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DEPARTMENT OF AGRICULTURE

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DAIRY AND COLD STORAGE
COMMISSIONER'S SERIES

DEPARTMENT OF AGRICULTURE
DAIRY COMMISSIONER'S BRANCH
OTTAWA, CANADA

IMPROVEMENT OF DAIRY HERDS

PART I. A Wisconsin Cow Census and its Lessons

PART II. The Result of Testing Individual Cows in 72 Herds

PART III. Record Testing Associations in Denmark

PART IV. Miscellaneous Records

BULLETIN No. 5

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DEPARTMENT OF AGRICULTURE
DAIRY COMMISSIONER'S BRANCH
OTTAWA, CANADA

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J. C. Chapais.....Assistant Dairy Commissioner, St. Denis en Bas, Que.

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C. Marker.....Superintendent Government Creameries, Calgary, Alta.
W. A. Wilson.....Superintendent Government Creameries, Regina, Assa.
C. F. Whitley.....In charge of Cow Census Work, Ottawa, Ont.

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†A. W. Grindley.....Chief Cargo Inspector for Great Britain.
(Address: Carlton House, Elgin Drive, Liscard, Cheshire, England.)

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* The Dairy Commissioner gives his personal attention to the Dairy and Cold Storage Divisions.

† Cargo Inspectors are stationed at Liverpool, Manchester, Bristol, London and Glasgow.

LETTER OF TRANSMITTAL.

To the Honourable

The Minister of Agriculture.

SIR,—I have the honour to submit Bulletin No. 5, Dairy Commissioner's Series. The information contained in this bulletin has been complied from various sources with a view of awakening a greater interest in the question of the improvement of dairy herds. I beg to recommend that it be printed for general distribution.

I have the honour to be, sir,

Your obedient servant,

J. A. RUDDICK,

Dairy Commissioner.

IMPROVEMENT OF DAIRY HERDS.

INTRODUCTION.

The information contained in this bulletin is published with a view of awakening a greater interest in the important question of the improvement of dairy herds. The writer believes there is no direction in which the dairy farmers of Canada can further their interests so materially as by taking up this question in a thorough and systematic manner.

Authorities agree that the average production of Canadian dairy cows is not much, if any, over 3,000 pounds of milk a year. That individual herds show much better results only goes to show the possibility of general improvement in this direction. On the other hand, we find (page 00), that the reports from 483 Danish creameries (over one-third of all the creameries in the country), show an average yield per cow of 5,351 pounds a year in 1903. Again on page 00 it is recorded that 1,014 herds in one province of Denmark averaged over 6,000 pounds of milk per cow in 1903, and 628 herds yielded over 7,700 pounds per cow, other herds going as high as 11,000 pounds and over. Special attention is drawn to the fact that these records are taken from the regular dairy herds of the country, and not from special or 'fancy' herds.

Are Canadian dairymen going to remain content with such comparatively poor results when it is clear that so much improvement may be made with a little intelligent effort?

Any scheme which has for its object the improvement of our dairy stock must provide for a study, and record, of the performance of the individual cow, as well as deal with the management of the herd, including its care and feeding, and the breeding of animals to replace those which are discarded in the 'weeding' process. Individuality can only be determined by the weighing and testing of each cow's milk.

That feeding and care are important considerations is clearly demonstrated in Part I, where we find that herds of the same breed and similar character produce widely different results. Of course, there are two aspects of the feeding question. Cows must not only be well fed to produce a large flow of milk, but the feeds must be selected and combined with skill and judgment in order to produce the milk economically. A close study of the feeding question is essential if the improvement in production is to be accompanied with the best attainable results in profit-making.

Part II contains some figures from the Cowansville Cow Census which was begun a few months ago and will be continued until a year's record will have been obtained of some of the herds. As the work is still in progress nothing more is given than a few comparisons between individual cows and herds for short periods. There is sufficient data to show the great difference between individual cows in the same herd, and also in herds under different management.

Part III is a reprint from Bulletin No. 4 of the Dairy Commissioner's Branch. It gives a detailed account of the Record Testing Associations of Denmark. The writer, Mr. C. Marker, is a Dane who has been employed in the Dominion Dairying Service for many years, and who recently revisited his native land. The Danes appear to have followed up this work with their usual thoroughness. If they have found it profitable to carry on this testing work so extensively with such a high standard to begin with, how much more useful should such work be in Canada under the conditions which have been shown to exist? Every one will admit that it should be much easier to increase the average yield from 3.000 pounds of milk a year than it is to raise it from something over 5,000 pounds in the same period.

While it is entirely practicable for the individual farmer to properly test his own cows, there can be no doubt that the co-operative or association plan of carrying on this work will prove the most successful. When a number of farmers combine to engage in such work, all the information collected is available to each and every member of the association, and the saving in equipment and labour on the part of the individual farmer is compensation for what little expense may be incurred if a properly qualified person is engaged to do the actual work of testing, and to work out the results for the information of all concerned.

The Minister of Agriculture has authorized the Dairy Division to undertake the testing of individual cows for thirty-day periods at some ten or twelve centres of eastern Canada, making a cheese factory or a creamery the base of each centre. These short period tests are only intended to be preliminary, because it is recognized that in order to derive the full measure of benefit from this work it must be organized on a more or less permanent and systematic basis.

There is no reason why the testing of cows should not be undertaken in connection with the cheese factory or creamery. Most factories have the necessary appliances (except the sample bottles), and the manager is, or should be, more competent to do the work properly than the average farmer. Every owner of a cheese factory or creamery should take a deep interest in this question. It needs no argument to prove that if the patrons of a factory increase the yield of milk from their cows the factory will derive a corresponding benefit. If the efforts which are now made by the owners of most factories to increase their milk supply at the expense of the neighbouring establishments, were to be directed towards securing an increased yield of milk from the herds already supplying the factories, a more abiding and better general result would be obtained, even from the individual factory standpoint.

J. A. RUDDICK,
Dairy Commissioner.

PART I.—A WISCONSIN COW CENSUS AND ITS LESSONS.

Paper read by Mr. C. P. Goodrich at a Wisconsin Dairymen's Convention, and published in 'Hoard's Dairyman.' Also included in part in Prof. Jas. W. Robertson's last evidence before the Select Committee on Colonization and Agriculture.

At the request of the President and Secretary of the Wisconsin Dairymen's Association, I came to Fond du Lac county last November to gather statistics from creamery and cheese factory patrons in relation to the dairy business, as it had been carried on here for the twelve months preceding October 1, 1902, with a view to presenting the results of my investigations to this meeting. I was well aware that here, as elsewhere, some men were carrying on the business at a good profit, and others at a loss, or, at best, getting very small pay for the work connected with it. . I hope to be able to present the facts and figures, which I have gathered, in such a way—contrasting the methods of the most successful with those who have been less successful—as to enable those who have been working for nearly nothing, feeding and caring for cows, to do better in the future, by following the methods of those who have been making good profit.

THE SCOPE OF THE INQUIRY.

I visited 48 creamery patrons and 12 cheese factory patrons. I ascertained the average number of cows each had kept during the year, including the whole number, as well when they were dry as when giving milk, because they were eating all the time in either case, and counting heifers, after having their first calves, as full cows; the kind of cows and the kinds and amounts of the different feeds given the cows ,and estimated the value of the same.

HOW COST OF FEED WAS OBTAINED.

I charged the cows for the feed raised on the farm the market price for which it could have been sold at the time, and for that which was purchased, the market price at the time it was fed. The prices I fixed on feeds are as follows: Timothy hay $12 a ton; other kinds of hay $8; corn stover $3 and ensilage $2.50. Pasture I fixed at the uniform price of $5 a head for the season. Oats were $28 a ton; corn $21; bran averaged $19.50; gluten feed, $24; malt sprouts, $18.50, and oil meal, $30.

I assumed that each cow consumed of roughage during the winter two tons of hay, or its equivalent. In the case of corn stover I figured that, as a rule, only about half its weight was eaten, as the thick, hard stalks and some of the rest was refused by the cows or trodden under foot and wasted. Therefore, when all the roughage a cow had during the winter was corn stover I calculated it took four tons, or $12 worth. If half of her roughage was corn stover I charged her six dollars for it.

I had some difficulty in finding out the amount of grain feed each man fed. Some men, it is true, could tell me the exact amount of feed they had bought or had ground; then it was easy. Some could only tell by measure; then my experience in measuring and weighing feeds would enable me to estimate the amount in pounds. Some, who fed shock corn, could only tell the number of acres fed. In such cases I had to make an estimate from that.

I do not claim that I have got the cost of feed of cows in every herd exactly right. From the nature of the case that would be impossible, but I believe that I have approximated pretty closely to it.

QUANTITY AND VALUE OF PRODUCT.

After getting all these facts from the patrons, I obtained from the creamery and the cheese factory the amount of milk delivered by each patron, the amount of product and the amount of money received for each of these 12 months. From these data I was able to figure out the average per cow, of milk, of product and of money per cow, together with the prices obtained and the profit or lack of profit per cow in each patron's herd.

WHY PRICES FOR BUTTER DIFFER.

It will be observed that some patrons received a higher price per pound for butter than some other patrons did. This is owing to the fact that those who received the higher prices produced a larger portion of their milk during the winter months when the price of butter was the highest. The price of milk also varied ,not only for this reason, but also on account of the difference in the percentage of fat it contained.

These facts and figures I have arranged in as convenient a form as I could devise, in the following table. The names of these patrons are not given. They are represented by numbers. I made a promise to that effect, when seeking the information, to each patron and also to the proprietors of the factories.

AVERAGES FROM THE CREAMERIES.

The 48 creamery patrons had 637 cows. By averaging the whole, we find the average cost of feed per cow to have been $29.88; average returns for butter from creamery, per cow, $35.82; average pounds of milk, per cow, 4204; average pounds of butter, 185; average net price of butter per pound to patron, 19·27 cents; average price of milk per 100 pounds, 85·2 cents; average value of butter for one dollar's worth of feed, $1.20; average net profit from butter per cow, over cost of feed, $4.94. Now, if we add 20 cents a hundred to the value of the milk as the value of the skim milk (and with the high price of all kinds of feed, last year, it was surely worth that) that would make $8.20 more, making an average profit per cow of $14.34. This is not so bad after all, and shows there was a fairly good profit for the Fond du Lac dairymen even last year, when the high price of feed had cut down the yield and the profits below what they had been in previous years.

And still I have not counted all that the patrons received from their cows. There were the calves; the whole milk used in the family; the whole milk fed to calves; and the manure to keep up the fertility of the farm. These last items varied considerably on the different farms, but as it would have been impossible to arrive at anything like a just estimate of their value, I have left them out entirely. It is true that some patrons used more whole milk in their families, and fed more to calves than others, still it is not likely there would be more than two dollars difference per cow in extreme cases. Yet these last mentioned items, when all put together, would help to a considerable extent, to pay for the labour in caring for the cows.

I have selected a few numbers, some of the best and some of the poorest, and will now go into the particulars of what I learned concerning them, and see if we can discover the cause of the great difference.

ONE MAKES A PROFIT AND ANOTHER A LOSS.

No. 1—Had 14 cows, grade Guernseys and grade Jerseys, fresh in spring and winter; cost of feed was $42 per cow for the year; returns from creamery for butter per cow, $57.89; pounds of milk per cow, 5,488; pounds of butter per cow, 300; average price of butter per pound, 19 cents; average price of milk per 100 pounds, $1.05; value of butter for one dollar's worth feed, $1.38; value of butter per cow over cost of feed,

$15.89. Average ration: bran, ground oats and corn, 13 pounds to fresh milkers, shredded corn stover, and for two months in spring timothy hay; run to straw stack; in summer pasture only. Adding 20 cents per 100 pounds for skim milk would make profits per cow $26.87.

No. 2—21 cows, quarter blood Guernseys, fresh at all times; cost of feed, $31; returns from creamery, $29.26; pounds of milk, 3,361; pounds of butter, 155; price of butter, 18·9 cents; price of milk, 87 cents; for one dollar in feed, 97 cents; value of butter per cow, less than cost of feed, $1.74. Ration: bran and middlings 4 tons, which would make less than two pounds per day during winter; 4 acres, heavy crop, well-eared sweet corn, and timothy hay; in summer, pasture only. If value of skim milk is added his profits would be $4.98 per cow.

Now, we can see what made the difference in results between these two men. It is no doubt partly owing to the difference in the kind of cows—quarter-blood Guernseys may have been the product of a half-blood sire, or a cross of something with half-blood Guernsey dams—but mainly to the feed.

No. 1 fed a fairly well balanced ration. He fed high; believed in feeding well let it cost what it would, so he told me. His feed was very expensive, yet he made a good profit.

No. 2 fed a very carbonaceous ration, did not believe in buying feed, but in feeding what he could raise on the farm, whether it made a well balanced ration or not.

THE BANNER HERD.

No. 4—25 cows, grade Guernseys and grade Jerseys, fresh at all times; cost of feed, $28; returns from creamery, $57.18; pounds of milk, 5,809; pounds of butter, 298; price of butter, 19·2 cents; price of milk, 98·4 cents; for one dollar in feed, $2.04; net profit of butter over cost of feed, $29.18 per cow. Ration: bran and malt sprouts, 6 pounds; well eared ensilage, 30 lbs.; straw; fodder corn in fall; in summer, pasture only. Adding value of skim milk makes profit $40.80 per cow.

SAME KIND OF COWS BUT LESS PROFIT.

No. 7—12 cows, grade Guernseys and grade Jerseys, most of them fresh in October and November; cost of feed, $30; returns from creamery, $44.05; pounds of milk, 4,201; pounds of butter, 220·3; price of butter 20 cents; price of milk, $1.05 per 100 pounds; for one dollar in feed, $1.47; net profit of butter over cost of feed, $14.05. Adding value of skim milk makes profit $22.81. Ration: bran and some corn and oats, 4 lbs.; ensilage, 35 pounds; a little oat hay; corn stover cut, wet, mixed and heated with ensilage; in summer, pasture only, except a little in mangers to induce them to come in to be milked.

A BEEFY TYPE HERD.

No. 12—7 cows, grade Durhams of beefy type, fresh in winter and spring; cost of keeping, $29; returns from creamery, $27.95; pounds of milk, 3,266; pounds of butter, 152·2; price of butter, 18·4 cents; price of milk, 85·6 cents; for one dollar in feed, 96 cents; value of butter per cow less than cost of feed, $1.05. Adding value of skim milk makes a profit of $5.48 per cow. Ration: malt sprouts and ground oats, 6 pounds; corn stover, marsh hay and straw.

It is plain to see why No. 12 did not get as good returns as Nos. 4 and 7. He fed fairly well, though not as well as 4 and 7 did, for they fed ensilage, but apparently the main reason is he was giving his feed to cows of a beefy type while theirs were cows of good dairy type.

Cost of Feed and Income in 48 herds belonging to patrons of creameries in Fond du Lac County, for the 12 months ending September 30, 1902.

Patron's Number.	No. of Cows.	Kinds of Cows.	Cost of feed per cow.	Returns for butter from creamery per cow.	Pounds of milk per cow.	Pounds of butter per cow.	Average price of butter.	Average price of milk per 100 pounds.	Value of butter for one dollar's worth of feed.	Net profit from butter per cow over cost of feed.	Net loss from butter per cow below cost of feed.
			$ cts.	$ cts.			Cents.	Cents.	$ cts.	$ cts.	$ cts.
1	14	Grade Jersey, and grade Guernseys	42 00	57 89	5,488	300.0	19.0	105.0	1 38	15 89	
2	21	Guernseys, ¼ bloods	31 00	29 26	3,361	155.0	18.9	87.0	0 97	.....	1.74
3	13	Grades, Durhams and Holsteins	25 00	33 17	3,968	185.0	18.0	84.0	1 34	8 17	
4	25	Grade Guernseys and grade Jerseys	28 00	57 18	5,809	298.0	19.2	98.4	2 04	29 18	
5	8	High grade Short-horns	28 00	37 81	4,531	204.4	18.5	83.4	1 34	9 81	
6	11	Grade Jerseys	30 00	31 54	3,175	167.0	19.0	99 0	1 05	1 54	
7	12	Grade Guernseys and grade Jerseys	30 00	44 05	4,201	220.3	20.0	105.0	1 47	14 05	
8	10	Grade Guernseys and grade Jerseys	34 00	35 03	3,866	177.0	19 8	90.6	1 03	1 03	
9	8	Grade Short-horns	34 00	33 06	3,969	183.0	18 1	83.2	0 97	.....	0.94
10	20	Grade Jerseys	38 00	41 40	4,576	213.0	19.4	90.5	1 09	3 40	
11	9	Grade Jerseys	24 00	36 64	3,812	192.0	19.1	96.1	1 53	12 64	
12	7	Grade Durhams	29 00	27 95	3,266	152.2	18.4	85.6	0 96	.....	1.05
13	11	Grade Jerseys, 2 grade Durhams	22 00	29 78	3,199	153.8	19.1	93.1	1 35	7.78	
14	18	Grade Holsteins and grade Jerseys	30 00	22 67	2,599	118.0	19.2	87.2	0 76	.....	7.33
15	12	Grade Holsteins and grade Jerseys	27 00	28 61	3,473	154.0	18.6	82.4	1 06	1 61	
16	15	Grade Short-horns	24 50	34 46	4,098	178.0	19.4	84.1	1 41	9 96	
17	18	Holsteins and grade Jerseys	30 50	43 19	4,806	218.0	19.8	89 9	1 44	12 69	
18	17	Grade Guernseys	31 00	36 80	3,820	191.6	19.3	96.3	1 19	5 80	
19	10	Grade Holsteins and Durhams	22 00	32 95	3,983	177.0	18.5	87.7	1 50	10 95	
20	5	Grade Jerseys	27 00	48 79	4,375	245.0	19.9	111.0	1 80	21 79	
21	22	Holsteins and Holstein grades	25 00	45 17	6,016	231.6	19.4	75.1	1 81	20 17	
22	10	Grades of different dairy breeds	38 00	42 23	4,843	214.7	19.7	87.2	1 11	4 23	
23	28	Grade Durhams, some grade Holsteins and Jerseys	28 00	31 16	3,674	167.0	18.7	85.0	1 11	3 16	
24	25	Grade Jerseys and grade Short-horns	32 00	34 31	3,634	186.5	18.5	94.4	1 07	2 31	
25	16	Holsteins	40 00	67 79	8,396	333.0	20.3	80.7	1 69	27 79	
26	17	Short-horns and some Jerseys and Holstein grades	34 50	24 33	3,182	133.0	18.3	76.5	0 70	.....	10.17
27	14	Grade Holsteins	31 50	31 28	3,630	159.5	19.6	80 2	0 99	.....	0.22
28	7	1 grade Holstein, 2 grade Jerseys, bal. common cows	40 00	45 39	4,964	231.5	19.6	90.1	1 13	5 39	
29	10	Grade Holsteins	33 00	37 11	4,756	189.0	19.6	78.0	1 12	4 11	
30	8	Common cows	30 00	33 06	3,831	170.5	19.3	86 3	1 10	3 06	
31	18	Common stock	24 00	34 22	4,602	190.0	18.0	75.0	1 43	10 22	
32	10	Common cows with a little Jersey blood	23 00	24 98	3,023	123.9	20.1	82.6	1 09	1 98	

33	15	Common cows	25 00	33 41	3,938	171.0	19.5	84.8	1 34	8 41	
34	7	2 grade Jerseys, balance grade Durhams	28 00	40 23	4,623	197.6	20.4	87.0	1 44	12 23	
35	10	Grade Jerseys and grade Short-horns	36 50	44 91	5,531	230.8	18.8	81.0	1 23	8 41	
36	10	Grade Short-horns	30 00	28 57	3,626	152.0	18.7	78.8	0 95	.....	1.43
37	10	Grade Durhams	31 00	26 49	3,382	139.0	19.0	78.3	0 85	.....	4.51
38	11	Jerseys and grade Jerseys	27 00	39 18	4,259	203.5	19.3	94.3	1 45	12 18	
39	12	Common cows	30 00	27 34	3,285	139.1	19.7	83.2	0 91	.....	2.66
40	15	Mostly grade Short-horns	27 00	41 06	4,974	213.2	19.7	82 5	1 52	14 06	
41	9	2 gr. Guernseys, gr. Holsteins, rest grade Short-horns	32 00	35 34	4,217	179.8	19.6	83.8	1 10	3 34	
42	20	Grade Guernseys, grade Jerseys and grade Holsteins	30 00	31 25	3,664	158.2	19.8	85.3	1 04	1 25	
43	10	Grade Jerseys and grade Short-horns	20 00	28 66	3,101	148.8	19.3	92.4	1 43	8 66	
44	13	Grade Short-horns	35 00	35 40	4,304	182.0	19.5	82.2	1 01	40	
45	14	Grade Red Polls and grade Short-horn, 2 grade Jerseys	32 00	32 80	3,775	161.2	20.3	86.9	1 03	80	
46	13	Grade Durhams and common stock	26 00	30 53	3,877	156.4	19.5	78.5	1 17	4 53	
47	12	Grade Durhams	31 00	28 46	3,618	143.2	19.9	78.5	0 92	.....	2.54
48	7	Common cows	28 00	37 27	4,503	189 0	19.7	82.8	1 33	9 27	

Cost of Feed and Income in 12 herds belonging to cheese factory patrons in Fond du Lac County, Wisconsin, for the 12 months ending September 30, 1902.

Patron's Number.	No. of Cows.	Kind of Cows.	Cost of feed per cow.	Returns for milk from factory per cow.	Pounds of milk per cow.	Average price of milk per 100 pounds.	Value of milk for one dollar's worth of feed.	Net profit per cow for milk over cost of feed.	Net loss per cow for milk below cost of feed.
			$ cts.	$ cts.		Cents.		$ cts.	$ cts.
1	20	3 Jerseys, rest common stock	23 50	25 16	2,817	89.3	1.07	1 66	
2	14	4 grade Jerseys, rest grade Short-horns	32 50	21 51	2,361	91.2	0.66	.....	10.99
3	15	Grade Durhams	26 00	31 61	3,602	87.8	1.22	5 61	
4	18	Grade Holsteins and grade Jerseys	35 50	57 73	6,338	91.1	1.63	22 23	
5	14	Common cows with a little Jersey blood	27 50	29 58	3,488	84 8	1.08	2 08	
6	13	Holstein, Jersey and Durham grades	33 00	42 47	4,760	89.8	1.29	9 47	
7	20	Common stock	33 00	27 60	3,205	86.1	0.84	.....	5.40
8	9	Grade Durhams and grade Holsteins	30 50	29 88	3,494	85.5	0.98	.....	0.62
9	14	2 grade Jerseys, rest grade Durhams	25 00	35 59	4,027	88.4	1.42	10 59	
10	15	Jersey, Holstein and Durham grades	26 50	29 67	3,116	89.5	1.12	3 17	
11	12	Grade Durhams	30 00	44 38	5,183	85.6	1.48	14 38	
12	8	1 Jersey, 2 Guernseys, rest common stock	35 00	33 40	3,748	89.1	0.95	.....	1.60

THREE GOOD HERDS, WELL MANAGED.

No. 20—5 cows, grade Jerseys, good dairy type, 3 fresh in March, 2 fresh in September; cost of feed, $27; returns from creamery, $48.79; pounds of milk, 4,375; pounds of butter, 245; price of butter, 19·9 cents; price of milk, $1.11, for one dollar in feed, $1.80; net profit of butter over cost of feed, $21.79. Adding value of skim milk makes profit $30.54 per cow. Ration: 2 tons of bran to the five cows; shredded corn stover and timothy hay (¼ of roughage, hay); in summer, pasture only.

No. 21—22 cows, Holstein and Holstein grades, 4 or 5 fresh in fall, balance in winter and spring; cost of keeping, $25; returns from creamery, $45.17; pounds of milk, 6,016; pounds of butter, 231·6; price of butter, 19·4 cents; price of milk, 75·1 cents; for one dollar in feed, $1.81; net profit of butter over cost of feed, $20.17. Adding value of skim milk makes profit of $32.20. Ration: 1½ pounds of bran, 45 pounds ensilage, 8 pounds clover hay and oat straw, all they will eat.

No. 25—16 cows, Holstein thoroughbreds and very fine dairy type, most of them fresh in fall; cost of keeping, $40; returns from creamery, $67.79; pounds of milk, 8,396; pounds of butter, 333; price of butter, 20·3 cents; price of milk, 80·7 cents; for one dollar in feed, $1.69; net profit of butter over cost of feed, $27.79; adding value of skim milk makes profit $44.58. Ration: 8 pounds of bran, 40 pounds of well eared ensilage, hay and corn stover, all they would eat; in summer good pasture only. Cows kept in good barn and fastened in Drown stalls.

COLD BARNS NOT CONDUCIVE TO PROFIT.

No. 26—17 cows, Short-horns and Short-horn grades, a few with a little Jersey and Holstein blood, fresh one-half in fall, rest in spring. Stable cold, cows fastened with chains; cost of keeping, $34.50; returns from creamery, $24.33; pounds of milk, 3,182; pounds of butter, 133; price of butter, 18·3 cents; price of milk, 76·5 cents; for one dollar in feed, 70 cents; value of butter per cow less than cost of feed, $10.17; counting the skim milk at 20 cents a 100 lbs. there is still a deficiency of $3.81. Ration: bran, oats and corn ground, 8 pounds; marsh hay, a little timothy hay and fodder corn, not well eared. In summer, pasture and a little bran.

What is the matter with No. 26? In the first place his cows are not very good dairy cows, and, secondly, and the main cause of his failure to get better returns, is his barn was so cold and his cows so uncomfortable that though half of them were fresh in the fall they produced very little milk during the winter, as shown by the records of the creamery. He fed very well and quite expensively, but the cows had to use most of the feed to keep warm, and left but little for milk production. They gave most of their milk in the summer on pasture, but even then they did not do very well, owing, no doubt, to the care they had in winter.

BETTER THAN THE AVERAGE.

No. 35—10 cows, grade Jerseys and grade Short-horns, fresh at all times, but most in early winter; cost of keeping, $36.50; returns from creamery, $44.91; pounds of milk, 5,531; pounds of butter, 230·8; price of butter, 18·8 cents; price of milk, 81 cents; for one dollar in feed, $1.23; net profit of butter over cost of feed, $8.41; adding value of skim milk makes profit $19.47. Amount of feed: 2 tons of gluten feed, 3½ tons bran, 6 acres of shock corn, well eared, timothy hay and corn stover; in summer, pasture and 5 pounds of bran to those giving a good mess of milk.

NEITHER GOOD COWS NOR GOOD MANAGEMENT.

No. 36.—10 grade Short-horns, fresh at all times; cost of feed, $30; returns from creamery, $28.57; pounds of milk, 3,626; pounds of butter, 152; price of butter, 18·7

cents; price of milk, 78·8 cents; for one dollar in feed, 95 cents; value of butter per cow less than cost of feed, $1.43; adding value of skim milk makes net profit $5.82. Ration: fodder corn with ears on, half the winter; then corn, oats and bran, 7 pounds; clover and timothy hay once a day and corn stover once a day; in summer, pasture only. This herd are not first-class dairy cows. They were fed corn half the winter till they had nearly dried up, then they were feed bran and some clover hay, but it was too late to bring back the flow of milk.

No. 44—13 cows, grade Short-horns, part fresh in fall and balance in spring; cost of feed $35; returns from creamery, $35.40; pounds of milk, 4,304; pounds of butter, 182; price of butter, 19·5 cents; price of milk, 82·2 cents; for one dollar in feed, $1.01; profit in butter over cost of feed, 40 cents; adding value of skim milk makes profit $9 per cow. Ration: well eared shock corn, 1½ months; then timothy hay and clover hay and 8 pounds gronud oats and corn; in summer, pasture, and in fall, fodder corn.

Here is another herd fed expensively and almost without profit. The mistakes here made are almost identical with the mistakes No. 36 made.

THE RELATION OF FEED TO PROFIT.

The 12 months through which these records run up make an unusually trying year for the dairyman. The widely extended drought of the summer of 1901 had made all kinds of feed very high and when winter came some dairymen were puzzled what to do. Some decided to feed grain as usual, no matter what the cost. Other said, 'I will not buy high priced feed to make a balanced ration, the cows will never pay for it.' Those of this second class whose cows were fresh in the fall made a sorry mistake, as the notes which I have presented show.

There was still another class who had cows that would not freshen till spring. Some of them said: 'We will give our cows cheap feed during winter—corn stover and straw—and not try to produce much milk in winter. They will be fresh in spring and give milk on pasture which is cheap. We may not get as much money per cow, but we will make more real profit than you fellows who pay out all you get for milk for feed.'

These arguments are quite plausible, and we will see what these facts I have gathered show.

Let us take the three highest feeders. No. 1 fed $42.00, got back $57.89, made a profit of $15.89. No. 25 fed $40.00, got back $67.79, made a profit of $27.79. No. 28 fed $40.00, got back $45.39, made a profit of $5.39.

Now take the three cheapest feeders, and their cows were all fresh in spring. No. 13 fed $22, got back $29.78, made a profit of $7.78. No. 19 fed $22, got back 32.95, made a profit of $10.95.

No. 43, fed $20.00, got back $28.66, made a profit of $8.66.

Now, fellow dairymen, these are the facts: The cheap feeders did very well when their cows came in in the spring, and they made a pretty fair profit; but the good feeders did better. There may never again come a time when the cheap feeder with summer cows will have such an advantage. The winter of high priced feeds was followed by a summer of luxuriant pasture, such as has never before been seen in this country.

ENSILAGE A FACTOR IN PROFITABLE DAIRYING.

There are five creamery patrons who fed ensilage: No. 4, who made on butter $29.18 profit per cow; No. 7, who made on butter $14.05 profit per cow; No. 17, who made on butter $12.69 profit per cow; No. 21, with $20.17 profit per cow, and No. 25, with $27.79 profit per cow. One cheese factory patron fed ensilage, No. 4, whose profit on milk delivered was $22.23. These six silo men averaged $21.02 profit per cow, while the average profit of creamery patrons was only $5.94 per cow. The gross returns for the silo men averaged $52.52 per cow, while those who did not feed ensilage received an average of but $34 per cow, a difference of $18.52 in favour of the ensilage men.

Can any one doubt, in face of these facts, that it will pay to build a silo? Is it possible that all this gain in gross receipts and profits is because these men feed ensilage? Or, is it, in part, because these men are more progressive, up-to-date farmers, have better dairy cows, study to feed a balanced ration, and, in short, have less of old fogyism than many of those who do not have silos? These are questions for you to ponder on and answer.

My own opinion is that, although I think any man is making a great mistake who keeps a herd of dairy cows without having a silo, the feeding of ensilage did not and could not, of itself, make this astonishing difference of over 54 per cent in gross receipts and more than 500 per cent in net profit.

Prof. Voorhees, Director of the New Jersey Experiment Station, found that ensilage increased the amount of milk 12 per cent over dry feed of the same kind, when everything else was equal. Taking that statement as being the real difference in favour of ensilage, then in our case $4.08 out of the $18.52 gain per cow should be credited to ensilage and $14.44 to 'the man behind the cow.'

So I hope that none of you here who have had small returns per cow will entertain the idea that all you have to do to get as large returns as these men who fed ensilage, is to build a silo. A silo will no doubt help some, but something else is needed.

RELATIVE PROFITS OF BUTTER AND CHEESE.

I took the statements of 12 patrons of a cheese factory. This factory made cheese the year round, and paid for milk by test, and these 12 were nearly all that had patronized the factory the whole 12 months.

These patrons had 172 cows. The average cost of feed per cow was $29.60; average returns from factory for milk, $34.20; average pounds of milk per cow, 3,835; average price of milk, 88·2 cents per 100 pounds; average profit per cow, $4.40.

There are many persons who wish to know whether it is more profitable to patronize a creamery or a cheese factory. It will be seen that the average price of milk at the creamery was 85·2 cents per 100 pounds, while at the cheese factory it was 3 cents more. This statement is a little misleading, for the milk received at the cheese factory did not average so high in test as that received at the creamery. Four per cent milk at the creamery averaged 84 cents and at the cheese factory 92 cents. Possibly this 8 cents may make up for the difference in value between skim milk and whey. At all events you have the facts as I found them.

PART II.—THE RESULT OF TESTING INDIVIDUAL COWS IN SEVENTY-TWO HERDS.

By C. F. Whitley.

In Charge of the Cow Census Work.

Acting under instructions from the Honourable the Minister of Agriculture, the Dairy Division announced early last spring that it would undertake to test for one year the milk of individual cows belonging to farmers in the district around Cowansville, Que., free of cost to the owners. The object of this work is to get data for the farmers of Canada showing the difference in productiveness of the individual cows in herds under the same management, &c., all with a view of showing the possibilities of increasing the profits from milk production by paying more attention to the selection, care and feeding of dairy stock.

The work is still in progress and cannot, therefore, be reported on fully at this time, but the following summary of the records for the first five months is submitted:

In a district about 15 miles square 72 farmers took samples under instructions issued by the dairy division of the Department of Agriculture. Each man provided himself with a spring scale and was furnished with a box of sample bottles and a small dipper. Blank forms were supplied for recording weights of the milk and details of the feed. Samples were taken of the morning and evening milking on the 3rd, 13th and 23rd of each month. When the six different milkings had been weighed and sampled the boxes containing the samples were sent to the government cool cheese curing room at Cowansville. As soon as the testing was finished the bottles were returned, with preservative in each, for the next month's samples, with a note showing the percentage of fat in each sample that had been tested and the calculated yield of pounds of butter fat for the month.

The averages for five months are given in Table I.

TABLE I.

Month.	Number of Dairies.	Number of Cows.	Total, Lbs. of milk per month.	Average, Lbs. of milk per cow per month.	Average % fat.	Average, Lbs. fat per cow per month.
June	61	945	616,502	652	3·85	25·1
July	67	1,120	625,154	558	3·74	20·8
August	57	893	446,150	499	3·98	19·8
September	52	821	344,165	419	4·32	18 1
October	23	335	109,802	327	4·59	15·0

The variation in the percentage of fat during June was from 2·4 to 6·5 per cent. Fifteen samples tested under 3·0 per cent, 539 (or 57 per cent of the total number of samples, see Table II.), were between 3·0 and 4·0 per cent; 354 (or 37·4 per cent of the total number), were between 4·0 and 5·0 per cent; 33 between 5·0 and 6·0 per cent, and 4 samples over 6·0 per cent.

As may be expected, the increase in richness of fat with the advance of the period of lactation alters the above proportion for the succeeding months; the varying percentage being given in the following table:—

TABLE II.

SHOWING the Comparative Richness of Samples Tested, by Months.

Month.	Number of Samples.	Percentage of the Total Number of Samples.				
		Under 3 per cent Fat.	Between 3 and 4 Per cent.	Between 4 and 5 Per cent.	Between 5 and 6 Per cent.	Over 6 per cent Fat.
June	945	1·5	57·0	37·4	3·5	0·4
July	1,120	3·6	60·4	33·1	2·3	0·4
August	893	1·5	44·5	47·5	5·8	0·4
September	821	0·6	26·5	52·3	16·6	3·7
October	335	0·8	15 2	48·3	28·0	7·4

For the month of June some individual records may be noticed. Out of 945 cows. 20 yielded 1,000 pounds milk and over, 10 gave 1,100 pounds or more, and 2 gave 1,200 pounds and more. Close to these animals were others yielding only 350 or 400 pounds. One cow on this June honour roll gave 1,135 pounds milk, testing 3·2 per cent fat, or 36 pounds fat, but another yielded 1,120 pounds milk, testing 6·5 per cent, or 62 pounds fat.

In July, one herd of 10 cows gave 4,330 pounds milk, while another herd of almost four times as many cows (39, to be exact), gave over seven times as much milk, namely 30,480 pounds. In another instance in July, 6 cows yielded 2,515 pounds milk, averaging 3·3 per cent fat, while 12 cows gave over three times as much, 8,020 pounds, averaging the same percentage of fat.

A September record shows that a dairy of 24 cows gave 12,060 pounds milk, while another herd of 24 cows produced only 9,130 pounds, both averaging 4·1 per cent fat.

Another striking comparison for the same month is that one lot of 23 cows yielded 8,120 pounds milk, containing 371·2 pounds butter fat, while a herd of 23 cows only 6 miles away gave 11,200 pounds milk, containing 647·9 pounds of fat. Valuing butter at 20 cents per pound, this indicates that in one case the cash receipts for the month are $86.60, and in the other, $151, from the same number of cows.

In a dairy of 10 cows the total yield of butter per cow for five months runs from 103 to 149 pounds; in another herd of 21 cows it varies from 113 to 251 pounds per cow.

A sample record of 14 cows for the 4 months of June, July, August and September is of interest.

TABLE III.

Dairy No. 2.

Cow No.	Age.	Pounds of Milk.	Average % Fat.	Total lbs of fat.	Equal to lbs. of butter.
10	3	1,100	3·9	44	51
13	2	1,460	4·0	59	69
8	3	1,570	3·9	62	72
9	4	1,600	3·9	64	74
12	8	1,720	4·0	70	83
14	8	1,890	4·2	81	94
6	7	2,180	3·9	86	100
1	15	2,130	4·0	87	101
11	5	2,040	4 3	89	104
7	8	2,240	4·0	90	105
3	7	2,310	3·9	91	106
2	11	2,760	3·7	103	120
4	10	2,480	4·2	104	121
5	9	2,850	3·8	109	127

In comparing the cash value of the yield of two herds the following figures deserve attention:—

TABLE IV.

20 cows, 4 months.			20 cows, 4 months.		
Pounds of milk.	Pounds of fat.	Value at 18 c. per lb.	Pounds of milk.	Pounds of fat.	Value at 18 c. per lb.
38,825	1,678	$ 302 04	50,410	2,418	$ 435 24

Table V. indicates the value of the work in showing the comparative yield of butter from animals in the same herd.

Six typical records are given, the yield of total pounds of butter having been calculated from the pounds of fat by adding one-sixth.

TABLE V.

Sample Records of Total Pounds of Butter per Cow in Six Different Dairies.

Cow, No.	Four months.		Five months.			Six months.
	Herd A.	Herd B.	Herd C.	Herd D.	Herd E.	Herd F.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
1	40	51	59	103	147	134
2	54	72	65	107	162	154
3	56	74	72	118	168	156
4	61	83	78	119	172	157
5	70	100	85	120	174	160
6	77	101	99	126	176	164
7	82	104	100	135	189	168
8	84	105	102	135	194	170
9	86	106	111	143	210	176
10	94	120	..	149	216	180
11	97	121	..	..	222	183
12	107	127	..	..	251	187
13	112	..	..	..	..	197
14	114	..	..	..	..	237
Average lbs. per cow	81	97	85	125	190	173

As the object of this investigation was to note the record of individual animals in the various dairies, it is satisfactory that some men have been keen enough to see that, irrespective of breed or pedigree, if the present performance is not satisfactory financially, that animal had to be disposed of.

Nearly all of the farmers were visited with the view of ascertaining the condition of the stables and general management, including care and feed the previous winter. In many cases good solid improvements to buildings are in progress, cement floors are being laid, and more attention is being paid to light and ventilation.

It is expected to obtain complete records of some herds for twelve months, obtaining cash returns from the factories, so that the exact net profit of each cow may be calculated.

PART III.—RECORD TESTING ASSOCIATIONS IN DENMARK.

(By C. Marker.)

GENERAL.

In the year 1895 members of the local Cattle Breeders' Association, Vejen, Denmark, formed themselves into an organization for the purpose of ascertaining, and possibly increasing, the productiveness of their dairy herds, some 300 milch cows.

They found the milk and butter production rather light in comparison with the ruling prices of feed stuffs, and that it did not leave a satisfactory margin of profit on capital invested and labour expended. The farmers realized that, in order to increase the productiveness of their herds, it would be absolutely necessary to ascertain the yield of the individual animals, as well as to learn the quantity and cost of feed consumed by each.

Such work would be costly, and in some cases impracticable, for the individual farmer to carry on single-handed, but on the co-operative plan the cost to the individual would be comparatively slight and quite within reach.

In this way, at a small outlay of money, the relative values of production and feed consumption could be ascertained.

The only accurate and reliable means of obtaining the information sought would be by the use, at regular intervals, of weigh scales and fat tests ,and by a carefully kept record of all details connected with the work.

A set of by-laws being adopted, the association was named the 'Vejen and Vicinity Record Testing Association.'

The movement, as might be expected, was watched with a great deal of interest; other districts interested themselves in the matter, and a number of new associations of a similar nature were formed each succeeding year.

The following table shows the rapid increase of associations, membership and cows. According to a recent census there are in Denmark 1,076,265 milch cows, of which 155,287 or 14·55 per cent belong to members of Record Testing Associations:—

Year.	Associations.	Members.	Cows.
1895	2	47	834
1898	109	1,844	45,005
1902	327	7,134	130,929
1903	367	7,990	142,296
1904	402	8,991	155,287

The bylaws of the Vejen Association are quoted here, because they have been adopted by the majority of the numerous similar organizations which have been formed in other districts from time to time:—

BYLAWS, VEJEN AND VICINITY RECORD TESTING ASSOCIATION.

1. The object of the association is to develop strains of cows which will produce a large quantity of milk rich in butter fat.

2. The association to be formed is to continue in operation for a period of five years, and during that time no member can withdraw except by removal from the district.

3. The membership in the association is, for the present, limited to twelve or thirteen, who will agree and undertake to have the milk from the individual cows in their entire herds weighed and tested once every two weeks.

4. The working expense of the association is to be charged to the members in amounts proportionate to the number of samples tested, and such amounts are to be collected semi-annually by the president of the association.

5. The association shall elect a board of management consisting of three members, one of whom shall retire each third year. The retirement shall be by drawing lots the first two years. The board of directors shall elect from among their number a president, who shall also act as manager and treasurer.

6. The board of management shall, on behalf of the association, engage an expert assistant to attend to the sampling and testing of the milk from the individual cows owned by members of the association. The assistant shall also keep a correct and complete account of the milk and butter yield from, and the quantity of food consumed by, each cow. He shall also prepare statements showing the comparative results from the different herds and individual animals of each, in order that a selection may be made of the animals which would appear to be specially valuable for breeding purposes.

7. The financial year of this association will be reckoned from May 1 to April 30, and all records and statements must be in the hands of the auditors before June 1 following, who will then return them two weeks prior to the annual general meeting of the association.

8. The annual general meeting of the association is to be held not later than the month of July of each year.

9. Any member who desires to present any matter or question for discussion or action at the annual general meeting must communicate same in writing to the president at least eight days prior to the date of meeting.

10. Each member of the association shall have one vote, to be given in person or by lawful proxy.

11. At the annual general meeting not less than one-half of the membership shall be required to form a quorum. Should there be no quorum a special general meeting may be called for not less than two weeks thereafter, and at such meeting any matter may be dealt with irrespective of the number of members present. At any meeting all questions shall be determined by a majority vote.

12. The association can be dissolved only by a resolution passed at a general meeting.

Adopted January 24, 1895.

In addition to the foregoing, it may be mentioned that the members of the association pay their assistant a stated salary per year, and furnish him with room and board during his periodical visits, besides conveying him and his equipment to the next farm on his route. The assistant devotes his whole time to the work of the association.

METHOD OF WORKING.

When a record association has been formed an assistant is engaged to carry out the practical details of the work. Being supplied with a complete sampling and milk testing equipment, he makes periodical visits to the farm of each member of the association, the frequency of his visits depending on the number of members.

In the majority of cases each farm is visited once every two weeks, and the day's milk from each cow is carefully weighed, afterwards sampled and tested by the assistant, who makes the entries in a book kept for the purpose, not only of the milk and butter fat yield, but also of the quantities of feed consumed by each cow since his last visit. The farmer keeps a record of the latter from day to day as nearly and as accurately as

possible. A uniform system of bookkeeping has been adopted by nearly all these associations. The result of the day's milking multiplied by the number of days having elapsed since the previous test, is taken as the yield for that period. The details of the feeding, furnished by the farmer, are recorded and computed into the so-called feed units, which furnish the basis for comparison of results obtained from individual animals or herds.

FEED UNITS.

The 'Feed Units' have been established through a series of feeding experiments planned and directed for a number of years by the late Professor Fjord ,for the Danish government. These experiments extend over a period of something like sixteen years.

The feed units or equivalents, so far as the tests have gone, are about as follows:—

One lb. oil cake=1 lb. grain=10 lbs. mangels, green feed or carrots=12½ lbs. turnips=3 to 4 lbs. hay=5 to 7 lbs. straw=1-10 day on pasture.

The cost of the commercial feed stuffs, about 1½c. per lb., is made the basis for calculating the value of feed units.

As to the composition of feeding rations, we find that according to report of United Testing Associations of the province of Fyen, for 1902-3, comprising 24,499 cows, each 100 feed units were made up of the following:—

19 per cent oil cake.
14 per cent grain (different kinds).
17 per cent roots.
38 per cent pasture and green feed.
7 per cent hay.
5 per cent straw.

100

The Vejen Association reports the proportion thus:—

	1900-1. p.c.	1901-2. p.c.	1902-3. p.c.	1903-4. p.c.
Oil cake	23	27	24	25
Grain and bran	11	10	7	5
Pasture and green feed	27	26	30	30
Roots	26	23	22	23
Hay	6	7	10	10
Straw	7	7	7	7
	100	100	100	100

At the end of each year the assistant prepares his report and a statement showing results of the year's work. The report is then in due course laid before the annual general meeting of the association, and afterwards printed for distribution among the members. These reports contain a great many very interesting facts and give rise to considerable discussion and reflection. They show at a glance the financial standing of the individual animals in each herd, indicating the yield of milk and butter, the increase in live weight and the quantity and cost of feed consumed.

One of the early reports of the pioneer association shows that one cow of a certain herd produced 10,183 lbs. of milk containing 382 lbs. of butter at a cost of $63, whilst another in the same herd gave 4,098 lbs. milk yielding 133 lbs. of butter at a total cost of $50.

Whilst these figures are extremes they show the usefulness of the testing and record system and tend to awaken closeness of observation and careful reasoning on the part of the man who is interested.

QUALIFICATIONS OF THE ASSISTANTS.

The nature of the duties required of the assistant demands that he possess a general knowledge of farming operations, and skill in the work which he is engaged to do, viz., milk sampling and testing, computation of feeding rations, and general bookkeeping, also ability to give general advice to the members of the association as to their part of the common work.

Some of the leading agricultural schools in Denmark conduct each year special courses for record testing association assistants, each course extending over periods of one, two and four months each, and including special instruction in the following branches, viz.:—

1. Milking, weighing and sampling of milk in the stable.

2. The use of Dr. Gerber's milk tester.

3. Practice in bookkeeping and recording milk and butter yields, feed consumed by the individual animals, and the keeping of herd books as practiced in the ordinary associations.

4. Lectures on milking, constitution of milk, &c.

5. Examination in the principles of cattle feeding and anatomy of domestic animals.

6. Instruction in the judging of live stock.

The students enrolling for these courses are expected to have a practical knowledge of the care and feeding of cattle. They are also expected to be thoroughly skilled in milking, able to write a legible hand, calculate correctly, and to possess generally such mature experience and judgment as will enable them to lead and instruct in every important branch of farm work.

STATE AID.

In accordance with law of May 23, 1902, the sum of 120,000 kroner ($32,000), is each year set aside by the Danish Government for the purpose of rendering financial assistance to the Record Associations, in portions of not more than 250 kroner ($66), to any one association having a membership of at least eight with not less than 200 cows, such associations having for their objects:—

'The investigation and recording of the feeding, as well as the milk and butter fat yield of each cow in the herd, and on the basis of these to make the cattle industry more remunerative and work towards the development of more productive strains of cattle.'

SOME OF THE RESULTS.

The Record Testing Association which has the longest record in Denmark is the one formed at Vejen in the year 1895, and through the courtesy of its consulting expert I am able to present some very interesting facts gleaned from late reports. The weights given in the following tables have been translated from the Danish and represent pounds avoirdupois.

Table I shows the average result of eight year's work of the above association, and indicates a decided improvement, practically from year to year, in the yield of milk and butter. It will be noted that the 'increase in the live weight' of the animals is also included in the table. The association procured a pair of portable cattle scales in 1897 for the purpose of weighing all animals twice each year, and the advantage of this move is obvious.

TABLE I.

Year.	Average Yield.					Yield per 100 Feed Units.		
	Herds.	Cows.	Milk.	Fat.	Butter.	Milk.	Butter.	Increase Live wght
	No,	No.	Lbs.	%	Lbs.	Lbs.	Lbs.	Lbs.
1895-96.....	13	293	6,988	3·34	262	143	5·22	—
1896-97.....	13	306	6,630	3·26	244	143	5·18	—
1897-98.....	19	393	6,496	3·37	243	137	5·04	2·3
1898-99.....	22	460	6,676	3·40	256	144	5·35	3·3
1899-1900.....	25	497	6,768	3·39	260	146	5·37	1·7
1900-01.....	25	504	6,503	3·38	249	136	5·12	2·0
1901-02.....	25	498	6,993	3·40	270	145	5·49	1·9
1902 03.....	26	494	7,335	3·42	283	146	5·55	2·4
1903-04.....	24	495	7,388	3·42	285	146	5·56	1·9
	Average of 9 years.		6,854	3·37	261	143	5·32	2·2

Table II is a record of one of the better herds owned by a member of the association, and indicates for the last five years a gradual increase in milk yield and per cent of butter fat. This has been accomplished by judicious *feeding, weeding* and *breeding*. A number of parallel cases appear in the report already referred to.

The herd in question consisted, in 1902-03, of fifteen cows, each consuming, on an average, 5,266 feed units. The average production of the cows was 148 lbs. of milk, yielding 5·80 lbs. of butter, and 2·9 lbs. gain live weight per 100 feed units.

TABLE II.—Milk and Butterfat records of one herd extending over eight years, Vejen.

Year.	Lbs. of Milk.	Per cent. of Butter Fat.
1895-96.....	7,023.....	3·30
1896-97.....	7,631.....	3·25
1897-98.....	6,538.....	3·28
1898-99.....	5,452.....	3·30
1899-00.....	5,869.....	3·36
1900-01.....	6,408.....	3·38
1901-02.....	6,818.....	3·42
1902-03.....	7,776.....	3·52

EXTENSION OF THE WORK TO OTHER LINES.

The information obtained from the keeping of correct and detailed records of the cost of milk and production has proved so valuable and interesting that the work of some of the associations has become extended so as to include other departments of farming such as cattle, hog and poultry raising, and the growing of field crops.

TESTING ASSOCIATIONS, FYEN.

The following table shows the growth of the movement on the Island Fyen, (Funen):—

2	associations	were formed in	1897
11	"	"	1898
10	"	"	1899
7	"	"	1900
11	"	"	1901
18	"	"	1902
11	"	"	1903

The membership of each association varies from 9 to 60.
The membership of each association averages 23.
The number of cows per association averages 350.
In 1903—

Total associations	70
" membership	1,589
" number cows	24,499

In point of milk production 1,172 herds were classed as follows:—

Yield from	2	herds averaging	3,300– 4,400	lbs. annually.
"	21	"	4,400– 5,500	"
"	135	"	5,500– 6,600	"
"	386	"	6,600– 7,700	"
"	438	"	7,700– 8,800	"
"	158	"	8,800– 9,900	"
"	27	"	9,900–11,000	"
"	5	"	over 11,000	"
	1,172			

If we classify the herds under different percentages of fat in milk we reach the conclusion that the milk from—

2	herds	gave an average	test of 2·91–3·00	per cent.
17	"	"	3·01–3·10	"
50	"	"	3·11–3·20	"
161	"	"	3·21–3·30	"
321	"	"	3·31–3·40	"
290	"	"	3·41–3·50	"
196	"	"	3·51–3·60	"
96	"	"	3·61–3·70	"
28	"	"	3·71–3·80	"
6	"	"	3·81–3·90	"
2	"	"	3·91–4·00	"
3	"	"	over 4·01	"
1,172				

Table III. shows the yearly average yield per cow of 1,172 herds for five years. Although an improvement from year to year is apparent, yet it is not as great as might be expected, owing, no doubt, to the fact that a number of new herds have been added each year, and these give the poorest results as a rule.

We find that in nine cases out of ten there is a substantial increase in both milk and butter yield, and in seven cases the test of butter fat has improved.

TABLE III.

YEARLY Average Yield per Cow of entire Herds—*Fyen.*

Year.	No. of Cows per 365 Days.	Lbs. of Milk.	Per Cent Fat.	Lbs. of Butter.	Feed Units Consumed.	Yield per 100 Feed Units.	
						Lbs Milk.	Lbs. Butter.
1898-99	3,464	6,645	3·37	249	4,167	159	6·0
1899-1900	5,467	6,833	3·36	254	4,637	169	6·3
1900-01	9,352	6,752	3·37	252	4,322	156	5·8
1901-02	11,967	7,032	3·38	264	4,494	156	5·9
1902-03	17,662	7,423	3·41	281	4,791	155	5·9

Table IV. shows the classification and yield of various sized herds for the year 1902-3.

TABLE IV.

AVERAGE Milk and Butter Yield from Herds of different sizes, 1902-3.

Size of Herds.	Herds.	Cows 365 Days.	Lbs. Milk.	Per Cent Fat.	Lbs. Butter.	Feed Units Consumed.	Yield per 100 Feed Units.	
							Lbs Milk.	Lbs. Butter.
Up to 15 cows.	869	8,061	7,813	3·44	299	4,901	159	6.1
16 to 30 cows	230	4,505	7,665	3·39	288	4,886	157	5·9
31 to 70 cows	47	2,193	6,822	3·39	257	4,600	151	5·7
Over 70 cows	26	2,902	6,415	3·36	239	4,486	143	5·3

Table V. contains the first (1898-99) and latest (1902-3) years' result of a five years' record of ten entire associations, all milking cows and heifers included.

TABLE V.

Association No.	1898 99.				1902 03.				Increase in Yield per Cow.		
	Cows in 365 Days.	Lbs. Milk.	Per Cent Fat.	Lbs. Butter.	Cows in 365 Days.	Lbs. Milk.	Per Cent Fat.	Lbs. Butter.	Lbs. Milk.	Per Cent Fat.	Lbs. Butter.
A	249·7	7,151	3 37	268	303·3	7,827	3·44	299	676	0·07	31
B	244·6	7,011	3·41	265	306·8	8,078	3·45	309	1,067	0·04	44
C	333·2	6,995	3·35	260	286 2	7,730	3·45	296	735	0·10	36
D	382·6	6,888	3 37	257	314·4	8,043	3·43	307	1,155	0·06	50
E	310·3	6,874	3·40	259	323·1	8,185	3·44	314	1,311	0·04	55
F	99·1	6,639	3 25	240	319·5	8,056	3·38	303	1,417	0·13	63
G	238·3	6,449	3·33	239	183·0	7,955	3·33	294	1,506	.. ..	55
H	499·1	6,387	3·49	249	418·8	6,371	3 35	236	16	0·14	13
I	318·5	6,374	3.49	248	255·8	7,768	3·37	290	1,394	0·12	42
J	432 0	6,355	3 24	228	414·7	7,440	3·35	276	1,085	0·11	48

The associations in Fyen are well organized and work hand in hand with the numerous local cattle breeders' associations, and there is no doubt that there, as in other portions of Denmark, the testing and recording movement has a bright future before it, and will be the means of weeding out many unprofitable animals which are to be found on most farms.

It is the aim of the central organization of the Cattle Breeders' and Record Testing Associations in the various provinces of Denmark:—

1. To hold meetings with local managers and assistants of each association for general discussion and instruction;

2. To further and encourage the practice of uniform and thorough bookkeeping by the associations:

3. To assist in a thorough training of expert assistants;

4. To assist the Record Testing Associations in their endeavours to include other branches of farm work under a system of careful control;

5. To publish the result of the work done by the various associations, in order that they may attain wide publicity and stimulate the interest of all concerned.

The following figures are quoted from the Danish Bureau for Creamery Statistics:

Six Annual Reports.

Year.	No. of Creameries included in Record.	Average Lbs. Milk per Cow.	Pounds Milk per pound of Butter.
1898	304	4,490	26·5
1899	323	4,755	26·4
1900	323	4,760	26·3
1901	355	4,842	26·1
1902	410	5,146	25·9
1903	483	5,351	25·6

PART IV.—MISCELLANEOUS RECORDS.

Mr. J. H. Grisdale, Agriculturist, Central Experimental Farm, Ottawa, has been encouraging the testing of dairy herds for several years and has succeeded in inducing a number of farmers to keep records of the yield of milk from individual cows. The results in many cases are quite remarkable. Mr. Grisdale has kindly supplied the following notes.

RECORD OF COWS AT SPRINGFIELD UNION CHEESE FACTORY FROM MARCH 15 TO DECEMBER 9, 1904.

Herd Number	No. of Cows.	Pounds Milk, Total.	Average Pounds per Cow.
1	18	90,856	5,047
2	29	129,968	4,481
3	19	66,063	3,635
4	24	99,342	4,139
5	10	54,308	5,430
6	17	68,082	4,004
7	28	110,695	3,953
8	25	116,726	4,669
9	17	70,669	4,156
10	13	58,098	4,469
11	19	92,325	4,859
12	24	107,035	4,460
13	19	71,118	3,743
14	19	66,187	3,483
15	8	41,411	5,176
16	29	81,352	2,805
17	19	47,978	2,525

NOTE.—Herds Nos. 1, 5 and 15 contained no heifers, but all or nearly all the others had a number of two and three year olds.

The figures in the foregoing table need no comment. The yield of milk per cow in the different herds varies all the way from 2,525 lbs. up to 5,443 lbs., in the factory year.

'Mr. J. A. Halliday, Sandwick, B.C., began keeping records of his herd in 1902. The yield of butter from his herd that year was 2,324 lbs. In 1904 the yield was increased to 3,328 lbs. of butter from the same number of cows. Mr. Halliday had selected and improved his herd through knowing what each cow was doing.'

'Mr. David Moir, of Almonte, Ont., brought his herd up from 3,500 lbs. per cow per annum in 1902 to 5,910 lbs. per cow in 1904.'

'Mr. A. C. Price, of Bridgetown, N.S., writes to Mr. Grisdale, saying: "I am applying to you for more milk recording sheets; since using the records for three years we have increased our yield nearly twofold. Cannot speak too highly of the plan."'

'Mr. D. D. Gray, of Chûte à Blondeau, Ont., in 1900 received $34.50 per cow for milk sent to the cheese factory, and in 1903 got $70 per cow. In 1904, with lower prices for cheese, he received $60.50 per cow.'

All these increases are the direct results of improvement based on the knowledge gained by the testing of individual cows.

DEPARTMENT OF AGRICULTURE
DAIRY COMMISSIONER'S BRANCH
OTTAWA, CANADA

CHEMICAL INVESTIGATIONS RELATING TO DAIRYING UNDERTAKEN IN 1904

BY

FRANK T. SHUTT, M.A.

Chemist, Dominion Experimental Farms

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