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Bulletin No. 127 - Report of the Richmond-Lewiston Cow Testing Association

W. E. Carroll

Utah Agricultural College

EXPERIMENT STATION

Bulletin No. 127

Report of the Richmond-Lewiston Cow Testing Association

By W. E. CARROLL

Logan, Utah, August, 1913

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INTRODUCTION.

The function of all domestic animals is to utilize the coarse rough feeds and transform them into something useful to mankind, either food, clothing, or energy. The animal thus acts as a concentrator for low grade ores, so to speak. The class of animals which will produce most human food, clothing, or energy for man from a given amount of feed—other cost being equal—is the most economical and the one which will remain longest with us as population becomes more dense and the question of food supply becomes keener.

Experiments have shown the dairy cow to be probably the most economical "reducer" of coarse feeds. That is, from a given amount of feed she will return more human food than any other class of animals.

The Dairy Cow a Machine.

Everyone who has had experience with machinery knows that machines of the same kind, or even of the same make, differ greatly in the amount of energy they require to produce a certain result. Teamsters have noticed the difference in the draught of wagons, one seemingly pulls considerably heavier than another. Threshing machines of the same size will not turn out the same number of bushels of grain per hour when running with the same power.

The milk cow can in a way be compared to a machine. If we could conceive of a threshing machine, for example, with the engine under the cylinder so constructed as to utilize part

of the grain or straw entering the machine to keep up the fire automatically, thus running the entire machinery, we would have a rough comparison of the conditions existing in a dairy cow. Another comparison would be that of a flour mill. A certain quantity of wheat, coarse and unfit directly for human food, is put into the mill and a certain smaller amount of refined flour is recovered, some of the coarse portions of the wheat kernel being unfit for high grade flour having been cast aside. If the mill could be kept running by burning the bran and low grade flours the comparison would be still more complete.

In comparing a number of the curious machines described above, or the flour mills, some would be found which would require a larger proportion of the grain fed into the machine to keep the engine running than would be necessary in others, and some mills would separate more completely the fine from the coarse material in flour making. The same condition is found in the dairy cow. Some cows can consume more feed than others and some require a larger proportion of what they eat to keep up the body processes, thereby leaving less to be converted into milk. These natural differences of economy of production found in cows result from differences of breed and individuality. It is necessary that the dairyman, if he makes a success of his business, understand and control these differences.

The Breed Question.

The question of breed is fairly easy. It is well known that some breeds have been selected and bred for many years for meat production, while other breeds have been just as long and carefully selected for the production of milk. It is natural,

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PLATE I.

No. 1.—Cow 7 in herd 24. Grade Holstein. Highest profit cow in the Association 1912-13. Yielded $122.66 profit in 12 months from 440.0 pounds fat. Note the capacity.

No. 2.—Cow 11 in herd W. Holstein-Jersey. Returned a loss of $5.99 the first year. Note the beefiness and lack of capacity.

No. 3.—Cow 20 in herd X. Holstein. Produced 406.3 lbs. fat the first year, and 403.9 lbs. the second.

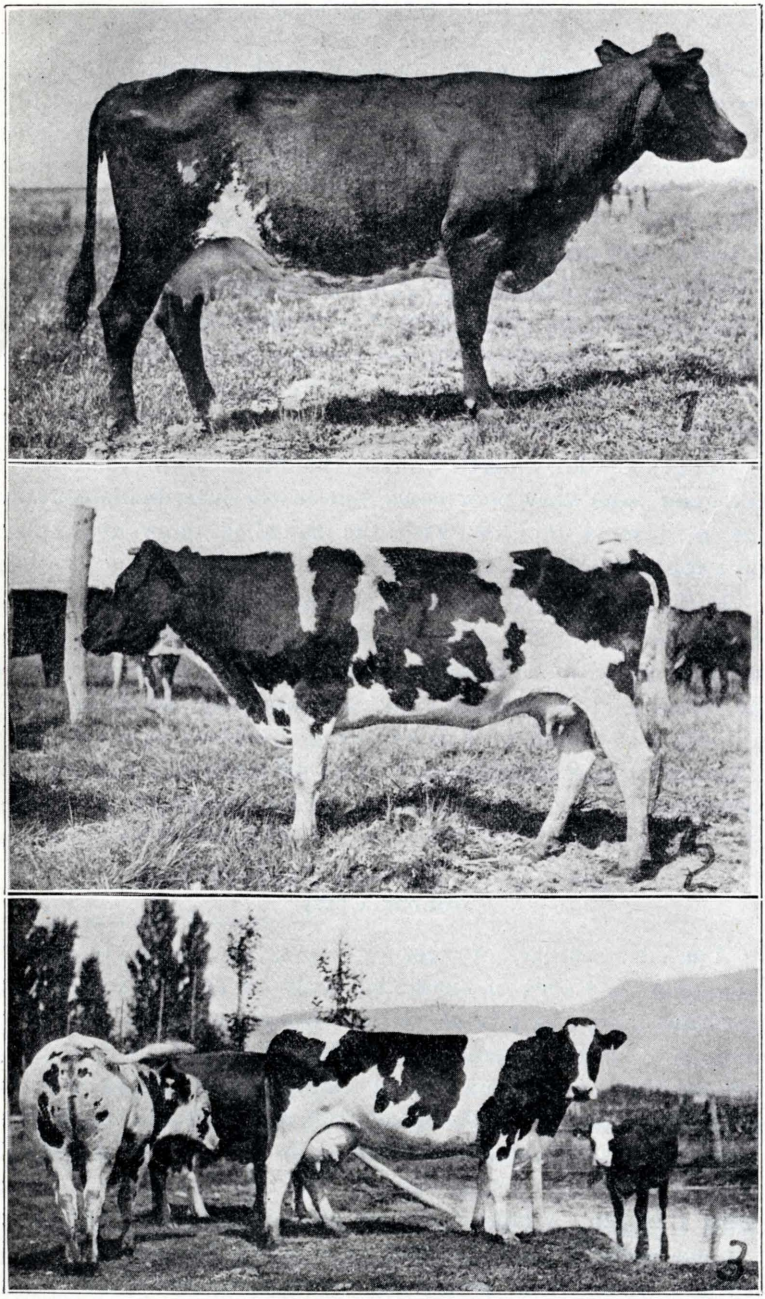

PLATE I.

therefore, when milk is the product wanted, to look to one of the breeds which were founded and have been bred to produce milk —one of the so-called dairy breeds. Which dairy breed to choose is a question of secondary importance and cannot be discussed here.

Dairy Individuality.

The chief consideration, and one which cannot so easily be settled as the breed question, is that of individuality. The value of a dairy cow depends upon the amount of milk and butter fat she produces and the quality of calves she raises as compared with the cost of her keep.

Judges of dairy cattle can in the majority of cases select very good from very poor cows, but in the intermediate grades even men most familiar with the so-called dairy type make grave mistakes.

If then there were no other means of judging the value of dairy cows except by external appearances, profits in dairying would be much more a matter of chance than is now the case. The other, and in fact the only accurate way, we have of determining the value of dairy cows is by the use of the milk scales and the Babcock test. With this cheap, accurate, and convenient method of determining the fat content of milk no dairyman can afford not to know just what his cows are doing.

Robber Cows.

The desirability of testing cows has been urged for many years. Scores of examples could be cited where testing has meant increased profits. It is generally accepted that many dairy cows yield inadequate returns, and that their removal from the herd would be a benefit. The easy means of detecting the "robber cows" (the Babcock test and scales) are also well known, and yet dairymen continue to go on letting the old cow pay what she wishes for the feed she consumes. Where would a merchant land if he let his customers do the same? It is not enough that the herd as a whole be paying a profit, each cow in the herd should be contributing her share toward the total profit. In a profitable herd some cows may be good

enough to pay their own board bill and that of two or three unprofitable cows as well.

Until dairymen come to recognize that adequate business methods are necessary they need not hope for success. One dairyman in the state after he had been testing his herd a year or two said that he could not afford not to test, and that if he had the choice of beginning the dairy business with a herd of cows without the scales and testing outfit, or beginning with the scales and tester without the cows he would choose the latter, as the scales and tester could not lose him money and the cows might.

Methods of Testing.

Individual. Granting that testing is necessary, the question now is, how can it best be done. One method is for each dairyman to provide himself with scales and testing outfit and weigh and test the milk from each of his own cows. This is a very satisfactory method, but many men object to the fuss and bother necessary.

Association. It has been found that by a number of men combining they can hire an expert to do the work for all more cheaply than it can be done by the individual men. An organization to accomplish this is spoken of as a Cow Testing Association.

Cow Testing Associations—Historical.

Denmark is responsible for the origination of the Association idea. It came as a direct result of a national demand for higher taxes and greater economy of farm production in general, which were made necessary by destructive and expensive wars during the closing years of the nineteenth century. And curiously enough the suggestion came not from a man in active dairy work, but from a woman who no doubt had been taking a keen interest in the improvements made in her husband's herd.

After nearly three years of cow testing agitation, active operations of the first association began May 1, 1895, with 13 herds entered. The number of associations in Denmark has increased every year since, till 1909 (the last figures available)

there were 530 such associations running. So successful were the results in Denmark that Germany began similar organizations in 1897. Within the next three years cow testing associations were organized in Sweden, Norway, and Finland, and later spread to practically all countries where cows are milked.

The first American association was established in Fremont, Mich., in 1905, and was known as the Newaygo County Dairy Testing Association. From here the good work spread to many states and has effected and is still working a wonderful improvement in the dairy industry.

In Denmark the average butter yield per cow increased from 112 pounds per year in 1884 to 224 pounds in 1908. In other words, in 24 years the average annual production of the Danish cows was doubled. It is generally accepted that the cow testing movement is almost entirely responsible for this improvement. The record is indeed remarkable when it is remembered that the average is for the entire country.

One association in Sweden having in its tenth year 639 cows increased in ten years the average production per cow 109 pounds of fat. One herd of about 70 cows in a Sweden Association increased the average annual butter fat yield 176 pounds per cow in ten years.

The first American Association mentioned above, increased the average yield of fat of all the cows entered 49.5 pounds in four years. The Ferndale (Cal.) Association shows an increase per cow of 40.5 pounds of fat as a result of only three years work. The number of cows in this association during this time was approximately 600.

Illustrations similar to the above could be multiplied almost indefinitely, but the ones given will serve to illustrate the value of cow testing associations.

PLATE II.

No. 1.—Cow 17 in herd Y. Highest producing cow in the Association the second year. Produced 443.8 lbs. fat.

No. 2.—Cow 1 in herd O. Pure-bred Jersey producing 342.4 lbs. fat the second year.

No. 3.—Homestead Belle Pietertje 66524, pure-bred Holstein cow in herd K, producing 459.7 lbs. fat in one year. Note size and capacity.

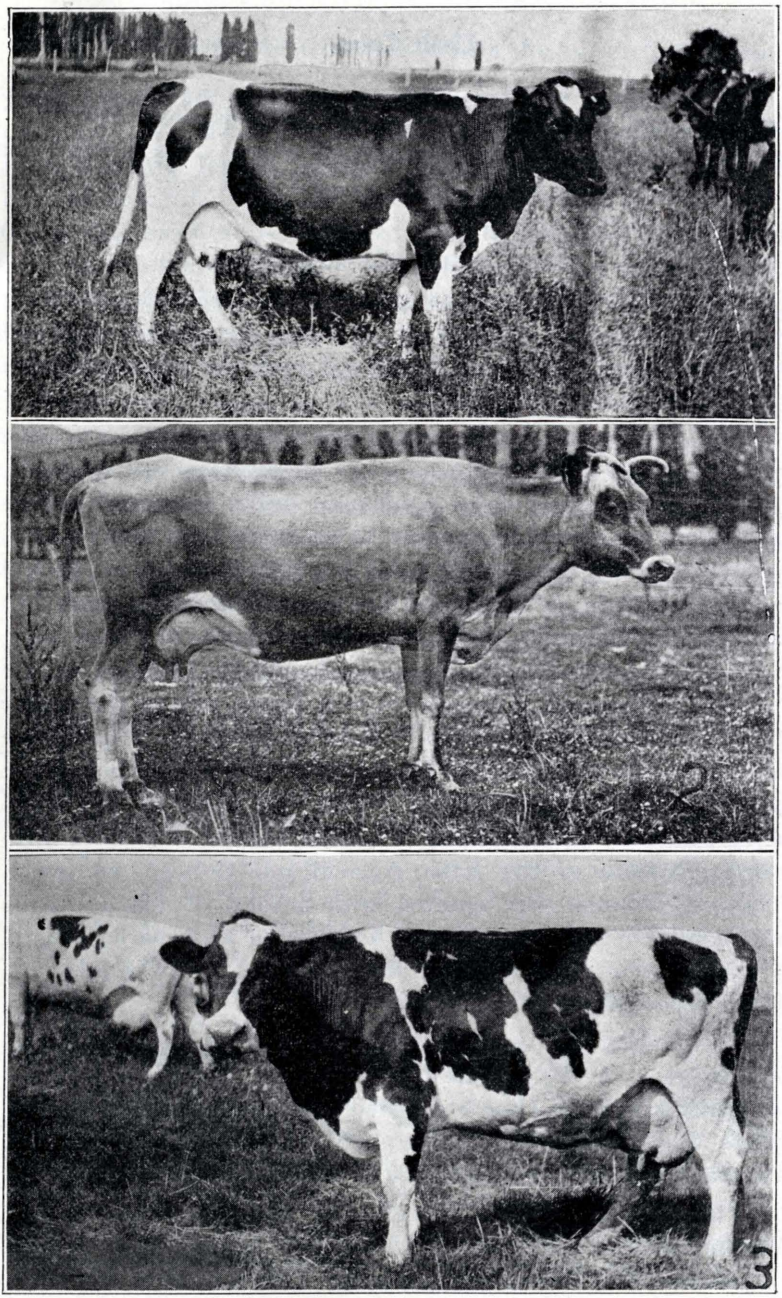

PLATE II.

Utah Cows.

According to the latest figures available there were being milked in Utah January 1, 1913, 85,000 cows. We have no means of knowing the exact average annual production of these cows. This average has been variously estimated by men most familiar with dairy conditions in the state, from 120 to 140 pounds of fat. If this yield (140 pounds) could be doubled for our 85,000 cows, as was the case in Denmark, counting butter fat worth an average of 32 cents per pound, it would mean an annual increase of $3,808,000 over the present income from the dairy cows of Utah.

The farmers of Cache county have been very progressive and among the first in the state to adopt improved methods. The establishment of two condensed milk factories in the county lent considerable impetus to the dairy industry. Recognizing that the grade of milk cows was not as high as it should be, the dairymen of Richmond became interested in their improvement. Through the co-operative efforts of these men, the Utah Experiment Station, and the Dairy Division of the Federal Government, a movement was begun during the winter of 1910-11 to organize a cow testing association. Plans were completed, the necessary arrangements were made, and active operations began May 1, 1911, under the name of the Richmond-Lewiston Cow Testing Association, with Frederick Froerer, a graduate of the Utah Agricultural College, as tester. Twenty-six herds were entered with a total of 444 cows the first month. The expense of the association was shared equally by the Experiment Station on the one hand, and the members of the association on the other.

The largest herds entered consisted of 40 cows each, belonging to A. L. Hyer and J. A. Carson. Eight cows owned by Henry Christofferson composed the smallest herd entered. Before the close of the year a total of 613 cows were entered in the association, the number of herds remaining the same.

The second year's work was under the supervision of John Wilson, another graduate of the Utah Agricultural College. The second year began with 25 herds with a total of 409 cows.

A total of 512 cows were entered before the close of the second year.

Grade Holstein cows were present in greater numbers than any other breed. Grade Shorthorns, pure bred Holsteins, grade Jerseys, and pure bred Jerseys follow in the order given.

Method of Collecting Data.

The tester visited each herd once each month arriving in time for the evening milking and staying till after milking the following morning. At each visit he would make a record of the kinds and amounts of feed given each cow. The milk from each cow was weighed night and morning and a composite sample taken representing both milkings. The sample bottles for all the cows of the herd were then taken to the tester's office, where each was tested for butter fat by the Babcock method, using a 32-bottle covered machine. All weights and tests were carefully recorded and kept by the tester.

Management of the Cows.

The feeding was very similar with all the herds. In the winter alfalfa hay was the chief roughage, and in fact the only feed given some herds. Some grain was fed by most men. This consisted of wheat bran, barley, wheat, oats, and a very little corn. The barley and wheat were usually chopped. Some herds received in addition some sliced beets or mangels. Beet pulp was fed in one or two instances. In the summer practically all the herds were on pasture for a part or all of the summer. In the fall many of the herds were turned into beet fields and other fields from which the crops had been harvested to gather what feed was available.

Charges were made each month for the feed or pasture at the prevailing market prices. Pasture was charged at $2.00 per month per cow. Alfalfa hay varied from $6.50 to $9.00 per ton, and the grains went from $20.00 to $40.00 per ton, according to the season, during the two years. Prices of both hay and grain ruled slightly higher the first than the second year.

TABLE 1--HERDS ARRANGED IN ORDER OF BUTTER FAT YIELDS, 1911-12.

Herd Letter	Av. No. of Cows for 12 mos.	Av. Milk Yield, lbs.	Av. Test	Av. Butter Fat, lbs.	Value of Butter Fat, Dollars	Av. Total Cost of Feed, Dollars	Av. Profit, Dollars	Returns for $1 expended for Feed, Dollars	Feed Cost of 1 lb. Fat, Cents	Feed Cost of 100 lbs. Milk, Cents
X	18.00	10093	3.41	344.5	115.40	43.76	71.64	2.63	12.7	43.3
K	18.83	9721	3.37	327.6	105.95	47.37	59.58	2.26	14.5	48.9
V	13.25	9451	3.26	309.1	102.91	44.95	57.96	2.29	14.5	47.3
H	8.50	7503	4.12	307.5	99.16	38.34	60.82	2.59	12.5	51.5
J	16.25	8728	3.39	295.8	97.50	46.18	51.32	2.11	15.6	52.9
Y	29.17	9006	3.23	291.1	96.12	44.07	52.05	2.18	15.1	48.8
M	10.92	6923	3.96	274.2	91.54	41.42	50.12	2.21	15.1	59.8
Z	7.75	8844	3.02	267.0	85.12	38.52	46.60	2.21	14.4	43.5
G	21.67	6556	4.03	264.2	88.09	37.09	51.00	2.38	14.0	56.4
F	8.91	7164	3.62	259.0	85.49	46.15	39.34	1.85	17.8	64.4
D	18.83	7419	3.49	258.8	85.46	34.40	51.06	2.49	13.3	46.3
Q	14.83	6777	3.72	252.4	83.18	36.39	46.79	2.29	14.4	53.6
N	45.67	6841	3.60	248.9	82.96	41.28	41.68	1.99	16.7	60.1
B	29.50	6581	3.74	246.2	80.24	35.79	44.45	2.24	14.5	54.2
E	13.17	6704	3.63	242.7	79.27	34.91	44.37	2.27	14.7	53.4
C	11.33	6096	3.91	238.1	76.12	31.45	44.66	2.42	13.2	51.6
I	15.50	6228	3.92	236.4	76.85	36.18	40.68	2.12	15.3	60.0
P	19.50	5856	4.07	236.4	78.14	36.25	41.89	2.16	15.3	62.3
R	41.33	6544	3.59	235.2	76.18	35.58	40.60	2.14	15.1	54.2
A	9.00	6030	3.82	230.6	74.90	34.15	40.76	2.19	14.8	56.5
U	13.42	5429	4.19	227.5	75.83	38.43	37.40	1.97	16.9	70.8
W	13.75	5486	3.95	216.4	71.84	34.85	36.99	2.06	16.1	63.6
L	19.17	5254	4.06	213.1	69.37	37.99	31.38	1.83	17.8	81.9
S	43.66	5490	3.76	206.9	67.79	33.76	34.03	2.01	16.3	61.3
O	20.58	4057	4.87	197.7	64.70	36.19	28.51	1.79	18.3	89.1
T	15.83	4826	4.03	194.5	63.83	34.08	29.75	1.87	17.5	70.6

TABLE 2—HERDS ARRANGED IN ORDER OF BUTTER FAT YIELDS, 1912-13.

Herd Letter or No.	Av. No. of Cows for 12 mos.	Av. Milk Yield, lbs.	Av. Test	Av. Butter Fat, lbs.	Value of Butter Fat, Dollars	Av. Total Cost of Feed, Dollars	Av. Profit, Dollars	Returns for $1 expended for Feed, Dollars	Feed Cost of 1 lb. Fat, Cents	Feed Cost of 100 lbs. Milk, Cents
20	8.83	8853	3.41	300.9	111.58	45.05	66.53	2.48	14.9	50.8
X	19.42	8672	3.37	292.1	107.40	46.11	61.29	2.33	15.8	53.2
Y	26.75	8293	3.51	290.9	107.32	41.36	65.96	2.59	14.2	49.8
Q	11.00	3771	3.82	281.4	102.97	37.17	65.80	2.77	13.2	50.4
K	18.42	8484	3.30	280.2	102.38	42.20	60.18	2.43	14.9	49.2
J	10.67	8353	3.33	278.1	100.24	39.82	60.42	2.52	14.3	47.6
F	9.33	7711	3.54	273.0	104.92	45.36	59.56	2.31	16.6	58.8
N	35.83	6577	3.57	262.9	85.67	42.99	42.68	1.99	18.3	65.3
O	14.83	5464	4.81	262.9	95.88	34.51	61.37	2.78	13.1	63.0
U	13.83	5890	4.31	253.6	92.09	37.23	54.86	2.47	14.7	63.4
D	18.67	7482	3.38	253.0	91.59	35.77	55.82	2.56	14.1	47.7
21	10.33	7393	3.40	251.4	93.27	35.39	57.88	2.64	14.8	50.3
24	11.33	6700	3.73	249.6	91.81	34.06	57.75	2.70	13.6	50.7
G	24.08	5658	4.38	248.0	89.84	37.62	52.22	2.39	15.2	66.6
V	5.08	7608	3.23	246.1	82.51	37.10	45.41	2.22	15.1	48.8
23	10.58	6276	3.90	245.0	87.84	32.46	55.38	2.71	13.3	51.9
25	12.58	6761	3.58	242.1	87.64	35.21	52.43	2.49	14.5	52.9
B	17.83	6665	3.63	241.9	82.64	31.87	50.77	2.59	13.2	47.9
W	14.25	5806	3.94	229.0	83.26	34.99	48.27	2.38	15.3	60.3
E	15.42	6496	3.48	226.2	80.90	37.73	43.17	2.14	16.6	57.8
P	11.25	5376	4.02	216.4	73.80	28.62	45.18	2.58	13.2	53.1
R	17.58	6163	3.48	214.5	78.40	35.36	43.04	2.21	16.6	57.8
22	14.75	5456	3.92	214.3	77.61	34.12	43.49	2.27	15.9	62.3
I	11.83	5435	3.76	205.3	71.95	31.18	40.77	2.31	15.2	57.2
T	14.17	5016	3.97	199.1	72.27	34.35	37.92	2.10	17.2	68.3

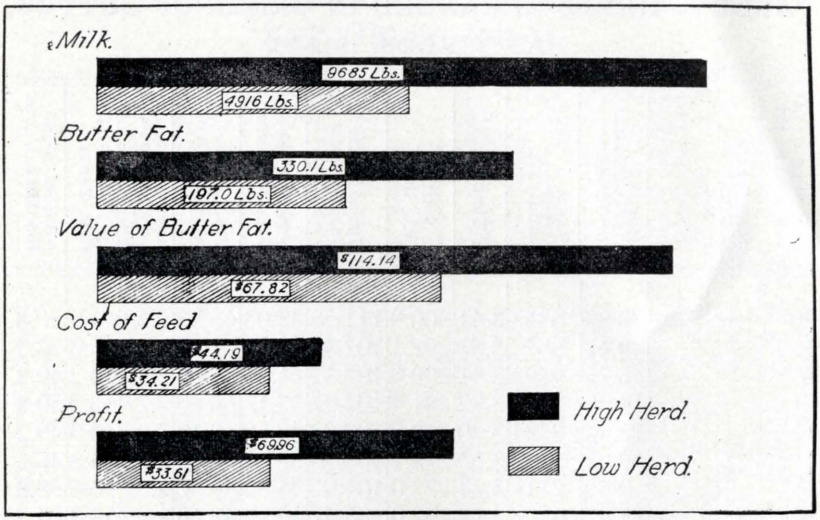

Figure 1. An average of the highest herd both years compared with an average of the lowest herd both years.

Each cow was credited monthly with the amount of butter fat she produced valued at the price paid by the local condensed milk factory. This price varied the first year from 26 cents to 38 cents, with an average not far from 32 cents per pound. For 1912-13 the prices ranged from 29 cents to 40 cents with an average about 36 cents per pound.

In the calculations following no account is taken of the calves or the manure produced by the cows, nor of the cost of housing, labor, etc. These two factors are usually considered to offset each other.

Discussion of Results.

Nineteen of the herds were in the association the entire two years.

It is believed that the second year's records fall considerably below what they would have been had it not been for a rather serious outbreak of contagious abortion among the herds. This handicap should be remembered in comparing the records for the two years.

The average yearly yield of butter fat per cow for the association was for the first year (1911-12) 250.8 pounds; for the second year (1912-13) it was 251.1 pounds.

Tables 1 and 2 give the herd averages for the first and second years respectively. The table shows the average number of cows milked for a 12-month period, the average amount of milk and butter fat produced, the cost of feed, the profit above cost of feed, the returns realized on each dollar expended for feed, and the feed cost of one pound of butter fat and of 100 pounds of milk.

Each table shows the herds arranged in descending order of butter fat production. Twenty-six herds are reported the first year and 25 the second. Each year the same number of herds (12) averaged above 250 pounds of fat per cow. The first year there were two herds whose average butter fat yield fell below 200 pounds, and only one the second year. Of the 19 herds that were in both years, 7 raised the average production per cow the second year, while for 12 herds the average is lower the second year.

A glance at the total profit column for each year indicates slightly higher profits the second year. This is in part due to the higher price paid for butter fat the second year as noted above. A comparison of the average cost of feeding the same herd for the two years shows that in 8 cases the cost increased the second year, while in 11 herds the feeding was cheaper the second year. This would account for some of the increase in profits.

Another interesting fact in connection with the average profit in the various herds is that in general greatest profit is realized on herds of high butter fat production.

The averages for the highest herd and the lowest herd each year as given in tables 1 and 2 were combined and the values thus obtained are shown in a graphic form in Fig. 1. The figure needs very little explanation. The two high herds averaged 26.83 cows and the two low herds 30 cows. The great difference in value between an average cow in each herd is shown very plainly.

It appears from this that the owner of the low herd could have profited rather markedly by a study of the methods employed in the high herds, for the high herds made more than double the profit per cow realized in the low herd.

TABLE 3—PERCENTAGE DISTRIBUTION OF BUTTER FAT RECORDS.

Pounds Butter Fat	1911-12				1912-13			
	No. of Cows	Per Cent	Av. Net Profit	Av. Net Value of 100 lbs. Fat	No. of Cows	Per Cent	Av. Net Profit	Av. Net Value of 100 lbs. Fat
Over 400	8	1.51	$92.95	$21.87	5	1.21	$112.61	$26.50
350-400	21	3.97	79.09	21.09	13	3.15	92.52	24.67
300-350	46	8.70	63.99	19.69	44	10.65	77.37	23.80
250-300	110	20.80	51.76	18.82	76	18.40	62.34	22.67
200-250	159	30.05	38.83	17.26	97	23.49	45.35	20.15
150-200	105	19.85	27.12	15.50	100	24.21	33.19	18.97
100-150	59	11.15	15.86	12.69	53	12.83	22.88	18.30
Under 100	21	3.97	2.85	3.80	25	6.05	5.68	7.57
Total	529	100.00			413	99.99		

Percentage Distribution of Butter Fat Records in the Association.

In the tabulations of the records of individual cows given in this report, no record is considered where the cow was in the association less than six months.

The records of all cows for both years were compiled in the order of the amount of butter fat produced, with the results found in table 3. This table shows 529 cows to have completed records six months or longer the first year, and 413 cows the second year. The table also shows the distribution of fat records in 50-pound groups. In 1911-12 there were 8 cows, or 1.45 per cent of the total, which produced over 400 pounds of fat. The second year there were 5 cows, or 1.21 per cent, produced this amount. A slight increase is noted the second year in the proportion of the cows producing between 300 and 350 pounds of fat. The popular production, so far as these percentages show, was from 200 to 250 pounds of fat the first year, and

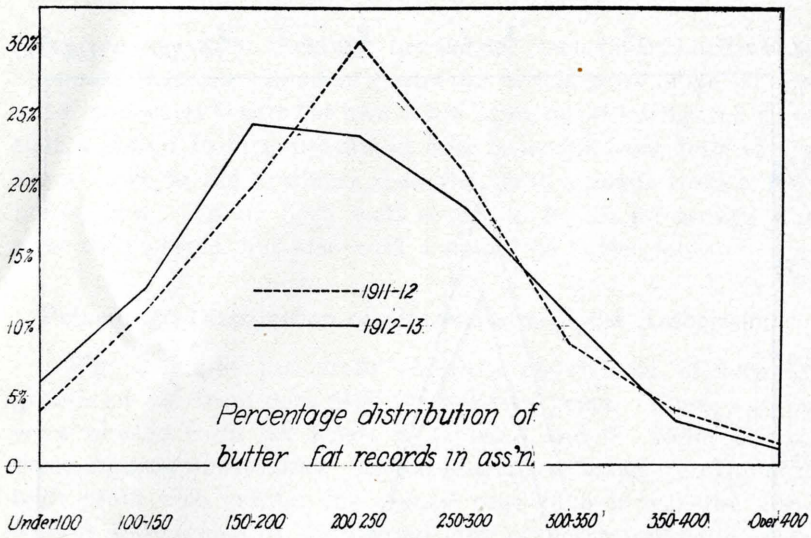

Figure 2.

from 150 to 200 pounds the second, though the 200 to 250 pound mark is almost equal the second year to the next lower mark.

The same points are shown in a graphic form by the curves in Fig. 2.

The average net returns for each group of cows considered is in all cases greater for the second year. Here again the high producing cows are seen to net the highest returns over cost of feed. The first year there is a difference of $90.10 in profit between a cow in the lowest producing group and one of the 400-pound cows. The second year this difference is $106.93 in favor of the high producing cow.

The two columns headed average net value of 100 pounds of fat have been calculated to show the relative economy of production of the several groups of cows. The figures there mean that each 100 pounds of butter fat produced, netted a profit, above feed, of the amounts shown. It will be seen that the net value of butter fat decreases regularly both years from the group of highest producing cows, until each 100 pounds from the low producing cows netted only about one-sixth the first year and one-fourth the second year, of the value of the

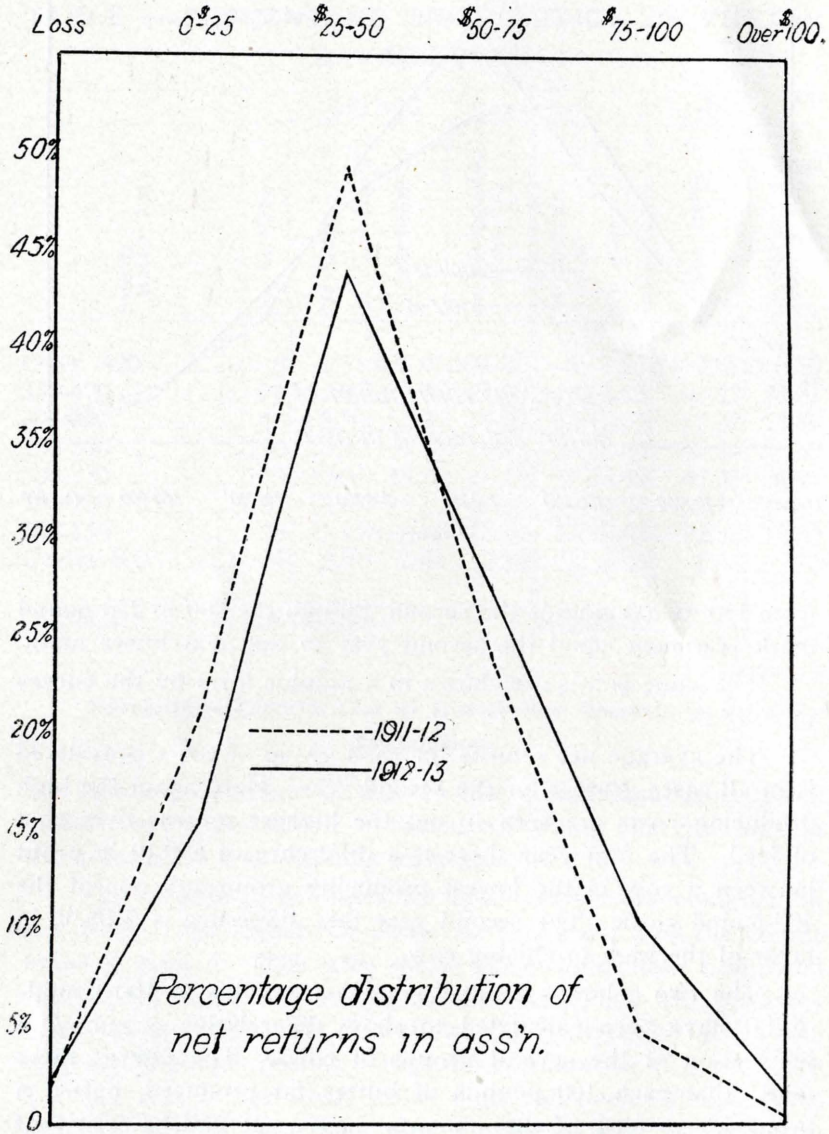
Loss
0-$25
$25-50
$50-75
$75-100
Over $100.
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0
1911-12
1912-13
Percentage distribution of net returns in ass'n.

Figure 3.

same amount from the high producing cows. Ordinarily it is supposed that one pound of butter fat is worth as much as any other no matter where the two come from, but these figures show that a pound from a 400-pound cow is worth from four to six times more to the producer than the same amount from a 100-pound cow. To be born well seems to be an advantage not only with people, but also with a pound of butter fat.

Percentage Distribution of Net Returns in the Association.

Fig. 3 shows the profit returned above cost of feed in groups of $25 from 0 to $100 for the two years. These curves were plotted from the totals in tables 8 and 9. Reference to these figures shows that the proportion of cows returning a high profit was greater the second year than it was the first. This is shown also by the second year curve crossing the other and remaining above it in the area of high profit. Over 10 per cent of the cows the second year returned a profit of between $75 to $100, while the first year only a little more than 4 per cent did this well. Both years there were cows kept at an actual loss. Nine cows, or 1.7 per cent of all the cows entered in the association the first year, failed to give enough butter fat to pay for the feed they consumed. The second year the number was 8, or 1.94 per cent.

The owners of these 17 cows then not only received nothing for the time they spent in caring for them, but actually paid part of the feed bill as well for the privilege of donating their time in that manner—self-sacrificing, but not very profitable.

Highest and Lowest Profit in Each Herd.

In tables 4 and 5 are arranged data for the most and the least profitable cow in each herd for the two years. In these tables only 12-month records are considered. All cows in for a shorter time have been excluded from this comparison, in order that no injustice be done the poorer cows.

A study of the two tables shows that the difference in the amount of butter fat produced by the two cows from the same herd varied from 40.7 pounds to 277.4 pounds the first

TABLE 4—HIGHEST AND LOWEST PROFIT FOR TWELVE MONTHS IN EACH HERD, 1911-12.

Herd Letter	Cow No.	Age of Cow, Years	Pounds Milk	Av. Test	Pounds Butter Fat	Value of Butter Fat, Dollars	Total Cost of Feed, Dollars	Profit, Dollars	Returns for $1 expended for Feed, Dollars
X - ------	7	8	10079	4.33	436.0	145.16	44.16	101.00	3.29
	10	13	8269	3.21	265.2	87.13	41.53	45.60	2.07
Difference	---	---	1810	----	170.8	58.03	2.63	55.40	1.22
K - ------	17	7	13566	3.19	432.3	141.52	49.71	91.81	2.85
	15	5	6251	3.15	196.7	63.84	46.13	17.71	1.38
Difference	---	---	7315	----	235.6	77.68	3.58	74.10	1.47
V - ------	8	8	10419	4.12	429.4	143.21	48.06	95.15	2.98
	2	3	7679	3.12	239.8	78.19	42.61	35.58	1.84
Difference	---	---	2740	----	189.6	65.02	5.45	59.57	1.14
H - ------	1	9	9399	5.23	392.7	127.95	43.79	84.16	2.92
	10	7	7462	3.54	263.9	84.90	39.01	45.89	2.18
Difference	---	---	1937	----	128.8	43.05	4.78	38.27	.74
J - ------	2	4	12062	3.11	385.6	127.66	58.93	68.73	2.17
	8	4	5883	3.53	207.6	67.65	43.54	24.11	1.55
Difference	---	---	6179	----	178.0	60.01	15.39	44.62	.62
Y - ------	21	4	13431	3.32	446.3	146.80	46.89	99.91	3.13
	13	3	7082	3.77	225.8	76.74	49.96	26.78	1.54
Difference	---	---	6349	----	219.5	70.06	—3.07	73.13	1.59
M - ------	10	9	6905	4.66	322.1	107.01	41.49	65.52	2.58
	3	7	7423	3.65	271.1	86.98	38.82	48.16	2.24
Difference	---	---	—518	----	51.0	20.03	2.67	17.36	.34
Z - ------	5	8	13478	2.74	368.9	120.07	47.13	72.94	2.55
	11	2	6824	3.03	206.7	68.38	42.49	25.89	1.61
Difference	---	---	6654	----	162.2	51.69	4.64	47.05	.94
G - ------	2	---	8292	4.28	354.5	115.25	38.90	76.35	2.96
	14	4	4014	4.87	195.4	63.25	35.12	28.13	1.80
Difference	---	---	4278	----	159.1	52.00	3.78	48.22	1.16
F - ------	8	3	6347	4.32	274.0	91.04	46.66	44.38	1.95
	6	3	5463	4.27	233.3	80.18	48.09	32.09	1.67
Difference	---	---	884	----	40.7	10.86	—1.43	12.29	.28

TABLE 4—HIGHEST AND LOWEST PROFIT FOR TWELVE MONTHS IN EACH HERD, 1911-12—Cont'd.

Herd Letter	Cow No.	Age of Cow, Years	Pounds Milk	Av. Test	Pounds Butter Fat	Value of Butter Fat, Dollars	Total Cost of Feed, Dollars	Profit, Dollars	Returns for $1 expended for Feed, Dollars
D	7	6	10725	3.34	358.3	123.69	34.24	89.45	3.61
	3	3	5352	2.86	153.2	48.49	34.24	14.25	1.41
Difference	---	---	5373	----	205.1	75.20	-----	75.20	2.20
Q	2	9	9282	3.28	304.0	98.89	36.25	62.64	2.73
	5	3	5929	3.53	209.3	68.87	36.25	32.62	1.90
Difference	---	---	3353	----	94.7	30.02	-----	30.02	.83
N	16	5	8761	4.54	397.5	136.68	41.54	95.14	3.29
	39	12	3214	3.74	120.1	37.06	38.10	—1.04	.96
Difference	---	---	5547	----	277.4	99.62	3.44	96.18	2.33
B	4	7	9059	3.93	356.7	115.00	36.22	78.78	3.17
	24	2	3542	4.26	150.9	48.17	28.03	20.14	1.73
Difference	---	---	5517	----	205.8	66.83	8.19	58.64	1.44
E	5	8	7987	4.19	335.0	109.13	34.75	74.38	3.14
	1	2	5177	3.65	188.8	62.45	34.75	27.70	1.80
Difference	---	---	2810	----	146.2	46.68	-----	46.68	1.34
C	1	4	7598	3.99	303.2	97.42	32.50	64.92	2.99
	8	7	4624	4.03	186.5	58.22	30.00	28.22	1.94
Difference	---	---	2974	----	116.7	39.20	2.50	36.70	1.05
I	1	8	8609	4.24	364.9	119.02	39.63	79.39	3.00
	9	3	3122	3.73	116.3	36.24	34.75	1.49	1.04
Difference	---	---	5487	----	248.6	82.78	4.88	77.90	1.96
P	1	7	8624	3.92	338.1	110.48	38.46	72.02	2.87
	12	2	3371	4.11	138.6	44.80	32.00	12.80	1.40
Difference	---	---	5253	----	199.5	65.68	6.46	59.22	1.47
R	7	5	8373	3.66	306.1	99.71	35.84	63.87	2.78
	17	2	4142	3.74	155.0	50.24	35.84	14.40	1.40
Difference	---	---	4231	----	151.1	49.47	-----	49.47	1.38
A	1	3	7766	3.64	282.8	92.32	34.38	57.94	2.69
	9	7	4161	3.6	149.9	46.59	33.53	13.06	1.39
Difference	---	---	3605	----	132.9	45.73	.85	44.88	1.30

TABLE 4—HIGHEST AND LOWEST PROFIT FOR TWELVE MONTHS IN EACH HERD, 1911-12—Cont'd.

Herd Letter	Cow No.	Age of Cow, Years	Pounds Milk	Av. Test	Pounds Butter Fat	Value of Butter Fat, Dollars	Total Cost of Feed, Dollars	Profit, Dollars	Returns for $1 expended for Feed, Dollars
U - ------	4	6	7594	4.01	304.4	102.24	41.97	60.27	2.44
	7	2	2764	4.59	126.8	41.40	33.55	7.85	1.23
Difference	---	---	4830	----	177.6	60.84	8.42	52.42	1.21
W ------	7	8	6191	4.37	270.4	90.99	37.19	53.80	2.45
	11	2	1657	4.38	72.5	22.70	28.69	—5.99	.79
Difference	---	---	4534	----	197.9	68.29	8.50	59.79	1.66
L - ------	14	9	6009	4.49	269.8	91.44	35.50	55.94	2.58
	16	4	3151	4.06	127.8	41.36	35.50	5.86	1.17
Difference	---	---	2858	----	142.0	50.08	-----	50.08	1.41
S - ------	7	8	6503	3.88	252.4	88.24	34.12	54.12	2.58
	3	10	3648	3.66	133.7	41.83	33.55	8.28	1.25
Difference	---	---	2855	----	118.7	46.41	.57	45.84	1.33
O - ------	14	---	4704	5.1	238.3	82.42	37.57	44.85	2.19
	5	12	2835	4.4	123.9	37.90	31.98	5.92	1.19
Difference	---	---	1869	----	114.4	44.52	5.59	38.93	1.00
T - ------	2	9	6623	3.85	255.1	83.92	35.89	48.03	2.34
	6	8	3296	3.78	124.7	38.89	29.19	9.70	1.33
Difference	---	---	3327	----	130.4	45.03	6.70	38.33	1.01
Total high cows			228386	----	8778.8	2907.26	1051.77	1855.49	----
Total low cows			126335	----	4584.5	1482.45	957.25	525.20	----
Av. high cows			8784	3.8	337.6	111.82	40.45	71.37	2.76
Av. low cows			4859	3.6	176.3	57.02	36.82	20.20	1.55
Difference			3925	----	161.3	54.80	3.63	51.17	1.21

TABLE 5—HIGHEST AND LOWEST PROFIT FOR TWELVE MONTHS IN EACH HERD, 1912-13.

Herd Letter or No.	Cow No.	Age of Cow, Years	Pounds Milk	Av. Test	Pounds Butter Fat	Value of Butter Fat, Dollars	Total Cost of Feed, Dollars	Profit, Dollars	Returns for $1 expended for Feed, Dollars
20	5	5	10692	3.51	375.7	137.40	44.77	92.63	3.07
	6	4	7053	3.33	235.1	84.88	43.80	41.08	1.94
Difference	---	---	3639	---	140.6	56.52	.97	51.55	1.13
X	15	6	13362	3.02	403.9	153.90	48.32	105.58	3.18
	5	6	4660	3.73	174.0	62.94	48.32	14.62	1.30
Difference	---	---	8702	---	229.9	90.96	-----	90.96	1.88
Y	17	5	14951	2.97	443.8	160.13	44.18	115.95	3.63
	5	3	6434	3.01	193.7	69.47	39.56	29.91	1.76
Difference	---	---	8517	---	250.1	90.66	4.62	86.04	1.87
Q	5	4	8855	3.49	309.1	114.36	36.15	78.21	3.16
	2	10	6771	3.44	233.1	81.51	37.62	43.89	2.17
Difference	---	---	2084	---	76.0	32.85	—1.47	34.32	.99
K	1	9	10804	3.86	416.7	154.65	46.73	107.92	3.31
	2	7	4808	3.11	150.4	56.19	42.93	13.26	1.31
Difference	---	---	5996	---	266.3	98.46	3.80	94.66	2.00
J	6	6	11323	3.53	399.2	145.14	42.99	102.15	3.37
	7	5	1952	3.82	74.5	24.50	34.00	—9.50	.72
Difference	---	---	9371	---	324.7	120.64	8.99	111.65	2.65
F	9	3	9194	3.33	306.3	116.53	48.57	67.96	2.39
	5	10	6849	3.41	233.3	90.22	43.72	46.50	2.06
Difference	---	---	2345	---	73.0	26.31	4.85	21.46	.33
N	28	5	9133	3.97	362.7	134.39	45.49	88.90	2.95
	37	2	3145	2.92	91.9	30.63	37.34	—6.71	.82
Difference	---	---	5988	---	270.8	103.76	8.15	95.61	2.13
O	1	6	7580	4.58	347.3	126.49	35.02	91.47	3.61
	15	2	3442	5.31	182.8	66.24	33.12	33.12	2.00
Difference	---	---	4138	---	164.5	60.25	1.90	58.35	1.61
U	7	7	8158	4.19	343.6	128.90	40.56	88.34	3.17
	12	4	1568	5.19	81.4	25.89	28.25	—2.36	.92
Difference	---	---	6590	---	262.2	103.01	12.31	90.70	2.25

TABLE 5—HIGHEST AND LOWEST PROFIT FOR TWELVE MONTHS IN EACH HERD, 1912-13—Cont'd.

Herd Letter or No.	Cow No.	Age of Cow, Years	Pounds Milk	Av. Test	Pounds Butter Fat	Value of Butter Fat, Dollars	Total Cost of Feed, Dollars	Profit, Dollars	Returns for $1 expended for Feed, Dollars
D - ------	7	7	10813	3.23	349.5	130.82	37.30	93.52	3.51
	21	2	5894	3.45	203.5	71.48	33.50	37.98	2.13
Difference	---	---	4919	----	146.0	59.34	3.80	55.54	1.38
21 -------	7	7	8031	4.39	352.8	131.11	36.41	94.70	3.60
	8	2	4177	2.81	117.4	40.38	34.05	6.33	1.18
Difference	---	---	3854	----	235.4	90.73	2.36	88.37	2.42
24 -------	7	6	11492	3.83	440.0	158.47	35.81	122.66	4.43
	1	2	4697	3.63	170.6	60.81	27.75	33.06	2.19
Difference	---	---	6795	----	269.4	97.66	8.05	89.60	2.24
G - ------	5	8	8143	4.37	355.5	127.83	41.43	86.40	3.09
	22	2	2981	4.02	119.7	42.09	34.49	7.60	1.22
Difference	---	---	5162	----	235.8	85.74	6.94	78.80	1.87
23 -------	3	5	7000	4.00	290.1	103.25	32.89	70.36	3.14
	9	4	3551	4.44	157.5	53.84	32.89	20.95	1.64
Difference	---	---	3449	----	132.6	49.41	-----	49.41	1.50
25 -------	6	5	8465	3.72	315.0	114.20	36.46	77.74	3.13
	1	3	6474	2.98	192.8	69.53	36.28	32.75	1.90
Difference	---	---	1991	----	122.2	44.67	.18	44.99	1.23
W -------	9	7	6915	4.19	289.6	102.24	33.85	68.39	2.85
	8	7	4667	3.29	153.7	53.77	29.35	24.42	1.83
Difference	---	---	2248	----	135.9	48.47	4.50	43.97	1.02
E - ------	5	9	7214	4.22	304.1	113.91	39.56	74.35	2.88
	15	2	4655	2.93	136.6	47.72	37.13	10.59	1.28
Difference	---	---	2559	----	167.5	66.19	2.43	63.76	1.60
R - ------	4	5	10873	3.21	349.0	126.85	35.35	91.50	3.59
	10	2	3643	2.97	108.2	38.67	35.35	3.32	1.09
Difference	---	---	7230	----	240.8	88.18	-----	88.18	2.50
22 -------	7	11	6927	4.52	313.0	115.00	35.47	79.53	3.24
	5	12	4261	3.66	155.9	53.57	33.04	20.53	1.62
Difference	---	---	2666	----	157.1	61.43	2.43	59.00	1.62

TABLE 5—HIGHEST AND LOWEST PROFIT FOR TWELVE MONTHS IN EACH HERD, 1912-13—Cont'd.

Herd Letter	Cow No.	Age of Cow, Years	Pounds Milk	Av. Test	Pounds Butter Fat	Value of Butter Fat, Dollars	Total Cost of Feed, Dollars	Profit, Dollars	Returns for $1 expended for Feed, Dollars
I - ------	1	6	7166	3.67	263.0	92.87	31.31	61.56	2.96
	8	3	3853	4.61	167.5	60.22	31.31	28.91	1.92
Difference	---	---	3313	----	95.5	32.65	-----	32.65	1.04
T - ------	13	---	5921	4.48	265.5	100.45	36.98	63.47	2.72
	11	---	2239	3.95	88.5	28.67	26.17	2.50	1.10
Difference	---	---	3682	----	177.0	71.78	10.81	60.97	1.62
Total high cows			203010	----	7595.4	2788.89	865.60	1923.29	----
Total low cows			97772	----	3422.1	1213.22	779.97	432.75	----
Av. high cows			9228	3.82	345.5	126.77	39.35	87.44	3.22
Av. low cows			4444	3.64	155.6	55.15	35.45	19.67	1.56
Difference			4784	----	189.9	71.62	3.90	67.77	1.66

year, and from 73.0 to 324.7 pounds the second year. Frequently the difference between the two is greater than the production of the low cow. In the value of butter fat the same condition is found.

When the cost of feed is considered not so much difference is noted. In many cases the poor cow was fed as much as the good one, and in a few instances she actually consumed more feed. Even where grain was fed the records show many herds in which the poor cow received as much as the cow netting the highest profit. This of course shows nothing but loose management which results in an enormous loss each year.

In herd N 1911-12 the highest cow received only $3.44 more feed than the poor cow, while she returned a profit of $95.14 as compared with a loss of $1.04 resulting from keeping the

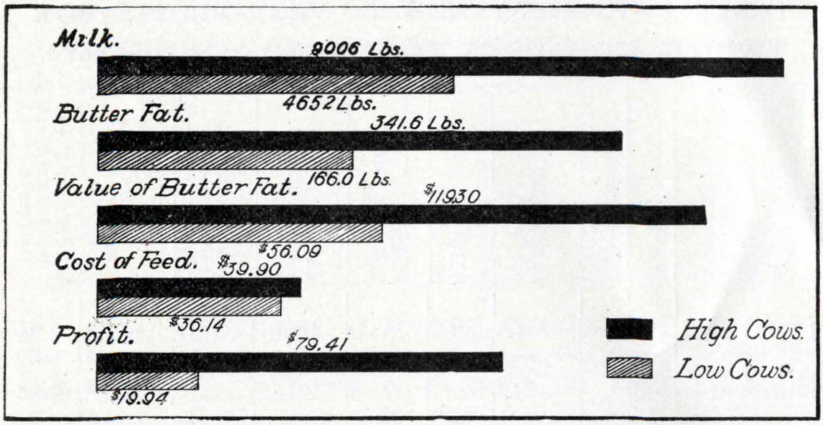

Figure 4. The average production of the most profitable cow in each of 48 herds compared with the average production of the least profitable cows in the same herds.

other cow. In herd J the second year (1912-13) it cost $8.99 more to feed the best cow than it did the poorest one. With the treatment given the two, cow 6 returned a profit above cost of feed of $102.15, while cow 7 lacked $9.50 of paying for her feed, making a difference between the cows for that year of $111.65. Something here again is radically wrong. Of course, it is understood that some years a good cow may be unprofitable due to some accident, but it is also well known that the conditions brought out in the two tables are true for a large majority of the herds of the state.

The difference between the averages of the high and the low cows in the 26 herds the first year and in the 22 herds the second year, shows the high cows to produce nearly double the amount of products and net returns given by the low cows.

Consider a herd composed of the 48 high cows and another of the 48 low producing cows whose records are tabulated in tables 4 and 5.

48 High vs. 48 Low Producing Cows.

	Lbs. Milk	Lbs. Fat	Value of Fat	Cost of Feed	Profit
High cows	431,396	16,374.2	$5,696.15	$1,917.37	$3,778.78
Low cows	224,107	8,006.6	2,695.67	1,737.22	957.95
Difference	207,289	8,367.6	$3,000.48	$ 180.15	$2,820.83

A study of these figures shows that it would take 98 of the low cows to produce as much butter fat as the 48 good cows produced. A man would have to milk 189 of the poorer cows to make as much profit over the feed consumed as the 48 good cows make. The question to ask is which cow is being milked on the average farm, one of the 189 or one of the 48?

A glance at figure 4 shows immediately the difference between one of the most profitable and one of the least profitable cows. This figure is made from the averages of the two classes of cows for the two years.

Range in Fat Production in Each Herd.

There is a great variation in the yield of butter fat from cows in the same herd. This is brought out in tables 6 and 7. The herds are arranged in the order of highest average butter fat yield as given in tables 1 and 2. Here again no records shorter than six months have been included.

The total number of cows are given in the second column. The other columns in the first half of the tables show the number of cows of each herd which fall in the groups as given. The second half of each table gives the percentage distribution of the cows of each herd within the various groups. For example, table 6 shows herd X to have been composed of 19 cows. Two of these gave over 400 pounds of fat, 5 between 350 and 400 pounds, 3 between 300 and 350 pounds, 5 between 250 and 300 pounds, 3 between 200 and 250 pounds, none between 150 and 200, and one giving between 100 and 150 pounds of butter fat. The second half of the table shows 10.5 per cent of the herd to fall in the 400-pound group, 26.3 per cent in the next lower

TABLE 6—PERCENTAGE DISTRIBUTION OF BUTTER FAT RECORDS IN EACH HERD, 1911-12.

Herd Letter	Total No. of Cows	No. of Cows Giving								Per Cent of Cows Giving							
		Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.	Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.
X	19	2	5	3	5	3	----	1	----	10.5	26.3	15.8	26.3	15.8	-----	5.3	----
K	22	3	3	3	1	3	5	2	2	13.6	13.6	13.6	4.6	13.6	22.7	9.1	9.1
V	14	2	----	3	4	3	1	1	----	14.3	-----	21.4	28.6	21.4	7.1	7.1	----
H	9	----	1	3	3	----	----	1	1	-----	11.1	33.3	33.3	-----	-----	11.1	11.1
J	17	----	1	3	7	3	2	1	----	-----	5.9	17.7	41.2	17.7	11.8	5.9	----
Y	30	1	3	5	6	10	2	3	----	3.3	10.0	16.7	20.0	33.3	6.7	10.0	----
M	11	----	----	2	6	----	----	2	1	-----	-----	18.2	54.5	-----	-----	18.2	9.1
Z	9	----	1	1	----	1	3	1	2	-----	11.1	11.1	33.3	11.1	-----	11.1	22.2
G	25	----	1	3	4	9	5	1	2	-----	4.0	12.0	16.0	36.0	20.0	4.0	8.0
D	18	----	2	2	5	5	2	1	1	-----	11.1	11.1	27.8	27.8	11.1	5.6	5.6
F	9	----	----	----	5	3	1	----	----	-----	-----	-----	55.6	33.3	11.1	-----	----
Q	15	----	----	1	6	8	----	----	----	-----	-----	6.7	40.0	53.3	-----	-----	----
N	49	----	2	5	11	14	12	5	----	-----	4.18	10.2	22.5	28.6	24.5	10.2	----
B	33	----	1	2	6	11	8	3	2	-----	3.0	6.1	18.2	33.3	24.2	9.1	6.1
E	13	----	----	2	3	4	3	1	----	-----	-----	15.4	23.1	30.8	23.1	7.7	----
C	13	----	----	1	3	2	5	1	1	-----	-----	7.7	23.1	15.4	38.5	7.7	7.7
I	17	----	1	----	3	7	2	3	1	-----	5.9	-----	17.7	41.2	11.8	17.7	5.9

TABLE 6—PERCENTAGE DISTRIBUTION OF BUTTER FAT RECORDS IN EACH HERD, 1911-12—Cont'd.

Herd Letter	Total No. of Cows	No. of Cows Giving								Per Cent of Cows Giving							
		Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.	Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.
P - --	19	----	----	2	4	6	5	2	----	-----	-----	10.5	21.1	31.6	26.3	10.5	----
R - --	42	----	----	4	7	21	8	----	2	-----	-----	9.5	16.7	50.0	19.1	-----	4.8
A - --	9	----	----	----	3	4	1	1	----	-----	-----	-----	33.3	44.5	11.1	11.1	----
U - --	14	----	----	1	2	4	3	4	----	-----	-----	7.1	14.3	28.6	21.4	28.6	----
W - --	14	----	----	----	4	5	2	2	1	-----	-----	-----	28.6	35.7	14.3	14.3	7.1
L - --	21	----	----	----	5	5	5	5	1	-----	-----	-----	23.8	23.8	23.8	23.8	4.8
S - --	47	----	----	----	5	15	18	9	----	-----	-----	-----	10.6	31.9	38.3	19.2	----
O - --	23	----	----	----	1	7	5	8	2	-----	-----	-----	4.4	30.4	21.7	34.8	8.7
T - --	17	----	----	----	1	6	7	1	2	-----	-----	-----	5.9	35.3	41.2	5.9	11.8
Total_	529	8	21	46	110	159	105	59	21	1.5	4.0	8.7	20.8	30.1	19.9	11.2	4.0

TABLE 7—PERCENTAGE DISTRIBUTION OF BUTTER FAT RECORDS IN EACH HERD, 1912-13.

Herd Letter or No.	Total No. of Cows	No. of Cows Giving								Per Cent of Cows Giving							
		Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.	Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.
20	8	----	1	4	1	2	----	----	----	-----	12.5	50.0	12.5	25.0	-----	-----	----
X	23	1	2	4	3	6	3	3	1	4.4	8.7	17.4	13.0	26.1	13.0	13.0	4.4
Y	32	2	2	5	3	5	8	6	1	6.3	6.3	15.6	9.4	15.6	25.0	18.8	3.1
Q	11	----	----	2	8	1	----	----	----	-----	-----	18.2	72.7	9.1	-----	-----	----
K	19	1	2	1	3	4	6	1	1	5.3	10.5	5.3	15.8	21.1	31.6	5.3	5.3
J	10	----	2	2	2	3	----	----	1	-----	20.0	20.0	20.0	30.0	-----	-----	10.0
F	9	----	----	2	5	1	----	1	----	-----	-----	22.2	55.6	11.1	-----	11.1	----
N	36	----	1	3	9	11	9	----	3	-----	2.8	8.3	25.0	30.6	25.0	-----	8.3
O	15	----	----	5	3	4	3	----	----	-----	-----	33.3	20.0	26.7	20.0	-----	----
U	14	----	----	3	5	1	4	----	1	-----	-----	21.4	35.7	7.1	28.6	-----	7.1
D	20	----	----	1	5	10	2	2	----	-----	-----	5.0	25.0	50.0	10.0	10.0	----
21	10	----	1	----	5	1	2	1	----	-----	10.0	-----	50.0	10.0	20.0	10.0	----
24	11	1	----	----	----	8	2	----	----	9.1	-----	-----	-----	72.7	18.2	-----	----
G	28	----	2	5	3	3	6	8	1	-----	7.1	17.9	10.7	10.7	21.4	28.6	3.6
V	8	----	----	----	----	----	3	2	3	-----	-----	-----	-----	-----	37.5	25.0	37.5
23	10	----	----	----	4	3	3	----	----	-----	-----	-----	40.0	30.0	30.0	-----	----

TABLE 7—PERCENTAGE DISTRIBUTION OF BUTTER FAT RECORDS IN EACH HERD, 1912-13—Cont'd.

Herd Letter or No.	Total No. of Cows	No. of Cows Giving								Per Cent of Cows Giving							
		Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.	Over 400 lbs.	350 to 400 lbs.	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.
25 - --	13	----	----	1	5	2	4	1	----	-----	-----	7.7	38.5	15.4	30.8	7.7	----
B - --	28	----	----	----	1	----	12	11	4	-----	-----	-----	3.6	-----	42.9	39.3	14.3
W - --	14	----	----	----	4	6	4	----	----	-----	-----	-----	28.6	42.9	28.6	-----	----
E - --	15	----	----	3	1	5	5	1	----	-----	-----	20.0	6.7	33.3	33.3	6.7	----
P - --	19	----	----	----	----	1	5	7	6	-----	-----	-----	-----	5.3	26.3	36.9	31.6
R - --	18	----	----	2	1	5	5	5	----	-----	-----	11.1	5.6	27.8	27.8	27.8	----
22 - --	15	----	----	1	2	6	5	1	----	-----	-----	6.7	13.3	40.0	33.3	6.7	----
I - - -	13	----	----	----	2	5	2	2	2	-----	-----	-----	15.4	38.5	15.4	15.4	15.4
T - --	14	----	----	----	1	4	7	1	1	-----	-----	-----	7.1	28.6	50.0	7.1	7.1
Total	413	5	13	44	76	97	100	53	25	1.2	3.2	10.7	18.4	23.5	24.2	12.8	6.1

group, 15.8 per cent in the third group, 26.3 per cent in the fourth, 15.8 per cent in the next and 5.3 per cent in the 100- to 150-pound group.

In a general way it is seen by the grouping of the figures that the herds toward the top of the table contain more high producing cows than the herds at the bottom. This is of course due to the order in which the herds are arranged.

One of the chief points to be noted in these tables is the wide variation in production of the different cows within the same herd. Some herds have representatives in all of the eight groups. This is true of herds X, Y, K both years, with one or two exceptions. Several of the other herds are represented in all but the highest group. This means a production per cow varying from under 100 pounds of fat to over 400 pounds, in the first herds mentioned, and from under 100 up to 400 pounds in the others. Such a wide variation is the rule in herds where regular testing has not been practiced. As the years of testing a herd increase a minimum standard of production is set by the owner and all cows not measuring up to this are "sent to the shambles," or sold to a less suspecting neighbor.

Another rather deplorable condition is shown in so many of the herds not having a single cow which produced over 300 pounds of fat. The owners of herds V and B sold their entire herds after they had finished six months for herd V and seven months for herd B of the second year. This accounts in part at least for their low records that year.

The totals shown by these two tables have been discussed in an earlier section.

Range in Net Returns in Each Herd.

Tables 8 and 9 have the same general arrangement as the two preceding tables, except that the cows have been grouped, not according to butter fat production, but according to the net returns they made during the year.

The same general points mentioned in connection with tables 6 and 7 are to be noted here. The profit realized from the various cows in each herd is seen to vary about as widely as

TABLE 8—PERCENTAGE DISTRIBUTION OF NET RETURNS IN EACH HERD, 1911-12.

Herd Letter	Total No. of Cows	No. of Cows Returning						Per Cent of Cows Returning					
		Over $100	$75 to $100	$50 to $75	$25 to $50	0 to $25	Loss	Over $100	$75 to $100	$50 to $75	$25 to $50	0 to $25	Loss
X	19	1	6	8	4	---	---	5.26	31.58	42.11	21.05	----	---
K	22	---	3	8	7	4	---	----	13.64	36.37	31.82	18.18	---
V	14	---	2	5	5	2	---	----	14.29	35.71	35.71	14.29	---
H	9	---	1	5	1	2	---	----	11.11	55.56	11.11	22.22	---
J	17	---	---	7	8	2	---	----	----	41.18	47.06	11.76	---
Y	30	---	3	10	13	4	---	----	10.00	33.33	43.34	13.33	---
M	11	---	---	5	3	2	1	----	----	45.46	27.27	18.18	9.09
Z	9	---	---	2	4	3	---	----	----	22.22	44.45	33.33	---
G	25	---	3	5	14	3	---	----	12.00	20.00	56.00	12.00	---
D	18	---	2	5	7	4	---	----	11.11	27.78	38.89	22.22	---
F	9	---	---	---	9	---	---	----	----	----	100.00	----	---
Q	15	---	---	6	9	---	---	----	----	40.00	60.00	----	---
N	49	---	2	13	20	13	1	----	4.08	26.53	40.82	26.53	2.04
B	33	---	1	8	15	8	1	----	3.03	24.24	45.46	24.24	3.03
E	13	---	---	5	7	1	---	----	----	38.46	53.85	7.69	---
C	13	---	---	3	8	2	---	----	----	23.08	61.54	15.38	---
I	17	---	1	2	10	4	---	----	5.88	11.77	58.82	23.53	---
P	19	---	---	6	10	3	---	----	----	31.58	52.62	15.79	---
R	42	---	---	8	27	6	1	----	----	19.05	64.29	14.29	2.37
A	9	---	---	2	6	1	---	----	----	22.22	66.67	11.11	---
U	14	---	---	2	7	5	---	----	----	14.28	50.00	35.72	---
W	14	---	---	3	7	3	1	----	----	21.43	50.00	21.43	7.14
L	21	---	---	4	7	9	1	----	----	19.05	33.33	42.86	4.76
S	47	---	---	3	29	15	---	----	----	6.38	61.70	31.92	---
O	23	---	---	---	12	9	2	----	----	----	52.18	39.13	8.70
T	17	---	---	---	12	4	1	----	----	----	70.59	23.53	5.88
Total	529	1	24	125	261	109	9	.19	4.54	23.63	49.34	20.61	1.70

TABLE 9—PERCENTAGE DISTRIBUTION OF NET RETURNS IN EACH HERD, 1912-13.

Herd Letter or No.	Total No. of Cows	No. of Cows Returning						Per Cent of Cows Returning					
		Over $100	$75 to $100	$50 to $75	$25 to $50	0 to $25	Loss	Over $100	$75 to $100	$50 to $75	$25 to $50	0 to $25	Loss
20	8		2	4	2				25.00	50.00	25.00		
X	23	1	4	7	7	3	1	4.35	17.39	30.44	30.44	13.04	4.35
Y	32	2	5	7	13	5		6.25	15.62	21.88	40.63	15.62	
Q	11		2	8	1				18.18	72.73	9.09		
K	19	1	3	4	8	3		5.26	15.79	21.05	42.11	15.79	
J	10	1	3	2	3		1	10.00	30.00	20.00	30.00		10.00
F	9			7	2					77.78	22.22		
N	36		2	9	17	5	3		5.56	25.00	47.23	13.89	8.33
O	15		5	5	5				33.33	33.33	33.33		
U	14		3	5	5		1		21.43	35.71	35.71		7.14
D	20		1	7	12				5.00	35.00	60.00		
21	10		3	4	2	1			30.00	40.00	20.00	10.00	
24	11	1		3	7			9.08	27.27	63.64			
G	28		5	5	11	7			17.86	17.86	39.29	25.00	
V	8				4	2	2				50.00	25.00	25.00
23	10			6	3	1				60.00	30.00	10.00	
25	13		1	5	7				7.69	38.46	53.82		
B	28			1	19	8				3.57	67.86	28.57	
W	14			7	6	1				50.00	42.86	7.14	
E	15			5	7	3				33.33	46.67	20.00	
P	19			1	10	8				5.26	52.63	42.11	
R	18		2	1	11	4			11.11	5.56	61.11	22.22	
22	15		1	3	7	4			6.66	20.00	46.67	26.67	
I	13			4	5	4				30.77	38.46	30.77	
T	14			3	7	4				21.43	50.00	28.57	
Total	413	6	42	113	181	63	8	1.45	10.17	27.36	43.83	15.25	1.94

TABLE 10—IMPROVEMENT IN THREE HERDS.

HERD	Place	Av. lbs. Fat	Av. Cost of Feed	Av. Profit	Returns for $1 Expended for Feed
Q 1911--12	12th	252.4	$36.39	$46.79	$ 2.29
1912-13	4th	281.4	37.17	65.80	2.77
Difference		29.0		19.01	.48
Per Cent Improvement		11.5		40.60	21.0
U 1911-12	21st	227.5	$38.43	$37.40	$ 1.97
1912-13	10th	253.6	37.23	54.86	2.47
Difference		26.1		17.46	.50
Per Cent Improvement		11.5		46.70	25.4
O 1911-12	25th	197.7	$36.19	$28.51	$ 1.79
1912-13	9th	262.9	34.51	61.37	2.78
Difference		65.2		32.86	.99
Per Cent Improvement		33.0		115.3	55.3

did the butter fat. A large majority of the cows in each herd made a profit between $25 and $75.

Nine cows from eight herds the first year and eight cows representing five herds the second year (only one being the same) were kept at a loss. Of these first year's cows, owners of seven remained in the association the second year. In looking up these herds it was found that three of the seven were sold, three were not re-entered the second year, and only one continued. This last cow returned a profit the second year of $36.00.

Three Herds Showing Great Improvement.

Some of the herds, as Q, U, and O, made rather wonderful improvement the second year. A few figures selected from the preceding tables make this clear.

The figures in table 10 shows an average increase in butter fat production per cow for entire herds of from 26.1 pounds

in herd U to 65.2 pounds in herd O. Expressed another way, two herds increased their average fat per cow 11.5 per cent, and herd O 33.0 per cent over the first year's production. The increase in profit varied from $17.46 to $32.86, or from 40.6 per cent to 115.3 per cent over the first year. The increase in profit in this last herd was actually greater than the total profit was the first year. Considered from the standpoint of the feed being an investment, herd Q returned 48 cents more on every dollar invested, herd U 50 cents more, and herd O 99 cents more for every dollar expended for feed. The percentage increase in this item varies from 21 per cent in herd Q to 55.3 per cent in herd O.

If the average production of the 85,000 milk cows in the state could be increased as much as that of herd O it would move the average annual fat production per cow from 140 pounds to 186 pounds. At 32 cents per pound this would mean an increase of $1,251,200 every year over and above the present revenues of the state.

One year of such prosperity would pay the present salaries of all our state officers for 33 years. One-seventh of the amount would pay the present entire expense of our State Judicial Department for a year. In one year it would pay the combined state appropriations to the University of Utah, the Utah Agricultural College, for the next four or five years on the basis of the money allowed these institutions by our last legislature.

These figures, although almost unbelievable, are far from idle dreams. With the employment of more efficient methods as suggested elsewhere, it would be but a very few years before such improvement would be realized.

What any one section of the state has done in dairy production is possible with the whole state. The more than 500 cows in the Richmond-Lewiston Association averaged slightly over 250 pounds of butter fat per year. With this in mind such calculations as the above seem far from unattainable. The difference between the state average and that of the association is 110 pounds. With this figure calculations similar to the ones

TABLE 11—DISTRIBUTION OF AVERAGE NET PROFIT AND BUTTER FAT RECORDS IN THREE HERDS.

HERD	Per Cent of Cows Netting					Per Cent of Cows Giving					
	$75 to $100	$50 to $75	$25 to $50	0 to $25	Loss	300 to 350 lbs.	250 to 300 lbs.	200 to 250 lbs.	150 to 200 lbs.	100 to 150 lbs.	Under 100 lbs.
Q 1911-12	----	40.00	60.00	----	----	6.67	40.00	53.32	----	----	----
1912-13	18.18	72.73	9.09	----	----	18.18	72.73	9.09	----	----	----
U 1911-12	----	14.28	50.00	35.72	----	7.14	14.29	28.57	21.43	28.57	----
1912-13	21.43	35.71	35.71	----	7.14	21.43	35.71	7.14	28.57	----	7.14
O 1911-12	----	----	52.18	39.13	8.70	----	4.35	30.44	21.74	34.78	8.69
1912-13	33.33	33.33	33.33	----	----	33.33	20.00	26.67	20.00	----	----

above give the astonishing and almost inconceivable figure of approximately $3,000,000 as the annual increase in value of butter fat over that produced at present.

Table 11 is practically self-explanatory. The improvement the second year is seen by the percentages showing an increase in the columns of higher value in the two parts of the table. For example, herd O the first year had no cows showing a profit as high as $50, while the second year one-third of the entire herd returned a profit between $75 and $100 and another third between $50 and $75. In other words, two-thirds the entire herd returned a profit the second year greater than that made by any cow in the herd the first year. Other increases in profit can be seen from the first part of the table.

In the amount of butter fat produced herd Q shows 18.18 per cent of the cows in the herd producing between 300 and 350 pounds the second year against 6.67 per cent the first; herd U 21.43 per cent against 7.14 per cent in the same group, and herd O shows 33.33 per cent the second year where there were none that high the previous year.

It is not argued that the work of the association was the only factor operating in the improvement made. It does seem

TABLE 12—DISTRIBUTION OF THE DRY PERIODS IN THE TWO YEARS.

YEAR	No. of Cows Dry							Per Cent of Cows Dry						
	Less than 1 Mo.	1 Mo.	2 Mos.	3 Mos.	4 Mos.	5 Mos	6 Mos and over	Less than 1 Mo.	1 Mo.	2 Mos.	3 Mos.	4 Mos.	5 Mos	6 Mos. and over
1911-12	4	66	133	72	20	10	7	1.3	21.2	42.6	23.1	6.4	3.2	2.2
1912-13	14	46	69	30	19	2	4	7.6	25.0	37.2	16.4	10.4	1.1	2.2

fair to consider, however, that the testing brought the necessity for improvement before the owners and opened up the lines along which improvement was most urgent.

LESSONS TO BE LEARNED FROM THE TWO YEARS' WORK.

A Study of the Dry Periods.

In order to determine the prevailing custom in the association regarding the length of time the cows were allowed to run dry, all cows showing a dry period during the two years were classified according to the length of that period. The results of this tabulation are shown in table 12. From these figures we learn that a dry period of one, two or three months is the most popular in that section, a dry period of two months showing the highest single percentage each year. The first year 42.6 per cent of the cows, having a dry period during the twelve months, were dry two months, and 37.2 per cent were dry the same length of time the second year. Some slight variations are noted the second year, but probably they are more accidental than due to any effect of the association.

Value of Long Lactation Period.

One point very vital to the value of a cow, and yet one that is frequently overlooked, is the number of months she will milk during the year. A large pail of milk for a short time,

just after a cow freshens, often misleads the farmer into thinking such a cow is a valuable one. She may or may not be, depending upon the length of time she continues to produce heavily.

Table 13 has been compiled to show this point. The cows have been arranged according to the length of time during the year that they were dry. The average yearly production of butter fat is given for each group and also the amount of fat produced during the first month. The table covers another point as well which will be mentioned a little later.

For the present let us consider the columns headed total in the three divisions. The first column gives the length of the dry periods, the second, seventh, and tenth columns (headed total) give the total number of cows, the yearly butter fat production, and the butter fat produced the first month of milking respectively. Beginning with the dry period of two months it will be seen that the total yearly butter fat gradually decreases from 272.7 pounds to 121.7 pounds when the cows were dry six months or over during the year. This is fairly reasonable because the cows lower down in the table were milking a shorter time, and on this account would probably not be expected to produce as high.

The question is, is the first month's production any standard by which to measure the production for a year? The third column from the last in the table answers this question in a fairly conclusive manner. The highest first month's yield happens to coincide with the highest yearly production, but what of the others? The next highest amount of fat for the first month, and a very close second it is too, comes with a dry period of five months where the annual yield is only 190.9 pounds. The variation throughout this column for the first month shows no regularity. Nor does there seem to be any correlation between the yearly and the first month butter fat production.

An examination of the two corresponding columns for the dairy cows and the scrub cows shows practically the same thing. The high first month comes with the five-month dry period with the dairy cows listed in the table.

TABLE 13—VALUE OF A LONG LACTATION PERIOD.

Dry Period	Number			Distribution of Breeds		Av. Yearly Butter Fat			Av. First Month Butter Fat		
	Total	Dairy	Scrub	Per Cent Dairy	Per Cent Scrub	Total lbs.	Dairy lbs.	Scrub lbs.	Total lbs.	Dairy lbs.	Scrub lbs.
Less than 21 days	18	17	1	94.5	5.5	257.3	260.4	206.1	30.1	30.8	17.3
1 month	112	79	33	70.5	29.5	271.1	275.4	260.7	34.4	35.4	32.1
2 months	202	139	63	68.8	31.2	272.7	281.5	253.3	39.1	40.8	35.3
3 months	102	67	35	65.7	34.3	231.6	242.3	211.0	35.8	38.0	31.6
4 months	39	17	22	43.6	56.4	207.1	205.0	208.7	35.2	39.7	31.7
5 months	12	8	4	66.7	33.3	190.9	196.3	177.3	38.0	41.1	31.8
6 months or over	11	5	6	45.5	54.5	121.7	112.4	129.1	*30.5	**38.7	27.7
Total	496	332	164	66.9	33.1						

*Average of 8 cows.
**Average of 2 cows.

It seems then that the amount of butter fat produced the first month in milk is no index of what a cow will produce in a year. The only way to learn the high from the low producing cows is to keep records of the amount of milk and butter fat produced during the year. Even keeping account of the number of months a cow usually runs dry is not sufficient. The eye cannot judge small differences in yield between cows milking the same length of time. A small difference in favor of the same cow all the time might mean the dividing line between a profitable and an unprofitable cow.

Dairy-Bred vs. Scrub Cows.

By dairy-bred cows is meant pure-bred or grade cows of the dairy breeds—in this case either Holstein or Jersey. The scrub cows include all others. These were almost entirely grade Shorthorns.

Not only does table 13 show a long lactation period to be an advantage with both dairy and scrub cows, but it also shows the dairy-bred cows to lead the scrubs in practically every group both in yearly production and in the amount of fat given the first month of lactation.

What is perhaps more interesting in the comparison of the two classes of cows is the proportion of the two which were dry for the periods indicated as shown in the fifth and sixth columns. The totals show any variation above or below 66.9 per cent for the dairy or 33.1 per cent for the scrub cows to be significant. Of the 18 cows dry less than 21 days 94.5 per cent were dairy-bred. As the dry period lengthens the percentage of dairy-bred cows decreases and the number of scrubs increase. This shows a decided tendency on the part of the scrub cows to remain dry a longer time than is profitable.

The other point referred to above in connection with table 13 is the lower yield of butter fat both for the year and for the first month, where the cows were dry less than 21 days or for only one month. This fact will receive closer attention in the following section.

The Effect of the Length of Dry Period on the Succeeding Lactation Period.

Data in the preceding table show rather clearly that a long dry period cuts down the annual yield of butter fat. The question naturally arises as to the advisability of shortening the dry period as much as possible or even eliminating it altogether where this can be done.

The records collected for two years on the same cows make a study of this question possible. All the cows showing in the two years a complete dry period followed by a complete lactation period were tabulated. Table 14 shows the number of cows with lactation periods of different length following the various dry periods, together with the fat and profit returned for the complete lactation period. For example, it is seen that three cows milked seven months following a dry period of one month, three others milked the same length of time but were

TABLE 14—EFFECT OF LENGTH OF DRY PERIOD ON THE FOLLOWING LACTATION PERIOD.

Dry Periods	1 Month			2 Months			3 Months			4 Months			5 Months			6 Months		
		Average			Average			Average			Average			Average			Average	
Months in Milk	No. of Cows	Fat, lbs.	Profit, Dollars	No. of Cows	Fat, lbs.	Profit, Dollars	No. of Cows	Fat, lbs.	Profit, Dollars	No. of Cows	Fat, lbs.	Profit, Dollars	No. of Cows	Fat, lbs.	Profit, Dollars	No. of Cows	Fat, lbs.	Profit, Dollars
6	2	141.5	27.31	-----	----	-----	---	----	----	---	----	----	---	----	----	---	----	----
7	3	147.5	28.41	3	211.4	40.08	2	180.0	29.00	1	211.1	34.40	1	162.1	21.07	1	154.4	13.51
8	2	206.7	42.85	13	258.5	49.12	4	227.8	45.04	2	199.8	31.12	2	216.6	33.20	---	----	----
9	14	235.5	47.07	20	262.9	53.41	6	264.2	50.09	3	242.4	39.57	1	197.3	26.10	---	----	----
10	10	261.8	53.14	13	297.3	59.18	8	282.6	53.28	2*	298.0	54.99	---	----	----	---	----	----
11	6	342.5	74.33	10	314.8	64.99	3	315.1	62.84	---	----	----	---	----	----	---	----	----
12	3*	317.6	70.88	4*	274.0	53.78	3*	272.1	50.93	---	----	----	1	327.5	52.35	---	----	----
13	---	----	-----	3**	322.5	60.54	---	----	----	---	----	----	1	462.4	92.14	---	----	----
14	2*	281.9	54.37	-----	----	-----	---	----	----	---	----	----	---	----	----	---	----	----
15	1*	392.0	90.09	4***	381.6	74.84	---	----	----	---	----	----	---	----	----	---	----	----
18-21	---	----	-----	3①	568.8	107.83	---	----	----	---	----	----	---	----	----	---	----	----
	43	----	-----	73	----	-----	26	----	----	8	----	----	6	----	----	1	----	----

*One cow still milking.
**Two cows still milking.
***Three cows still milking.
① 59 months in milk.

dry two months previous, that two cows were dry three months and then milked the next seven months, one was dry four months, another five months, and another six months, all milking seven months thereafter. The vertical columns show the number of cows milking from one to twenty-one months after having been dry from one to six months.

The lesson of the table comes in the horizontal lines. For almost every length of milking period where the average stands for a number of cows, the amount of butter fat produced and the profit realized are greater where the cows were dry two months than when a dry period of only one month preceded the lactation period. Especially is this true for the lactation periods of more common length (7 to 10 months). A dry period longer than two months does not seem to be in any way beneficial to the following lactation period. In other words, it seems that a cow for highest production needs a longer rest than one month, and that a rest of more than two months adds nothing to her power of producing milk and butter fat.

This taken in connection with the deduction of the preceding table, that a long dry period reduces the fat and profit realized, seems to justify the statement that the normal dry period should be about two months long. It takes about this time to give the average cow sufficient rest for highest production, and a longer dry period reduces unnecessarily the length of her productive period.

The data in table 14 have been condensed so that all cows dry for one month are considered together, those dry for two months in another group, and so on for each dry period. These weighted averages have all been calculated to a comparable basis, and the figures for fat and profit representing a lactation period of ten months following the dry periods of different lengths, are given in table 15. For example, all the cows milking after a dry period of one month gave an average per month of 26.23 pounds of fat and $5.413 profit. These figures multiplied by 10 give the fat and profit for ten months as shown in the table.

These figures point to the same conclusion arrived at by a study of table 14; namely, that cows dry two months produce

TABLE 15—THE EFFECT OF THE LENGTH OF DRY PERIOD UPON THE SUCCEEDING LACTATION PERIOD CALCULATED TO TEN MONTHS.

Length of Preceding Dry Period	No. of Cows	Total Months Milking	Calculated for a Lactation Period of 10 months		Pounds Fat for Each $1 Profit
			Lbs. Fat	Profit	
1 month	43	420	262.3	$54.13	4.846
2 months	73	751	287.1	56.80	5.055
3 months	26	249	276.3	52.46	5.267
4 months	8	70	276.3	46.48	5.944
5 months	6	57	277.7	45.27	6.134
6 months	1	7	220.6	19.30	11.43

more fat and return more profit than cows that are allowed to rest only one month, and that a dry period longer than two months seems a waste of time.

Best Length of Lactation Period.

There is some difference of opinion among dairymen as to the length of time each year a cow should be milked. Some maintain that to breed a cow to freshen every ten months is more profitable, because cows usually milk heavier when they are fresh, and in an eight-month lactation period a cow is milking fresh a larger proportion of the time. On the other hand, it is claimed that with a short lactation period a larger proportion of the time is spent, dry, and there is no need to force a cow to dry off against her natural tendencies. Of course it is clear that a greater number of calves are born if the lactation period is short, provided the dry period is of the same length in each case.

In order to see if there is any advantage on either side, the fat and profit for all the lactation periods of different length following a normal dry period have been tabulated. The fat is

TABLE 16—BEST LENGTH OF LACTATION PERIOD.

Lactation Period, Months	No. of Cows	Total Months Dry	Total Months Milking	Av. Per Cow for Total Period		Av. Per Cow for 12 Months		Relative No. of Calves
				Lbs. Fat	Profit	Lbs. Fat	Profit	
7	8	15	56	179.6	32.93	242.8	44.53	208
8	19	40	152	246.5	47.60	292.8	56.52	183
9	43	77	387	248.8	49.65	276.6	55.22	171
10	29	56	290	278.2	53.84	279.8	54.15	155
11	20	37	220	325.4	67.73	303.9	63.25	144
12	9*	19	108	279.6	55.06	237.7	46.82	131
13-14	5**	8	68	302.2	57.39	238.6	45.31	121
15-21	9***	17	149	435.7	83.84	283.4	54.54	100

*Two cows still milking.
**Three cows still milking.
***Six cows still milking.

that produced during the entire milking period. The figures for the profit are for both the dry and the lactation period. That is, the cost of feed during the preceding dry period and also during the milking period has been taken from the value of butter fat produced during that lactation period.

These calculations are shown in columns 5 and 6 of table 16. As would be expected there is an increase in the amount of fat produced, the longer the cows milk up to and including the eleven-month period. Some irregularities are shown by the three longer periods.

In columns 7 and 8 of the table are given the amount of fat produced and the profit realized by the cows producing at the same rate for a twelve-month period. That is, the average production per month, including the dry and the milking periods, has been calculated. This average multiplied by 12 gives the respective values in the two columns mentioned. The calculations are such that the cows of each group could be expected to go on producing at the same rate year after year. In other words, the same proportion of a normal dry period and of the

various complete lactation periods has been included in each twelve-month period.

The variations shown in these columns seem to be too irregular to suggest any correlation between length of milking period and the fat and profit produced per year. So far, then, as the amount of butter fat yielded in any given time is concerned, these figures indicate that it makes no difference whether a cow is dry a normal period (two months) and then is bred to freshen again in 9, 10, 11, or any number of months, allowing for another dry period of two months before calving.

There is an advantage, however, in the number of calves produced. The last column of the table shows the relative number of calves that would be born under the various systems of management. Theoretically it is possible to breed a cow to freshen about every nine months. In practice, however, it would probably not work out. It is, however, entirely possible to have a cow freshen every ten months. In this case the figures show that a herd of such cows would produce 183 calves, while the same number of cows in the last group, freshening about every 18½ months, would produce 100 calves. To a man with pure bred stock this would be an item of added profit well worth considering.

Table 16 does not point strongly to any certain length of milking period being best. This, taken together with the point made in the following section, would indicate that for a cow to freshen every twelve months, allowing six weeks to two months of this for dry period, is about as good practice as any.

Probably the worst difficulty arising in this connection is that the average farmer or dairyman does not keep breeding records. Without these of course it is practically impossible to control the length of either the lactation or the dry period. Without question there is a considerable loss due to irregularities in breeding cows and in drying them off. This could be overcome if proper breeding records were kept.

Spring vs. Fall Freshening.

From considerations rather more theoretical than otherwise it has seemed that a cow freshening in the fall should produce

TABLE 17—SPRING VS. FALL FRESHENING.

	No. of Cows	Av. No. of Months Dry	Av. for Next 12 Months			Returns for $1 Expended for Feed
			Lbs. Fat	Cost of Feed	Profit	
Spring	51	1.42	280.5	$38.41	$58.49	$2.52
Fall	35	1.21	325.6	43.74	67.92	2.55

somewhat more milk and butter fat than if she freshened in the spring. The reasoning which led to this belief is somewhat as follows:

A cow freshening in the fall goes on to the dry feed of the usual winter ration, stimulated to high milk production by recent calving. By spring, lactation has advanced until the organs of milk secretion are not so active. In this condition the cow is turned to fresh grass on pasture. This change stimulates the milk flow and increases the production for some time at least.

On the other hand, a cow calving in the spring is on green feed when it cannot act as a stimulating factor, as she is already stimulated to the limit of her production by the instincts of motherhood. She milks along and by fall has dropped off considerably in her milk. The change now to dry feed and cold winter causes a further shrink in milk yield which she never recovers.

In order to test the truth of this reasoning the production of all cows in the association for the next twelve months following the date of calving in March, April, or May was tabulated as spring freshening. Calving in September, October or November was counted fall freshening, and the production for the next twelve months was considered as in the other case. The period of twelve months taken often included one or more dry months. These were averaged and are found in table 17 together with the other data.

From this table it will be seen that 51 cows freshened in the spring and 35 in the fall. They were dry on the average about the same length of time. The difference found in the amount of fat and profit is rather surprising. Cows freshening

in the fall gave 45.1 pounds more fat and $9.43 more profit over cost of feed per head than the ones coming fresh in the spring. It cost $5.33 more to feed the cows which calved in the fall than it did the other group, but this was more than made back in the profit obtained. The returns for the money invested in feed are 3 per cent in favor of the fall group.

Highest Producers Most Profitable.

Probably one of the most instructive features of the entire report is that dealing with the profit realized from cows of different productive capacity. All the cows in the association each year completing records six months or longer were tabulated in the order of decreasing butter fat production. The first year there were 523 such cows and 419 the second year. The amount and the value of butter fat produced, and the cost of feed were averaged for groups of ten cows, beginning with those of highest production. This gave the first year 52 groups of ten cows each, and one of three cows. The second year there were 41 full groups and one group of nine cows.

These averages have been put in graphic form in figures 5 and 6 respectively. The lower curve represents the cost of feed, and the upper curve the value of the butter fat produced. All in between these would of course be profit and is shown in the figures by the shaded portions. The average pounds of butter fat for each group are placed along the upper curve.

The cost of feed of the various groups does not differ widely. This is shown by the comparative levelness of the lower curves. The upper curves are decidedly more steep, thereby leaving a greater distance between them, showing higher net returns, at the end of the high producing groups. The curves gradually approach each other until they cross each year between the two lowest groups. This means, of course, that the cost of feed was greater for the low group both years than the value of butter fat, giving a slight loss each time.

This only emphasizes the fact so often stated that a poor cow will eat practically as much feed as a good one, but fails to give as good account of it. The folly of keeping low producing cows should be so apparent that such cows would be shunned as thieves and robbers.

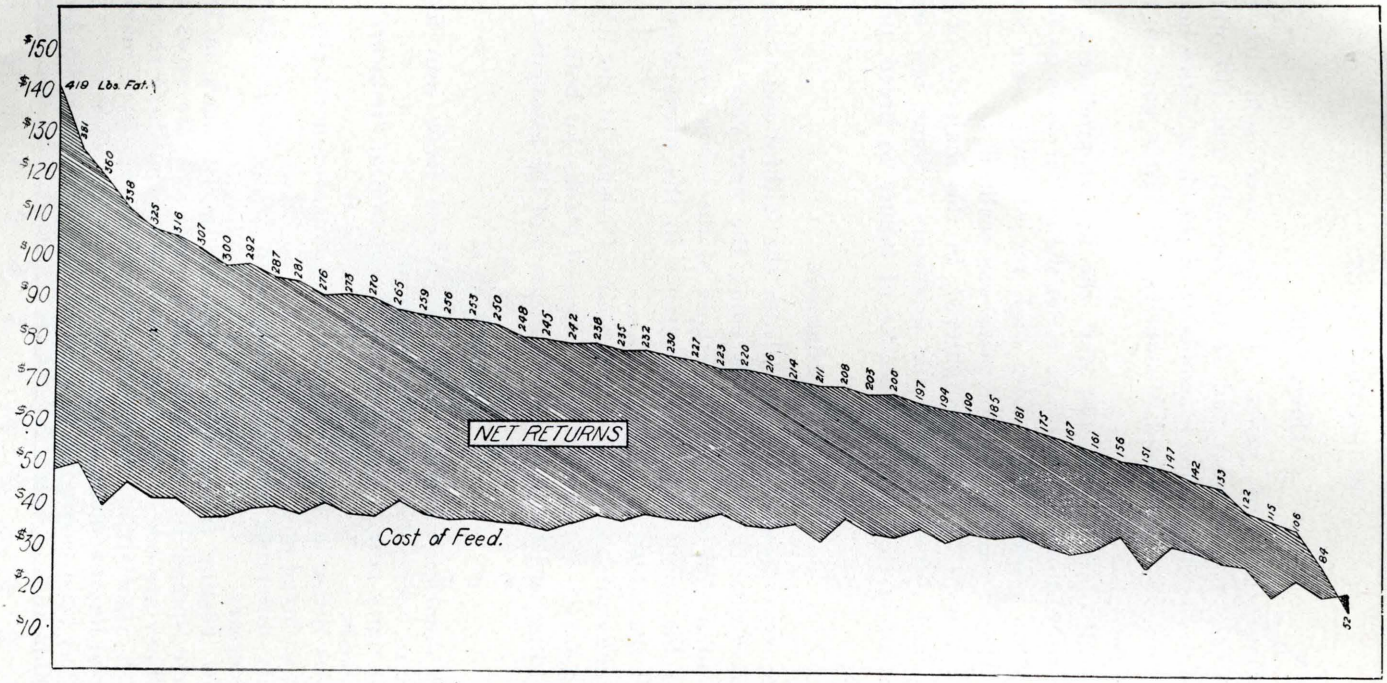

FIGURE 5. AVERAGE VALUE OF BUTTER FAT, COST OF FEED, AND NET RETURNS, 1911-12. Arranged for groups of 10 cows each in decreasing order of butter fat production. The last group is an average of only 3 cows. Note the fairly regular decrease in net returns with decreasing butter fat production.

Cows Sold.

During the two years 51 cows were sold to the butcher (27 the first year and 24 the second), and 119 others changed ownership. This is exclusive of the three entire herds that were sold—B, P, and V—during the latter part of the second year.

Not all of the cows sold were the lowest producers, but the tendency would naturally be to let the poorer cows go first. There were a few cases where high record cows were sold. Under these conditions a good price was realized.

The cows that were slaughtered, in the majority of instances, had proved unprofitable producers. Some few were disposed of in this manner because of failure to breed, or of old age.

Acknowledgment.

The writer wishes to acknowledge the faithful and efficient work of Frederick Froerer in keeping the first year records, and of John Wilson in keeping those of the second year, and also for his suggestions and assistance in the preparation of some of the tables.

Thanks are extended to the Dairy Division of the U. S. Department of Agriculture for the record blanks for both years work and for assistance in the organization of the association.

Summary.

All domestic animals transform coarse feeds into food, clothing or energy for the use of mankind.

The dairy cow is one of the most economical "reducers" of coarse feeds.

Cows differ in their capacity to produce economically according to breed and individuality.

This difference makes testing with scales and Babcock test necessary.

Cow Testing Associations originated in Denmark in 1895 and have spread to practically all countries where cows are kept. They are one of the best means of keeping herd records.

Such associations have been the direct means of making wonderful improvement in dairy herds.

It has been estimated that the average Utah cow produces only 140 pounds of butter fat per year.

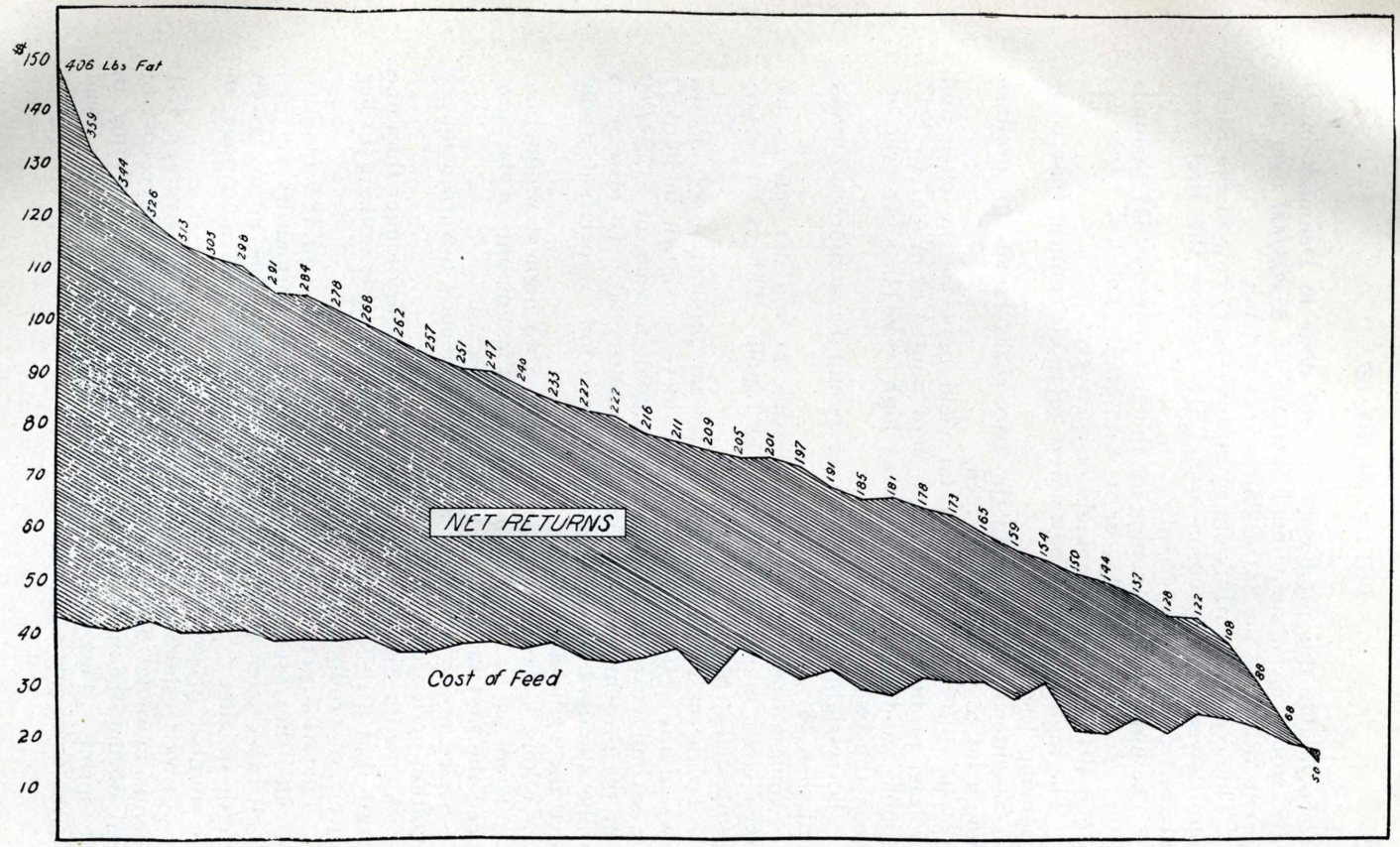

FIGURE 6. AVERAGE VALUE OF BUTTER FAT, COST OF FEED, AND NET RETURNS, 1912-13. Arranged for groups of 10 cows each in decreasing order of butter fat production. The last group is an average

To double this production as was done in Denmark in 24 years would mean an annual increase of $3,808,000 over the present income of the 85,000 dairy cows in Utah.

The average yearly yield of butter fat per cow in the Richmond-Lewiston Association was 250.8 pounds the first year and 251.1 pounds the second.

The highest herd average for the first year was 344.5 pounds of fat. For the second year it was 300.9. The low herds averaged 194.5 and 199.1 pounds respectively.

The high producing cows were more economical than cows producing less fat.

Seventeen cows during the two years failed to produce enough fat to pay for their feed.

The difference in butter fat yield between the most and the least profitable cow in each herd ranged from 40.7 to 324.7 pounds. A difference in profit as high as $111.65 per year between the two is noted.

Forty-eight of the best cows would be a more profitable herd than 189 of the poorest.

Wide variation in yield of butter fat and net returns between cows in the same herd was found. This is customary in untested herds.

To increase the average butter fat production of all the cows of the state as much as the increase shown in herd O the second year would mean an annual increase of $1,251,200 over the present annual value of the butter fat. To raise it up to the standard of the Richmond-Lewiston Association would raise the value $3,000,000.

A long lactation period is necessary to highest production.

There is no correlation between the amount of fat produced the first month and the annual record.

Dairy bred cows show a decided tendency toward a longer lactation period than scrub cows.

A cow for highest production should be dry longer than one month, but a rest longer than two months adds nothing to her powers of production.

Lactation periods of various length from 7 to 18.5 months, provided they are preceded and followed by normal dry periods, in all cases seem to yield the same fat and profit in any given length of time. The shorter periods have the advantage in the number of calves produced.

Cows freshening in the fall produced on the average 45.1 pounds more fat and returned $9.43 more profit above cost of feed during the next twelve months than cows freshening in the spring. The cost of feed was only $5.33 more per head for the cows calving in the fall.