are subject to sterilization under steam pressure in an autoclave.

results with this cheese. (2) Some of the very best cheese made to date were ripened during the summer months in a deep cool cellar in one of the Farm residences. A humid atmosphere is necessary to success. (3) Provided the humidity of atmosphere is maintained this cheese may be held for from three to five months after it is sufficiently cured for use. The flavour improves with age provided drying out does not take place.

OUTSIDE ASSISTANCE

As in the past, the Dairyman has rendered assistance in the way of milk-testing for farmers and dairymen from a wide area, has made demonstrations of methods of manufacture as required, assisted those taking up dairy manufacture for the first time and has judged dairy products at a number of local fairs and exhibitions.

HORSES

There are at present 27 horses at the Central Experimental Farm, 10 grade geldings and mares, 2 general purpose horses and 15 registered Clydesdales.

During the year the work performed for the various Divisions on the Central Farm has amounted to 7,811.5 days.

COST OF MAINTENANCE

While cost figures are available covering all horses maintained, the cost of feeding and generally maintaining work horses is hereby shown from 13 head that have been in this stable throughout the year employed at regular farm work.

In considering the cost of maintenance per head, these facts must be remembered:—

(1) These are high-class heavy draught horses averaging 1,700 pounds in weight.

(2) The interest charge is based on a valuation of $225 per head.

(3) The labour charge is a correct proportion of that applying to the care of all horses.

(4) These horses have little or no idle period on grass and are maintained in good flesh throughout.

(5) Feed charges are based on actual prices paid or on cost of production as in the case of hay.

(6) Maintenance charges, aside from feed, will vary under different conditions. Quantities of feed consumed per head, represents the information of basic importance.

FEED AND MAINTENANCE COSTS FOR 13 DRAUGHT HORSES FOR ONE YEAR

Feed Cost—		
37.59 tons oats at $32.30		$1,214 16
2.57 tons bran at $27.00		69 39
36.5 tons hay at $6.60		240 90
Total feed cost		$1,524 45
Average feed cost per head		117 26
Quantities consumed per Horse—		
Grain	5,783 pounds	
Bran	395 "	
Hay	5,615 "	

Cost of Maintenance—

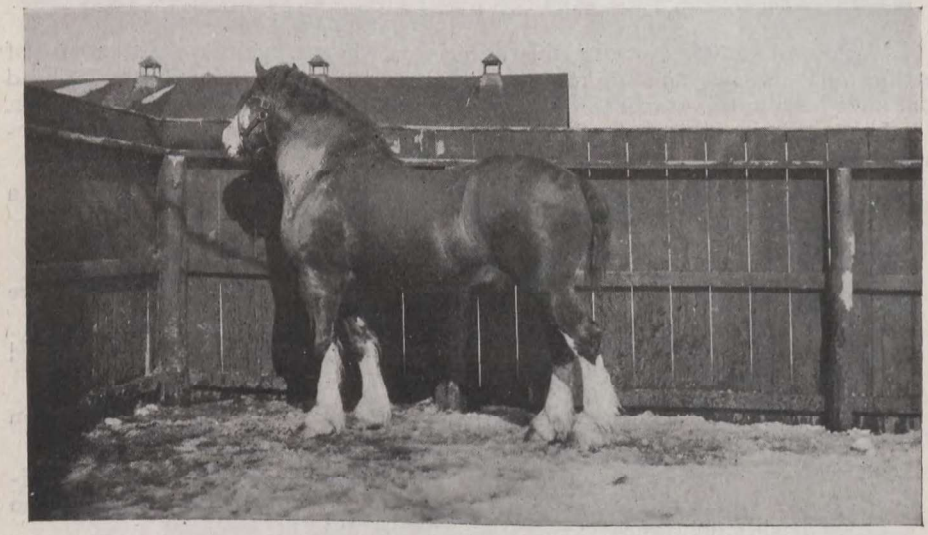
Total feed	$1,524 45
Labour (stable attendance)	650 00
Interest ($2,925 at 6 per cent)	175 50
Shelter (estimated at $25, each)	325 00
Harness and repairs	271 83
Shoeing	262 47
Total yearly cost	$3,209 25
Cost per horse	246 86

FEED COST OF AN AGED CLYDESDALE STALLION FOR ONE YEAR

Hay, 4,376 lb. at $6.60 per ton	$ 14 44
Grain, 4,376 lb. at $32.30 per ton	70 73
Bran, 1,460 lb. at $27.00 per ton	19.70
Total cost of feed	$ 104.87

HORSE-BREEDING

Two exceptionally high-class Clydesdale mares have been added to the stud, one of these mares winning her class at the Royal Agricultural Winter Fair at Toronto in 1925 and at the Ottawa Winter Fair.



The breeding qualities of many stallions are seriously affected by lack of exercise and fresh air during winter months. The imported Clydesdale Sandy Mac at the head of the stud at the C.E.F. spends a great part of the winter outdoors.

Sandy Mac (imp.) 24,318, at the head of the stud, has developed exceedingly well. Of the thick, draughty cart-horse type, with plenty of quality, and a splendid mover, he has proven a sure getter of the right kind of foals. At the Royal he was placed second and at Ottawa was grand champion in 1925.

Following the previously adopted policy of occasional exhibition of live stock at the larger fairs, the two individuals mentioned were among a small but select lot shown successfully in 1925.

It is hoped that some 9 or 10 mares will be bred during the summer of 1926.

A SHORT REVIEW OF FOAL REARING EXPERIENCES AND METHODS AT THE CENTRAL EXPERIMENTAL FARM

Four good Clydesdale foals were reared during the summer of 1925. These have been reared without untoward incident and are developing well. Reference to the reports of this Division for several years past will reveal the fact that since the year 1922, no difficulty was met with in the matter of foal-rearing, from joint-ill or weaknesses generally as applying to foals at the time of or shortly after birth. Prior to this time, more or less trouble was encountered yearly, in spite of the best treatment of mares calculated to act in a manner preventive toward such maladies, and including of course, the use of mixed bacterial vaccines and vaccines of more specific nature. While positive results were not obtained, undoubtedly the vaccine treatment was of considerable assistance. It may be of interest to enumerate briefly the points toward which special emphasis is directed, in the way of care and management of stallions, mares and foals.

1. The Stallion is kept in good flesh, but not in high condition, this the result of careful and even restricted use of grain, the liberal use of bran, roots during the winter, good clean hay moderately fed, and lastly, exercise. During the greater part of the year the horse is housed in a shed with access to a large paddock surrounded by a high board fence. (See illustration.) The result is the right bodily condition at practically all times during the year—hard, firm flesh, vigour and activity, and a properly toned, well-cleansed system. Unquestionably this factor of health and vigour in the male, particularly at breeding time, has much to do with his breeding powers and with the subsequent strength of the embryo.

2. Mares are maintained in good flesh and all pure-bred mares are worked regularly winter and summer. Where for any reason work is not available, mares spend a great part of the time outdoors. It has been found, however, that exercise of the latter variety, while much preferable to idleness or inactivity in a stall, cannot compare with work. The actual expenditure of energy with the resultant normal functioning of assimilation, building up processes, and proper scavenging of the system ensures a healthy well-cleansed blood circulation. An active, hard-fleshed, vigorous in-foal mare has much to do with the first heritage of her future foal.

3. Special or medicinal treatment of the mare should receive some attention. Beyond the regular weekly bran mash containing some Glaubers Salts or potassium nitrate as required, Experimental Farm mares receive little medicinal supplement to the ration. Since 1922 vaccine treatment as a preventive to joint ill has been discontinued. Replacing this treatment, small quantities of potassium iodide are fed regularly to in-foal mares, beginning with the month of October. Each mare receives $\frac{1}{8}$ of an ounce (a level teaspoonful), dissolved in a small quantity of water and administered in the drinking water twice monthly, say on the first and fifteenth of the month. This feature of the general treatment would seem to have exerted a very considerable influence toward attaining the one hundred per cent results in foal rearing during the past few years.

4. Mares are worked, wherever possible, close to foaling time, or, in the case of late foaling mares, are given a few weeks on grass. Possibly no single phase of management directed toward successful foal-rearing is more important than that of giving a short period on grass. The exercise, fresh air, sunlight and general freedom have their effect, but of most value is the diet of grass with its known cleansing qualities. By no means must it be forgotten, however, that methods of management as described *must be instituted early in the period of pregnancy*.

5. Mares are placed in disinfected box-stalls a few days before the probable foaling date. There is no better disinfectant than lime,—dry on the floors and as a wash on the walls. Mares are watched closely, but subjected to no more bother than absolutely required at foaling.

6. Where necessary, the navel cord is ruptured a few inches from the body avoiding a sharp severing of the membranes. The stump is immediately disinfected with tincture of iodine. Further application of iodine may be desirable should the stump be slow in drying up. The frequently recommended custom of ligaturing or tying the navel with a disinfected cord or tape is not followed.

7. Recognizing the fact that a prolonged retention of the contents of the bowel (the meconeum, as it is called) may undo all the effect of previous good management, the foal is watched carefully during the first few hours after birth. The strong foal from a well-exercised mother that has been fed minimum quantities of grain will usually evacuate the meconeum promptly. Where this action is delayed, warm injections of soapy water are used, and usually suffice. Persisted trouble is best treated by the use of milk of magnesia or castor-oil. The foal seems to get a better start, however, where no laxatives are necessary.

OBSERVATIONS ON JOINT-ILL IN FOALS

The specific germ origin of joint-ill is more or less obscure. Whether the disease is of pre-natal origin, the foal being dropped with the disease, so to speak, or whether the foal acquires the infection, most likely through the umbilicus (navel), or otherwise, are still contentious points. The more general opinion is that infection most frequently occurs after birth and this is supported by the results of an exhaustive survey of many of the large studs in Scotland made some years ago, and by the work of several investigators.

Certain facts familiar to the observant horse-breeder pertaining to this question have been observed:—

A show mare kept in high fit, fed heavily on grain, given little exercise and no work, in many cases drops a weak foal. Where navel-ill has been prevalent such a foal is a fit subject within a few days after foaling.

On the other hand, foals from properly managed mares have developed the trouble shortly after foaling in spite of disinfection at birth.

Several cases have been noted of delayed occurrence, where for example four to six weeks have elapsed between foaling and the appearance of trouble, the foal evidencing perfect health during the interval.

The danger of joint-ill disappears as the foaling date advances into the summer, i.e., with the spring foal the liability is much greater than with one born in July, other things being equal. The reason is apparently clear,—work, exercise, freedom, sunlight and grass, as favourably affecting the condition of the mare. With late or fall foals the danger is eliminated to all intents and purposes,—this the result of observation at the Central Experimental Farm and in several other breeding establishments.

The in-foal farm mare, regularly employed and periodically hard worked, fed grain generously only when she works hard, kept during periods of comparative idleness (as in the winter) on a maintenance ration, foaling in only fair flesh, but hard, healthy and active, usually drops a rugged foal. Navel-ill is not common on the ordinary farm. No specific attempt is made to prevent it; foaling occurs under conditions far from ideal. Apparently there are but two explanations; the first, that the sources of germ infection are not present; the second, that preventive conditions have been supplied involuntarily or in an unpremeditated way.

Under conditions applying at the Central Experimental Farm where mares are always kept in good condition, and do not "rough it" in the ordinary sense, good results have apparently attended the use of potassium iodide as described.

From the foregoing paragraphs it would appear that attention to certain points in the care of the in-foal mare has an effect in the control of joint-ill. In all probability the result is a removal of predisposing causes i.e., the strong rugged foal is better enabled to withstand bacterial infection or invasion; this on the assumption that the disease is largely of post-natal (after foaling) rather than pre-natal (previous to foaling) origin.

In this connection, and turning from the observations and experiences of the feeder and breeder to the findings of the pathologist, certain quotations follow as taken from the work "Diseases of the Genital Organs of Domestic Animals" by Dr. W. L. Williams of Cornell University, one of the world's foremost investigators concerning the subject,—

"Pyemic arthritis (navel-ill, joint-ill) is commoner in foals than in any other species of domestic animals. This is due chiefly to the fact that a large proportion of the cases is caused by post-natal infection through the umbilicus (omphalo phlebitis, pyo-septicemia), owing to the longer and thicker umbilic cord which breaks with a longer stump. An important part is played by the long stump by inviting imprudent ligation, so that the umbilic stump is ligated more frequently in the foal than in all other new-born animals combined. Umbilic infection is so evidently the cause of many cases of pyemic arthritis that until quite recently the navel was considered the sole avenue of invasion. Lately Schofield has shown satisfactorily that *arthritis is frequently due to intra-uterine infection and that in etiology it conforms to the basic principles of pyemic arthritis in calves and may be either ante-natal or post-natal in origin.* Like arthritis in calves, *the anthritis of foals is prominently associated with intense intra-uterine infection in mares with abundant sterility and abortion.* Bacteriologically there are recognized in the infected joints or other pyemic centers, streptococci, staphylococci, the *B. abortive-equinus,* etc. In other words, there may be present in the diseased joints any bacteria which may exist (a) in the uterine cavity of the pregnant mare and may be swallowed by the fetus, (b) in the milk of the dam and be swallowed by the foal when the alimentary epithelium has been damaged or destroyed, or (c) externally and invade the foal through the umbilicus."

From the foregoing it would appear that:—

1. While joint-ill in the large proportion of cases is caused by infection through the navel opening or otherwise after foaling, it has been proven satisfactorily that pre-natal infection may occur.

2. Intra, uterine infection is prominently associated with sterility and abortion infection in mares. Further in this connection and as mentioned in Dr. Williams' volume, Schofield found that abortion in mare was chiefly observed in those that had been bred to certain stallions. It was further noted by Schofield that the foals born of mares bred to stallions whose mares had largely aborted, frequently suffered from arthritis, (navel-ill).

As to method of infection Williams writes as follows:—

"The invasion is not necessarily direct through the genital tract. The fetus swallows the infection, derived from the uterus of the mother, with its amniotic fluid. Again the new-born swallows any infection emanating from the uterus which may flow down the tail or thighs and reach the exterior of the teats. In many cases the infection enters the body of the new-born through the navel wound, in which case arthritis becomes the outstanding clinical phenomenon. But the arthritis of navel infection, except in some cases for the navel lesions themselves, is not clinically nor bacteriologically differentiable from the arthritis caused by the fetus swallowing the infection emanating from the utero-chorionic space, or by the new-born swallowing infection in its food."

From the foregoing it is seen that infection may take place other than through the umbilicus or navel opening, the resultant disease differing not at all from that where navel infection is the case.

As in the case of contagious abortion in cattle, much remains to be learned concerning the cause and control of joint-ill. Leading up to a few final recommendations, it has been thought advisable to review the matter thus

briefly. To the horse-breeder operating in a large or small way these practical suggestions may be made:—

1. In so far as possible use stallions of proven breeding propensities. It is recognized that, in most cases, much difficulty may exist in securing such information. Nevertheless the final control of several of the general infections of live stock to-day may be summed up in the words *mate sexually normal and healthy animals.*

2. Direct all points of management toward securing *a strong foal at birth.* Give the foal every chance to fight infection to which it may be subject immediately after foaling. The system of hygiene already described has been found effective.

3. In cases of intra uterine infection or of specific infection from the dam shortly after foaling, as discussed, actual curative treatment is difficult, nor can any logical system of prevention be suggested. Where the trouble persists in spite of the folowing of proper hygienic control of the stallion and mares, vaccines *may* be of assistance. This will depend largely upon whether the vaccine, from its nature and origin, is a specific for the type of infection.

FEEDING WHOLE VS. CRUSHED OATS TO WORK HORSES

Horses at active farm work do not lend themselves readily to experimental feeding investigations when the results derived from these investigations are measured solely on the basis of variations in weight. This is largely because of the fact that much of the energy derived from the food is expended in work and not utilized to make gains in weight. However, lacking a better method, the factor of weight can be made use of to give useful information by so feeding the horses that each horse in a team is a check upon its mate.

In order to obtain some data relative to the value of feeding crushed oats to work horses four two-horse teams were selected. One horse in each team was fed a grain ration consisting of whole oats, while its mate received crushed oats. These grain rations were alternated every two weeks, one horse receiving whole oats every other period and crushed oats in the intervening periods, while the other horse of the team was fed just the reverse way. This procedure was necessary in order to test the two methods of feeding the oats under similar working conditions.

The test started on June 20, 1925, and continued until December 5, 1925. Individual weights were taken at the end of each period of two weeks and the feeds then reversed.

The accompanying table shows in detail the results obtained in the various fortnightly periods, the gains or losses in weight and the oats consumed.

WORK-HORSE FEEDING EXPERIMENT—WHOLE VS. CRUSHED OATS

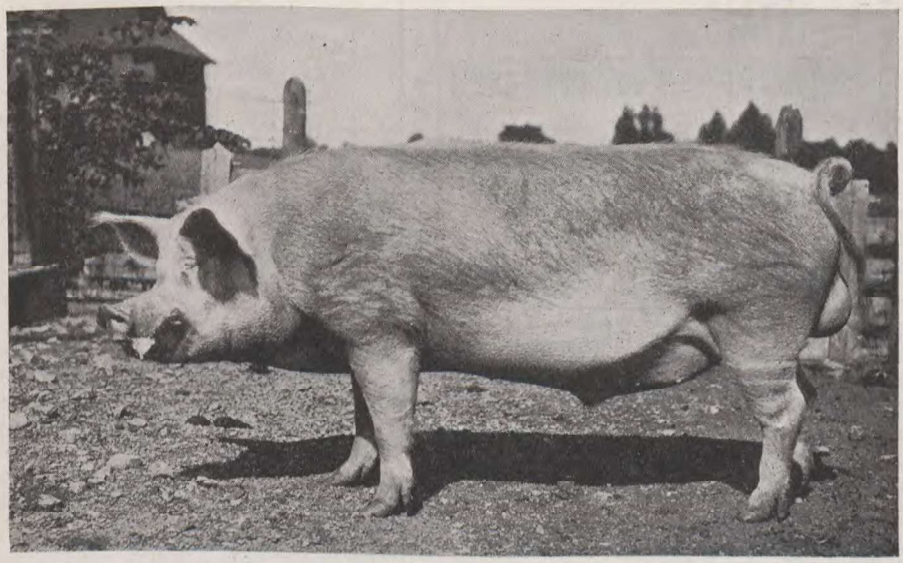
Period	Horses fed whole oats						Horses fed crushed oats					
	Number of horses	Total initial weight	Total final weight	Gain	Loss	Whole Oats consumed	Number of horses	Total initial weight	Total final weight	Gain	Loss	Crushed oats consumed
1925	No.	lb.	lb.	lb.	lb.	lb.	No.	lb.	lb.	lb.	lb.	lb.
June 20–Julv 4	4	6,800	6,825	25	.....	878	4	6,885	6,970	85	.....	878
July 4–July 18	4	6,970	6,960	.....	10	900	4	6,825	6,815	.....	10	858
July 18–Aug. 1	4	6,815	6,775	.....	40	858	4	6,960	6,890	.....	70	900
Aug. 1–Aug. 15	4	6,890	6,830	.....	60	900	4	6,775	6,725	.....	50	900
Aug. 15–Aug. 29	4	6,725	6,840	115	.....	858	4	6,830	6,885	55	.....	900
Aug. 29–Sept. 12	4	6,885	6,825	.....	60	900	4	6,840	6,720	.....	120	858
Sept. 12–Sept. 26	4	6,720	6,695	.....	25	858	4	6,825	6,925	100	.....	900
Sept. 26–Oct. 10	4	6,925	6,915	.....	10	856	4	6,695	6,715	20	.....	816
Oct. 10–Oct. 24	4	6,715	6,720	5	.....	816	4	6,915	6,880	.....	35	856
Oct. 24–Nov. 7	4	6,880	6,945	65	.....	856	4	6,720	6,750	30	.....	816
Nov. 7–Nov. 21	4	6,750	6,745	.....	5	816	4	6,945	6,925	.....	20	856
Nov. 21–Dec. 5	3	5,400	5,445	45	.....	622	3	4,945	4,985	40	.....	622
Totals	.....	80,475	80,520	255	210	10,118	.....	80,160	80,185	330	305	10,160
Net gain	.....	.....	45	45	.....	.....	.....	.....	25	25	.....	.....

DEDUCTIONS.—The results from this test fail to demonstrate that crushed oats had any greater feeding value than the whole grain. In the 168 days, the horses on whole oats showed gains in five periods totalling in all 255 pounds, while in seven periods losses in weight were shown totalling 210 pounds, this giving a net gain for the whole period of 45 pounds. When feeding crushed oats gains were recorded in six periods, these totalling 330 pounds, while losses were shown in the other six periods totalling 305 pounds, a net gain for the full period of 25 pounds.

The crushed oats, therefore, actually gave slightly poorer results than the whole oats, but the difference between the two was slight.

One feature of interest in the table is the consistency of the results obtained with the two feeds in the same periods in that with three exceptions a gain or loss shown by the horses on one feed was duplicated to a greater or less extent by the horses on the other feed, this illustrating that the work to which the horses were subjected directly affected the gains or losses.

SWINE



Dalmeny A. R.—88840—imported by the Central Experimental Farm in 1923 from the herd of the Earl of Rosebery, Dalmeny, Scotland. This boar represents the type of English Large White from which good results may be expected when crossed on Canadian Yorkshire sows.

On March 31, 1926, the herd of swine at the Central Experimental Farm numbered 256 head: 200 Yorkshires, 56 Berkshires. There was a heavy demand for breeding stock during the year and 120 pigs were sold to farmers, 93 of these being Yorkshires and 27 of the Berkshire breed. There was an especially strong demand for six-months gilts and young bred sows in the fall of 1925, probably due to a seeming shortage of sows in the country, coupled with an especially strong market for pork.

The increasing demand for Yorkshires of the longer type indicates clearly the desire of farmers and the efforts they are making to improve the type of their swine through the use of good pure-bred Yorkshire boars. There also has been a number of young sows of this breed sold during the year to farmers desiring to start the building up of small Yorkshire herds.

In order to meet this heavier demand for Yorkshire breeding stock it has been necessary to decrease, somewhat, the size of the Berkshire herd in order to make room for more Yorkshire brood sows. There are now 37 Yorkshire and 12 Berkshire gilts and mature sows in the breeding herd.

During the year there has been an important addition made to the herd of Yorkshires, a very promising young boar, Orchard Grove Pat 76 —109848—. This young animal possesses a wealth of smoothness, refinement and length and will be used on the progeny of the two imported herd boars latterly in use. The progeny of these boars have been chiefly remarkable for their substance and strength as combined with good bacon type generally.

Yorkshire gilts sired by imported Yorkshire (Large White) boars.

EXPERIMENTAL WORK

The sale of so many young pigs for breeding has somewhat curtailed the extent of the experimental work. However, as in former years, considerable investigational work has been conducted.

MILK AND MILK SUBSTITUTES

OBJECT OF THE EXPERIMENT.—A problem that many farmers raising hogs have to solve is that of obtaining a milk substitute for young pigs. Investigational work was continued with the object of determining whether hogs can be produced and fattened economically with a milk substitute and if this is so, to determine the best substitute for milk by-products. The object in this particular experiment was to compare different substitutes with skim-milk and buttermilk for the fattening of hogs after weaning.

PLAN OF EXPERIMENT—PERIOD I.

Lot	Breed	Number of hogs	Days of period	Meal ration	Other feed
1	Yorkshires.....	5	60	Oats, 2 parts; barley, 1 part; shorts, 1 part; Middlings, 1 part; Tankage, 5%; Oil meal, 3%.	Skim-milk.
2	Yorkshires.....	5	60	Same as above.....	Buttermilk.
3	Yorkshires.....	5	60	Same as above.....	Semi-solid buttermilk.
4	Yorkshires.....	5	60	Same as above.....	Prolac.
5	Yorkshires.....	5	60	Same as above.....	Ground flax.
6	Yorkshires.....	5	60	Same meal ration, except that tankage increased to 9 per cent.	Tankage.

PERIOD II

Lot	Breed	Number of hogs	Days of period	Meal ration	Other feed
1	Yorkshires.....	5	30	Barley, 2 parts; oats, 2 parts; shorts, 1 part; tankage, 5%; oil meal, 3%.	Skim-milk.
2	Yorkshires.....	5	30	Same as above.....	Buttermilk.
3	Yorkshires.....	5	30	Same as above.....	Semi-solid buttermilk.
4	Yorkshires.....	5	30	Same as above.....	Prolac.
5	Yorkshires.....	5	30	Same as above.....	Groundflax.
6	Yorkshires.....	5	30	Same meal ration, except that tankage increased to 9 per cent.	Tankage.

In this experiment skim-milk and buttermilk were fed approximately at the rate of 2½ pounds of milk per pound of meal.

The semi-solid buttermilk used was the ordinary commercial product and was mixed in water at the rate of 2 pounds of semi-solid buttermilk for each gallon of water.

Prolac is an American product sold as milk substitute, and was purchased in the form of meal. This finely powdered product was mixed with water at the rate of 1 pound to 65 pounds of water and the meal mixed in this solution at least 24 hours before feeding.

The ground flax was mixed with boiling water at the rate of 7 pounds to 8 gallons of water.

The tankage was fed at the rate of 9 per cent of the total meal ration.

VALUATION OF FEEDS

Meal for first 5 lots	$38 00 per ton
Meal for lot 6	35 00 " "
Skim-milk and buttermilk	30 per 100 pounds
Semi-solid buttermilk	3 50 " "
Prolac	6 00 " "
Flaxseed meal	4 00 " "
Tankage	60 00 per ton

MILK AND MILK SUBSTITUTES
(Started June 15)

—		Lot I Skim-milk	Lot II Butter-milk	Lot III Semi-solid butter-milk	Lot IV Prolac	Lot V Ground flax	Lot VI Tankage
Number of hogs	No.	5	5	5	5	5	5
Total initial weight	Lb.	176	216	229	216	262	254
Average initial weight	"	35·2	43·2	45·9	43·2	52·4	50·8
Total finished weight	"	791	841	832	677	798	800
Average finished weight	"	158·2	168·2	166·4	135·4	159·6	160
Total gain	"	615	625	603	461	536	546
Number of days on test	Days	90	90	90	90	90	90
Average gain per hog	Lb.	123	125	120·5	92·2	107·2	109·2
Average daily gain per hog	"	1·36	1·39	1·34	1·02	1·19	1·21
Total meal consumed	"	1,405	1,320	1,440	1,325	1,410	1,495
Total milk or substitute consumed	"	3,535	3,535	760	59	116	134
Lbs. meal eaten per lb. of gain	"	2·28	2·11	2·39	2·87	2·63	2·73
Lbs. milk or substitute eaten per lb. of gain	"	5·74	5·66	1·26	0·127	0·217	0·238
Total cost of feed	$	37·29	35·68	52·96	28·71	31·42	30·13
Cost of feed per head per day	cts.	8·26	7·93	11·76	6·38	6·98	6·91
Cost of feed per pound gain	"	6·06	5·70	8·78	6·01	5·86	5·51

RESULTS.—Lots I and II, which were fed skim-milk and buttermilk respectively, made the largest gains in this test. The lot fed semi-solid buttermilk followed very closely with a gain of 1.34 pounds per hog per day, while tankage was not far behind. The lot fed Prolac made the smallest gains with 1.02 pounds per hog per day.

In economy of gains it will be noted that tankage made the most economical gains at a cost of 5.51 cents per pound of gain, followed by buttermilk, ground flax, Prolac and skim-milk, with little difference shown. The semi-solid buttermilk lot, although making good gains, did not make these gains as economically as those made by other lots.

DEDUCTIONS.—1. Judging from the foregoing results and those obtained previously there is little to choose between skim-milk and buttermilk of good quality for the feeding of hogs. With the practical feeder, however, buttermilk usually obtains the preference.

2. Semi-solid buttermilk, while productive of satisfactory gains, is, generally, too expensive to be used extensively for the growing and fattening of swine. This product enters into another test as reported elsewhere in these pages, the results of one test agreeing with the other. This product may have a place for a short period at weaning time and until the pigs are three months old where no skim-milk or ordinary buttermilk is available.

3. Tankage in this test gave exceptional results. Although this feed is recognized to be one of the best substitutes for milk by-products it does not, as a rule, prove more economical than skim or buttermilk.

4. Ground flax in this case gave good results. Where used in another test conducted later, it did not prove so desirable and before it is highly recommended as a supplement or substitute more experimental work is needed.

5. Pigs fed Prolac did not make as heavy gains as the other lots; these gains, however, were made economically.

WINTER FEEDING EXPERIMENTS WITH SWINE

This experiment was started October 7, 1925, with the following objects in view:—

1. A comparison of types of winter housing.
2. To compare Yorkshires and Berkshires under winter feeding conditions.
3. To test semi-solid buttermilk against skim-milk.

The first and main object was to determine the advisability of feeding pigs in single-boarded sheds, each pen provided with a warm enclosed sleeping-berth, and with outside runs accessible at all times, as contrasted with feeding in a more expensive type of a building.

Yorkshires and Berkshires were used under these housing conditions, thus making possible a further comparison of the two breeds as to economy of gains under different conditions.

The third object was a repetition of the summer-feeding experiment just reported—to test the value of semi-solid buttermilk as an economical substitute for skim-milk or buttermilk.

PLAN OF EXPERIMENT—PERIOD I

Lot	Breed	Number of hogs	Days of period	Ration	Housing
1	Berkshires	5	60	Oats, 2 parts; barley, 1 part; shorts, 1 part; middlings, 1 part; tankage, 5%; oil meal, 3%; skim-milk	Outside
2	Yorkshires	7	60	Same as above	Outside
3	Berkshires	6	60	Same meal ration and semi-solid buttermilk	Outside
4	Berkshires	4	60	Same ration as lot 1 and 2	Inside
5	Yorkshires	5	60	Same ration as lot 1 and 2	Inside

PERIOD II

Lot	Breed	Number of hogs	Days of period	Ration	Housing
1	Berkshires	5	80	Barley, 2 parts; oats, 2 parts; shorts, 1 part; tankage, 5%; oil meal, 3% and skim-milk	Outside
2	Yorkshires	7	80	Same as above	Outside
3	Berkshires	6	80	Same meal and semi-solid buttermilk	Outside
4	Berkshires	4	80	Same ration as lots 1 and 2	Inside
5	Yorkshires	5	80	Same ration as lots 1 and 2	Inside

VALUATION OF FEEDS

Meal mixture	$39 50 per ton
Skim-milk	30 per 100 pounds
Semi-solid buttermilk	3.5 cents per lb.

The semi-solid buttermilk was mixed with water at the rate of 2 pounds to each gallon of water.

—		Lot I Outside	Lot II Outside (Skim-milk)	Lot III Outside (Semi-solid Butter-milk)	Lot IV Inside	Lot V Inside
		Berkshires	Yorkshires	Berkshires	Berkshires	Yorkshires
Number of hogs	No.	5	7	6	4	5
Total initial weight	Lb.	223	345	267	175	231
Average initial weight	"	44·6	49·3	44·5	43·7	46·2
Total finished weight	"	945	1,465	1,115	672	910
Average finished weight	"	189	209·3	185·8	168	182
Total gain	"	722	1,120	848	497	679
Number of days on test	Days	140	140	140	140	110
Average gain per hog	Lb.	144·4	160	141·3	124·3	135·8
Average daily gain per hog	"	1·03	1·14	1·00	0·81	1·23
Total meal consumed	"	1,836	3,315	2,360	1,400	1,600
Total milk consumed	"	3,464	6,040	1,230	3,935	3,980
Lbs. meal eaten per lb. of gain	"	2·54	2·96	2·78	2·81	2·35
Lbs. milk eaten per lb. of gain	"	4·80	5·39	1·45	7·92	5·86
Total cost of feed	$	46·65	83·59	89·66	39·45	43·54
Cost of feed per head per day	cts.	6·66	8·53	10·67	7·00	7·91
Cost of feed per lb. of gain	"	6·44	7·45	10·57	7·94	6·41

As in the previous test, the lot fed semi-solid buttermilk made fair gains, but at comparatively high cost, the gains for this lot costing over 4 cents more per pound when compared with the check lot receiving skim-milk but otherwise fed under identical conditions. This greater cost was due to the relatively high price of the semi-solid product.

Lot V, Yorkshires fed inside, made the highest and also the most economical gains. The corresponding lot of Yorkshires, fed the same ration outside, made slightly lower and more expensive gains by approximately one cent per pound, consuming more meal per pound of gain.

The reverse was observed with Berkshires, Lot I, Berkshires fed outside, making larger and more economical gains than the Berkshire lot fed inside. Berkshires do not seem to stand heavy feeding when confined to small pens without exercise; such appeared to be the case in this test, as borne out by previous findings.

In comparing the two breeds under outside conditions, it is found that the Berkshires, although not making as rapid gains as the Yorkshires, made these gains more cheaply. Under more confined housing conditions the Yorkshires proved to be much the better.

DEDUCTIONS.—1. Bearing out previous results, semi-solid buttermilk did not prove economical as a substitute for skim-milk or ordinary buttermilk.

2. Pigs fed under cheaper housing conditions made reasonably good and economical gains, thus indicating that comparatively expensive and warm piggeries are not a necessity in winter swine-feeding.

3. As would be expected, pigs fed under colder conditions consumed slightly more feed than when fed in the warmer building, as indicated by the two Yorkshire lots, but when given dry though relatively cold shelter, were healthier. This was indicated more especially in the Berkshire lots.

4. Berkshires appeared to make rather more economical gains than Yorkshires under the shed-feeding method. The Berkshire breed requires exercise under fairly heavy winter feeding conditions.

CROSS-BREEDING EXPERIMENT

OBJECTS OF EXPERIMENT.—1. To determine the value of cross-breeding for the production of market pigs.

2. To establish the cost of pork production.

PLAN OF EXPERIMENT—PERIOD I

Lot	Cross	Number of hogs	Days of period	Meal ration	Other feeds
I	Tamworth boar x Berkshire sow	6	60	Oats, 2 parts; shorts, 1 part; barley, 1 part; middlings, 1 part; oil meal, 3%; tankage, 5%	Skim-milk
II	Yorkshire boar x Berkshire sow	9	60	Same as above	Skim-milk
III	Pure-bred Berkshires	6	60	Same as above	Skim-milk

PERIOD II

Lot	Cross	Number of hogs	Days of period	Meal ration	Other feeds
I	Tamworth boar x Berkshire sow	6	76	Barley, 2 parts; oats, 2 parts; shorts, 1 part; middlings, 1 part; oil meal, 3%; tankage, 5%	Skim-milk
II	Yorkshire boar x Berkshire sow	9	76	Same as above	Skim-milk
III	Pure-bred Berkshires	6	83	Same as above	Skim-milk

VALUE OF FEEDS

Meal mixture ..... 39.00 per ton
Skim-milk ..... 0·30 per 100 lb.

CROSS-BREEDING EXPERIMENT
(Started May 4, 1925)

—		Lot I Tamworth boar x Berkshire sow	Lot II Yorkshire boar x Berkshire sow	Lot III Berkshire (pure-bred)
No. of hogs	No.	6	9	6
Total initial weight	Lb.	195	255	153
Average initial weight	"	32·5	28·3	25·5
Total finished weight	"	1,203	1,570	930
Average finished weight	"	200·5	174·4	155
Total gain	"	1,008	1,315	777
No. of days on test	Days	136	136	143
Average gain per hog	Lb.	168	146·1	129·5
Average daily gain per hog	"	1·23	1·08	0·905
Total meal consumed	"	2,635	3,190	1,959
Total skim-milk consumed	"	6,783	7,345	5,703
Lb. of meal eaten per lb. of gain	"	2·61	2·42	2·52
Lb. of milk eaten per lb. of gain	"	6·73	5·51	7·34
Total cost of feed	$	71·72	84·23	55·30
Cost of feed per head per day	cts.	8·78	6·88	6·44
Cost of feed per lb. gain	"	7·11	6·41	7·11

In this test the Tamworth x Berkshire cross made the largest gains but failed to make these gains as economically as lot II. The Yorkshire x Berkshire cross, which lot, although making smaller gains, made these gains somewhat cheaper. The pigs of lot I were good feeders at all times, standing up well under heavier feeding, while in the case of lots II and III much more careful feeding was necessary to avoid digestive trouble. The pigs in lot II developed short and thick even shorter than the purebred Berkshire lot, but proved to be the most economical feeders. The lot of pure-bred Berkshires made gains at the same cost as shown by lot I. While the daily gains were smaller these pigs did not consume as much feed per day; they proved more difficult to keep on feed and could not be forced at any time during the test.

It is not considered wise to draw any deductions regarding the value of cross-breeding from this single comparison. Many experiments are on record indicating that cross-bred pigs frequently make larger and more economical gains, while in other cases the pure-breds have shown equal and occasionally superior results. In this case it would appear, therefore, that the individuality of the pigs in the lots concerned, has as much to do with economy of gains as the breed or cross.

Cross-breeding, as followed in the bacon breeds is, in reality, a very extreme type of out-crossing. The type is, or should be, similar in both breeds as crossed. Such results as greater thrift and vitality, with resultant better feeding qualities, may rightly be attributed to the infusion of new blood. Where pure breeding is properly followed and the necessary attention paid to maintenance of vitality through selection of boars, introduction occassionally of fresh blood, and a study generally of families and strains, cross-breeding shows comparatively no better results.

The Value of Potassium Iodide for Pregnant Sows

The use of potassium iodide has been recommended in the feeding of pregnant sows mainly for the prevention of hairless litters and goitre. These and kindred troubles are recognized to-day as due to a lack of iodine in the ration fed. Where such deficiency exists, with attendant trouble, the use of potassium iodide apparently has proven successful in the experience of the Experimental Farms. Although neither goitre nor hairlessness in pigs are prevalent at the Central Experimental Farm, a test was made to determine whether the administering of potassium iodide might affect advantageously the strength and vitality of coming litters.

With this object in view, two lots each of five Yorkshire sows, were wintered in cabins in the usual manner. Each lot received the same ration, but to that of lot I was added potassium iodide. The method of preparation and administration is as follows: dissolve 1 ounce of potassium iodide in 1 gallon of water; add 1 tablespoonful of this solution to the daily feed of each sow. This system of feeding is recommended for the prevention of hairlessness and goitre and the quantities are sufficient for the purpose.

The following table shows the results obtained at farrowing time from the two lots of sows.

THE VALUE OF POTASSIUM IODIDE IN THE RATION OF PREGNANT SOWS

—		Lot I Potassium Iodide	Lot II Check
No. of mature sows	No.	5	5
Total number of pigs born	"	56	67
Average number of pigs per sow	"	11·2	13·4
Total weight of pigs when born	Lb.	133	159
Average weight per pig at birth	"	2·4	2·37
Number of good, healthy pigs	No.	44	56
Percentage of good, healthy pigs	%	78	83
Average number of good, healthy pigs per litter	No.	8·8	11·2
Number of weak pigs	"	9	9
Average number of weak pigs per litter	"	1·8	1·8
Number of dead pigs	"	3	2
Average number of dead pigs	"	0·6	0·4
Number of pigs weaned	"	28	43
Number of pigs weaned per litter	"	5·6	8·6

In this particular experiment there is no indication of benefit from the administration of potassium iodide. The number of pigs born was greater from the check lot, this probably due to the individuality of the sows. The number and percentage of strong, healthy pigs was also slightly higher in the case of the check lot.

A similar test was carried on in 1923 with like results to those herewith reported.

Therefore (as indicated by the results of these two tests), in districts where hairlessness or goitre is not of common occurrence, the feeding of potassium iodide to brood sows does not seem to be of value in increasing the number of pigs in the litters nor the number of thrifty and strong pigs. Where hairlessness or deformity in pigs at birth, is of prevalent occurrence the feeding of potassium iodide, in the above mentioned manner, is highly recommended.

FEED COST OF RAISING PIGS TO WEANING AGE

Five mature Yorkshire sows were fed during the winter of 1925-26 with the object of establishing the feed cost of raising young pigs to weaning age. All of the feed was carefully weighed from the time of service of the sows until the time the pigs were weaned at eight weeks old.

The meal ration fed during pregnancy consisted of shorts and bran, 3 parts; oats, 2 parts; oil meal, 3 per cent and tankage, 3 per cent. Besides this meal ration the sows were fed pulped mangels as a succulent feed and mixed alfalfa and clover hay in racks, as roughage.

During the suckling period the meal ration consisted of equal parts of shorts, middlings, bran, oats, corn, with 3 per cent of oil meal and 3 per cent of tankage. This meal mixture was fed with skim-milk.

The following table gives a detailed analysis of the amount of feed consumed and the cost per pig.

FEED COST OF RAISING A PIG TO WEANING AGE

Number of sows (mature)	No.	5
Number of pigs farrowed	No.	67
Average number of pigs farrowed per litter	No.	13.4
Average number of good pigs per litter	No.	11.2
Total number of pigs weaned	No.	43
Average number of pigs weaned per litter	No.	8.6

Total lb. of milk consumed during gestation period	Lb.	394
Total lb. of milk consumed during gestation period per sow	Lb.	79
Total lb. of meal consumed during gestation period	Lb.	3,907
Total lb. of meal consumed during gestation period per sow	Lb.	781
Total lb. of roots consumed during gestation period	Lb.	2,205
Total lb. of roots consumed during gestation period per sow	Lb.	441
Total lb. of alfalfa and clover hay consumed during gestation period	Lb.	400
Total lb. of alfalfa and clover hay consumed during gestation period per sow	Lb.	80
Total cost of feed during gestation period	$	69 37
Total cost of feed during gestation period per sow	$	13 87
Total cost of feed per litter at birth	$	13 87
Milk consumed during suckling period (8 weeks)	Lb.	2,060
Milk consumed during suckling period per sow	Lb.	412
Meal consumed during suckling period	Lb.	3,705
Meal consumed during suckling period per sow	Lb.	741
Total cost of feed during suckling period	$	71 01
Total cost of feed during suckling period per litter	$	14 20
Number of pigs weaned	No.	43
Total cost of feed from breeding to weaning time	$	140 38
Cost of feed per sow	$	28 08
Cost of feed per pig at 8 weeks old	$	3 26

VALUE OF FEEDS

Meal Mixture
1. During gestation period .. $32 per ton
2. During suckling period .. 35 per ton

Milk—30 cents per 100 pounds.
Roots—$4 per ton.
Hay—$8 per ton.

This table needs no lengthy explanation. For raising a pig the total feed cost from breeding of the sow until weaning age (8 weeks) was found to be $3.26 per pig when an average of 8.3 pigs were weaned per litter. The number of pigs weaned is a highly important factor in raising or lowering the cost per pig. Therefore, care should be taken in the selection of brood sows for the future herd, to procure, by selection, the very essential qualities of prolificacy and good mothering. Gilts from sows that have given large litters and are good mothers, are more likely to possess these qualities than gilts from poor mothers. Only the former should be raised to replace the old sows in a herd. Mature and, therefore, proven sows, usually raise more pigs than young gilts. A good motherly sow is one of the great factors in economical pork production.

SOFT PORK INVESTIGATION

The necessity for further investigation into the causes of soft pork has been indicated by the fact that high percentages of soft sides have been reported by the Canadian packing interests during the past year. The Dominion Chemist, Dr. F. T. Shutt, has already reported the results of much careful experimental work in past years, resulting from the combined effort of the Divisions of Chemistry and Animal Husbandry.

Further experiments have been under way during the past winter but as results of this test are still incomplete, no report will be made until next year. The work connected with the feeding of the various experimental lots has been conducted by the Division of Animal Husbandry; the very essential chemical investigations involved, are in the hands of the Dominion Chemist, while much assistance has been given by the packing-houses and by the Industrial and Development Council of Canadian Meat Packers.

THREE YEARS WORK WITH IMPORTED LARGE WHITE BOARS ON SELECT YORKSHIRE SOWS

In previous reports reference has been made to the importation in 1923 of two Yorkshire boars from Scotland. These boars have been used almost exclusively up to the present time in the large herd of sows maintained at the

Central Experimental Farm. In view of the fact that considerable controversy exists with reference to the advisability of utilizing imported swine, a brief report on results to date would appear in order.

ENGLISH VERSUS CANADIAN TYPE.—At the outset it may be of interest to compare the English with the Canadian type. In Great Britain the Yorkshire (as the breed is termed in Canada) is known as the Large White as distinguishing it from another very popular breed, the Middle White, the latter a shorter, lower set, more compact, thicker pig, ideal for the shop or fresh meat trade.

The English Yorkshire or Large White, in general does not show just the quality that is found in the ideal Canadian development of the same breed. They have slightly less length, are rather heavier at the shoulder, have a stronger, coarser head and a heavier ear inclined in many cases to droop slightly as compared with the erect carriage and firm attachment desired in the Canadian Yorkshire. In general, the Large White has plenty of bone of good quality, in fact this is an outstanding feature in considering this breed for use in Canada. While they have not the arch of back so much desired here, they are deep, have a well-sprung rib, a good underline, plenty of teats and a well developed mammary system generally. The sows in general, are prolific and good mothers.

THE OUT-CROSS ON THE CENTRAL EXPERIMENTAL FARM HERD.—Admitting that one of the problems of the Canadian swine-grower is the preservation of strength and vitality (this reflecting itself in the practical problem of where to secure new blood) the Large White has seemed to offer possibilities.

The herd of sows at the Central Experimental Farm offered a good opportunity for the observation of results where mated with these two boars. Dalmeny A. R. came from the noted herd owned by the Earl of Rosebery at Dalmeny and was sired by one of the greatest breeding boars ever used in Scotland, Spalding Wonder 6th, incidentally the 1921 Highland Champion. Dalmeny A. R., although subscribing well to the English type, would also stand high in the aged class at any of the large Canadian shows at this writing. The second boar, Culcairn Monarch, also represented some of the best English strains and was purchased from a breeder in Inverness, Scotland. He was by a good son of Spalding Wonder 6th, the sire of the first mentioned boar, and out of Dalmeny Mana 2nd, sold at auction for the record price of 720 gs. This boar has exceptional strength of bone, a good middle, and an underline of the kind not often seen. He is rather heavy in the ear, lacks slightly in length, and has not the character and quality generally of Dalmeny A. R.

Crossed on the well selected herd of sows at Ottawa, these boars have brought about an advancement, if not in the finer points indicating quality, certainly in the way of increased strength and vitality as evidenced in turn by larger stronger litters. Sows sired by one boar have been bred to the other and vice versa. While this plan has afforded maximum use of the boars, the pigs resulting have not been so satifactory as those of the first cross on Canadian sows. The second-cross pigs have lacked in quality and showed plain heads and ears. These boars are now being bred to home-bred sows only and the sows from this mating bred in turn to Canadian-bred boars strong in quality. The results are most encouraging.

BREEDING RECORDS COMPARED.—A comparison of the results obtained is interesting as taken over a three-year period:

—		Sired by Dalmeny A.R. -88840-	Sired by Culcairn Monarch -88845-
Number of litters farrowed	No.	49	43
Total pigs in litters	"	600	461
Average per litter	"	12·2	10·7
Total good pigs at birth	"	424	389
Per cent of good pigs at birth	%	70·6	84·4
Total weak pigs at birth	No.	76	7
Per cent of weak pigs at birth	%	12·6	1·52
Total small pigs at birth	No.	66	49
Per cent of small pigs at birth	%	11	10·6
Total dead pigs at birth	No.	34	16
Per cent dead pigs at birth	%	5·66	3·47

The table shows that the more outstanding boar did not give quite such good results as his mate. Although the data given do not include figures on the weaning and after-weaning periods (where the influence of the boar on thrift is more or less temporarily submerged by conditions of feeding and management), the pigs sired by the Monarch boar have shown a slight superiority. Where crossed on Canadian-bred sows of the approved type good results have been obtained. Increased strength and vitality has been clearly in evidence, this due to the out-cross and in accordance with expectations. There has been no particular improvement in type. With the get of both boars the females were superior to the males.

When the two boars were imported three gilts were chosen as representing the best type of Large White female. These sows bred to the imported sires have naturally passed on English type to their offspring,—strength and depth with a little greater development of shoulder, rather heavier heads and ears, and not just the trimness and quality of the typical Canadian sow. All of these sows have proven prolific, good mothers and profitable producers.

Knowing that good breeding stock of this origin was needed by breeders and farmers, and that boars in particular carrying this out-cross should do much good in the way of adding strength to many herds, a large number of pigs, mainly boars, have been distributed throughout Ontario and Quebec and elsewhere in Canada, at very moderate prices. Just what this has amounted to in concrete form is shown by the following tables:—

OFFSPRING OF IMPORTED BOARS SOLD

—	Boars	Sows
Dalmeny A R.	101	47
Culcairn Monarch	77	50

HOW THEY WERE DISTRIBUTED

—	Dalmeny		Monarch	
	Boars	Sows	Boars	Sows
Ontario	64	24	46	23
Quebec	31	15	26	15
New Brunswick	.....	4	.....	4
Manitoba	4	3	2	6
Alberta	1	.....	2	2
Saskatchewan	.....	1	.....	.....
British Columbia	1	.....	.....	.....
Nova Scotia	.....	.....	1	.....

Some deductions as to the use of imported Large Whites in Canada:

1. If carefully chosen, the English Yorkshire or Large White will improve the vitality, strength and thrift of many Canadian strains of Yorkshires.

2. Actual improvement in type, refinement or bettering of quality is less likely to follow, because of reasons already given. In other words, there is more refinement in the true Canadian type than there is in the English. The discriminating nature of the export trade is having its reflection on type in breeding stock.

SHEEP

At the end of the fiscal year March 31, 1926, the flock of sheep at the Experimental Farm included 175 breeding sheep of the Leicester and Shropshire breeds. The two breeds are represented as follows:

Leicester		*Shropshire*	
Breeding ewes	75	Breeding ewes	73
Yearling ewes	11	Yearling ewes	10
Rams	4	Rams	2
	90		85

LEICESTERS

This flock has not been increased in numbers in the last years but a close selection has been practised, so that to-day the flock is of high quality and very uniform. Good results have been obtained through the use of imported rams of good type and breeding. Another imported ram, Culloden Demonstrator—19145—bred by William R. Ross, Inverness, Scotland, which had been used at the Experimental Farm at Ste. Anne de la Pocatiére, has been transferred to the flock of the Central Farm and will be used on the progeny of the two imported rams previously used. He is also a very good ram and should further improve the flock.

The specific disease diagnosed by members of the Health of Animals Branch as Hemophilus Ovis, a very virulent form of pneumonia, has not affected the Leicester flock this year as was the case in the past few years and not a single loss was sustained during the year due to this cause. The health of the flock has been exceptionally good all year.

SHROPSHIRES

The flock of Shropshire sheep has also improved in uniformity through selection and the use of two very good imported rams, that are still in the flock. These are from the famous Buttar flock in Scotland. The health of the Shropshire flock has been very good throughout the year.

BREEDING RESULTS

The results obtained at lambing time were disappointing, due to the prevalence of goitre, premature deliveries, and weak lambs generally. While this occurrence was unprecedented at the Central Experimental Farm, it was considered as possibly due to the use of a rather low quality of range hay, which apparently lacked in some of the necessary mineral constituents.

In order to prevent the recurrence of this trouble, which is commonly caused by a lack of iodine in the ration of the pregnant ewe, potassium iodide was given during the winter of 1925-1926, being administered to the ewes in the following manner: 4 ounces of potassium iodide was dissolved in a small quantity of water, which solution was sprinkled on the mineral mixture kept before the ewes at all times. The latter consisted of 100 pounds of common salt and 50 pounds of bone char.

The results at the time of writing this report prove to be excellent. Among the ewes that lambed before April 1 not a single case of goitre has appeared nor has there been a single weak lamb born. The preventive properties of potassium iodide in this connection are well known, and it would seem that the use of small quantities, as described, may be responsible for stronger and more vigorous lambs at birth, even aside from cases where goitre may be anticipated.

CROSS-BREEDING

The practice of cross-breeding for the production of market lambs has given excellent results in the past years in early maturity and weight. This practice was again carried out. A close selection was made of the best ewes and those were bred to rams of their own breed. The balance of each flock was used for cross-breeding, the Leicester ewes to a Shropshire ram and the Shropshire ewes to a Leicester ram. A number of these lambs were marketed, but due to the great demand for breeding ewes the cross-bred ewes were sold for breeding purposes. No direct comparison was made between these cross-bred lambs and those that were pure-bred, as to weight at time of marketing, but their weights were recorded. Lambs born in late March and early April, when marketed at the end of July, weighed an average of 100.5 pounds.

Although the flocks were on excellent pasture, these weights would indicate the early and rapid development of cross-bred lambs of the extraction noted. This work is being continued, and arrangements made for special market comparisons during the coming season.

WOOL

The 1925 wool clip amounted to 1,708 pounds which, as usual, was sold through the Canadian Co-operative Wool Growers on a graded basis.

The Shropshires showed an average weight per fleece of 8.42 pounds. With the Leicesters the average was 9.56 pounds per fleece. As is usually the case the Leicester wool suffered in grading. Admitting that the Leicester fleece usually grades lower and consequently obtains lower prices, the peculiar qualities of this breed should not be overlooked. The Leicester ewe is active and a good milker. She can raise a good lamb almost invariably. For crossing purposes the breed is unexcelled. As indicated, an exceptional quality of market lamb was secured from both the Shropshire ram—Leicester ewe and Leicester ram—Shropshire ewe crosses, indicating certain possibilities for the Leicester as crossed on flocks of Down extraction or grade.

ANIMAL HYBRIDIZATION AT BUFFALO PARK WAINWRIGHT, ALTA.

In the annual reports of this division for the years ending March 31, 1924 and March 31, 1925, there will be found sections devoted to brief interim reports on progress made in animal hybridization.

The following is an inventory of stock on hand in the Cattalo enclosure, Buffalo Park, as at the end of the 1925 breeding season:—

Bison	2 males	5 females.
Domestic Cattle	2 males	13 females.
Yak	2 males	3 females.
Cattalo	——	4 females.—(a part of the original Mossom Boyd herd. See March 31, 1924, report).
Hybrid (Bison-Domestic)		2 three-year-old females. 1 yearling female. 3 from original herd.
Hybrid (Domestic-Yak)		1 male, yearling. 1 female of 1925.

Hybrid (Yak-Domestic)	5 three-year-old females. 2 1925 females. 1 three-year-old male. 1 yearling male. 1 1925 male.
Hybrid (Yak-Bison)	1 three-year-old female.
Hybrid first cross (Yak x Hybrid Bison-Domestic)	2 1925 females.
Hybrid first cross (Yak x Hybrid Yak-Domestic)	1 1925 male.

A hybrid (Domestic x Yak) female of 1925. While there are only two of this particular cross in the herd, it is apparently secured with no more difficulty than applies to the reverse cross (Yak x Domestic) of which there are now a number at Wainwright.

NATURAL INCREASES TO THE HERD DURING 1925

The increases for the year have been as follows:—

Yak x Domestic	1 male, 2 females.
Domestic x Yak	1 female.
Yak x Hybrid Bison-Domestic	2 females.
Yak x Hybrid Yak-Domestic	1 Male.

The possibility of the Domestic x Yak cross has been proven as shown by the foregoing. Of the reverse cross Yak x Domestic, several animals are already in the herd.

The outstanding feature, as disclosed by this statement of increase, is the production of what may be termed first-cross, first-generation, or FI hybrids, through the mating of Yak sires with Bison x Domestic and Yak x Domestic females resulting in progeny of the following extraction: 50 per cent Yak; 25

per cent Bison; 25 per cent Domestic in the first case, and 75 per cent Yak, 25 per cent Domestic in the second. Of these two latter crosses, the former including as it does the blood of the Yak, Bison and Domestic, is of peculiar interest. All of the 1925 calves have developed into very fine specimens.

The illustrations depict these animals as young calves, at a period when the peculiarities of their extraction were not much in evidence. The hybrid dam of the "three-in-one" calf shown (Yak, 50 per cent; Bison, 25 per cent;

A hybrid (Yak x Domestic) of 1925. This cross is readily secured, no abnormal conditions being met with from mating to parturition.

Domestic, 25 per cent) was in turn sired by a Bison sire and out of a grade Hereford cow. The dominant "white face" is much in evidence.

The yearling "three-quarter" Yak (Yak x hybrid Domestic-Yak) is an oddity in that it has developed closely in appearance to the Yak, as would be anticipated, but the hybrid Yak x Domestic (Hereford grade) mother has imparted some of her "white face" blood here also in the way of a partly white face and a light coloured but otherwise typically Yak tail and fringe.

It is suggested that the interested reader may obtain more complete reference to this work, pictorially and otherwise, by securing the reports for the years ending March 31, 1924 and 1925. Further in this connection, it is proposed to issue shortly an interim report on the various projects under way at Wainwright.

A two-year-old hybrid (Bison x Domestic) with her first-generation hybrid calf sired by a Yak bull.

A first-generation hybrid male (50% Yak, 25% Bison, 25% Domestic) sired by a Yak and out of a hybrid (Bison x Domestic) female. Pronounced strength and vigour are noticeable features in practically all hybrids and first-generation hybrids produced so far.

ADDITIONS AND LOSSES DURING 1925.—No additions were made to any of the foundation herds during 1925. Owing to the fact that from the females of the original Mossom Boyd herd no increase has resulted after repeated efforts during several years, it was decided to maintain this herd for exhibition purposes only and to make no further attempt toward including them in the various breeding groups. From this time on all hybridization work will be carried on with stock produced in the Cattalo enclosure, with the exception of the Domestic, Yak and Bison foundations. One Domestic cow in calf to a Bison bull was lost at calving.

A three-quarter-bred Yak male or first-generation hybrid resulting from the mating of a Yak sire with a hybrid (Yak x Domestic) female. Note the Yak tail, the gradual development of fringe; and the white markings inherited from a white-face granddam.

GROUP MATINGS MADE DURING THE 1925 SEASON.—Commenting more in detail on results obtained from the 1925 matings as outlined in last year's report and repeated here, the difficulties in the way of obtaining normal increase will be apparent.

Group A.—

One 2-year-old yak-domestic bull.
One 1-year-old bison-domestic heifer.
One 2-year-old yak-bison heifer.
One 2-year-old yak-domestic heifer.
Two domestic cows.

When this group was arranged the hybrid male was an unknown quantity. While he proved active and vigorous at service, it is thought that only one female may be in calf—a two-year-old yak x domestic heifer. The yak x bison hybrid in this group was noticed to be non-pregnant during the fall and she was bred apparently with success to an Angus bull, providing for the probability of another interesting combination. Neither of the domestic cows in this group proved with calf.

Group B—

Two domestic bulls.
Three Yak cows.
Two 2-year-old hybrid bison-domestic heifers.
Four 2-year-old hybrid yak-domestic heifers.

The two bison x domestic and the four yak x domestic heifers have all produced calves. None of the yak cows are with calf.

Group C—

Two buffalo bulls.
Five domestic cows.

This represented the violent bison x domestic cross concerning which full comment has been made in previous reports. Only one of these cows proved with calf. This cow died at parturition.

Group D—

Two Yak bulls.
Six domestic cows.
One bison cow.

Two domestic cows are in calf. Four are non-pregnant. The bison cow appears to be with calf, but may not prove to be so, owing to the difficulty of determining by observation this state in the bison female.

It will be noted that poor results have been obtained from the domestic females for reasons not entirely clear. Some of these are suspected as being rendered sterile or temporarily so by one of several possible affections or infections. They will be utilized once more in the matings as arranged for the summer of 1926, after which, should they prove infertile, they will be sold and their places taken by younger domestic females.

GROUP MATINGS AS ARRANGED FOR THE 1926 BREEDING SEASON

Group I—	
Yak bull	3 domestic cows. 2 bison heifers. 1 bison-domestic heifer.
Group II—	
Bison bull	7 domestic cows. 3 Yak-domestic heifers (3-yr.-olds).
Group III—	
Domestic bull	3 Yak cows. 2 Yak-domestic heifers. 2 Bison-domestic heifers. 1 Bison cow. 1 Bison heifer (2-yr.-old).
Group IV—	
Yak-domestic bull	2 Yak-domestic heifers. 1 Yak-bison heifer. 2 domestic cows. 1 bison heifer. 1 domestic-Yak heifer.

As two males are available in each group, further subdivision of groups is probable, depending on possible arrangement for enclosures.

With the Yak x Domestic and reverse crosses well established, the need of more hybrid Bison x Domestic foundation females is apparent. This cross is difficult to secure, but when secured, the females are apparently readily crossed further. Several of them are required and this necessity will explain why several domestic cows will be mated with a bison male.

In that it would appear desirable at this stage to ascertain the possibility of the Domestic x Bison cross, it will be noted that such provision has been made in the grouping. This cross has been regarded generally by previous experimenters practically as an impossibility.

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