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Influence of Fatness of Cow at Parturition
on Per Cent of Fat in Milk

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COLLEGE OF AGRICULTURE
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INFLUENCE OF FATNESS OF COW ON PER CENT OF FAT IN MILK.

C. H. ECKLES

It is a well known fact that the per cent of fat present in milk is subject to wide variations. Among the causes that are known to be responsible for those variations are: breed of the animal; stage of lactation; the individuality of the animal; and to some extent the season of the year regardless of other factors.

During the last few years data has been accumulated in our investigations with dairy cows which indicates that it is possible in another way to increase the per cent of fat to an abnormal degree for a short time and to a less degree for a somewhat longer time. This factor is the condition of the animal as measured by the amount of fat stored in the body at the beginning of the milking period.

Attention was first called to this factor by the author under the heading of "A New Factor Influencing the Per Cent of Fat in Milk," published in Hoard's Dairyman, July 9, 1909. A second article dealing with the same subject entitled, "Abnormal Per Cent of Fat in Seven Day Tests," was published by the author in Hoard's Dairyman, April 22, 1910. As far as the writer has been able to determine the articles referred to were the first put in print regarding this subject. Although as pointed out in these articles practical feeders in recent years have been taking advantage of this means of increasing the per cent of fat in order to secure the maximum yield of fat, and especially a high per cent of fat in seven day tests of dairy cows. An abundance of data showing the influence of the factor under consideration may be found in Advanced Registers published by dairy cattle organizations.

Table I shows the per cent of fat in official seven day tests and the per cent of fat for the entire year for certain animals selected from Volume II of the Holstein-Friesian Year Book.

These records are selected to illustrate the fact that a short time test made at the beginning of a lactation period may give an entirely erroneous idea as to the real average fat content of the milk produced by the animal in question. The seven day tests are made

at the beginning of the milking period. The rules of this Association allow such tests to begin the seventh day after parturition.

TABLE I.

Name of Cow	% Fat 7 day record.	% Fat year record
Cedar Lawn Dekol Johanna 11805.....	4.02	3.35
Marcella Late 6094.....	4.21	3.33
Victoria V 8827.....	3.92	3.45
A. & G. DeFreule DeKoi 2nd 11783.....	4.32	3.72
Mermaid Gerben 5057.....	4.50	3.23
Artasia Korndyke 8031.....	4.30	3.64
Gracie DeKoi Korndyke 8030.....	4.01	3.54
Daisy Lincoln 7984.....	4.22	3.71
Edith DeKoi Burke Hengerveld 11814.....	4.64	3.36
Lady Bak Homestead Brinsley 8482.....	4.51	3.44
Pontiac Pyrrlia 5775.....	4.01	3.31
Winana Pietertje DeKoi 3d 9543.....	5.93	3.89
Missouri Chief Josephine 6912.....	4.09	2.76
Carlotta Pontiac 10469.....	4.15	3.10
Average.....	4.35	3.42

It will be noted that the per cent of fat averaged .93% higher for the seven days than for the year. It should also be pointed out that only one of the seven day tests given is above 5 per cent. Only a very few of the numerous cows having a seven day record showing over 5 per cent of fat are tested officially for a year. Were figures from these animals at hand the difference between the per cent of fat for the seven days and for the year would be still wider.

In Vol. 11 Holstein-Friesian Year Book, p. 565, the records of 337 animals are reported including those making the largest yields of fat in seven days in the different classes based upon age. In regard to the per cent of fat these are divided as follows:

Between 3% and 4%.....	184
Between 4% and 5%.....	138
Between 5% and 6%.....	14
Between 6% and 7%.....	1

337

In Vol. 22 of the Holstein-Friesian Advanced Register are found records covering a full year for 191 cows. Of these only five are above 4 per cent, the highest being 4.11 per cent while five are below 3 per cent. These facts show that the high per cent of fat in many of the seven day tests are abnormal.

It should be stated that there are other records where the per cent of fat for the seven days test is not far different, and little if any higher than the average for the entire year. This does not in any way detract from the facts given. In these cases where the per cent of fat for the seven days is close to the yearly average it

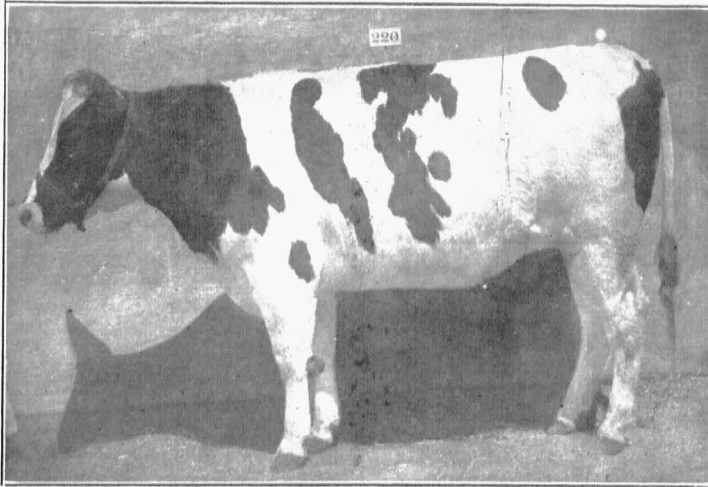


Fig. 1.—No. 220, Excessively fat before calving. In this condition she was entered in Advanced Register, under the rules, with an official test of 5.1% for seven days. The average for the year was 3.30%. See Table 6.

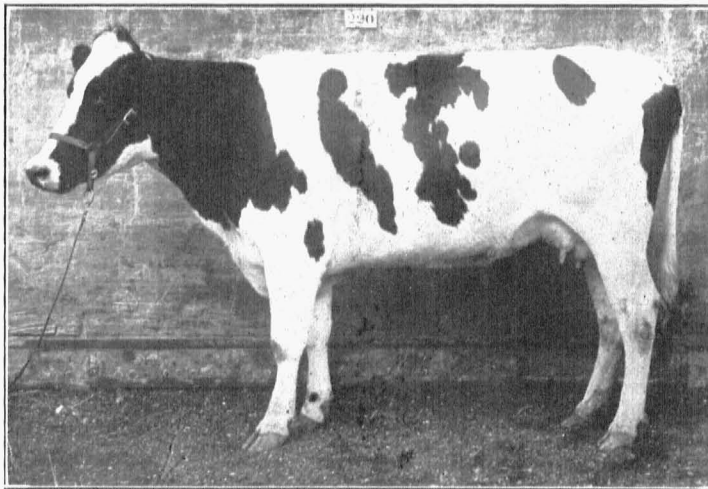


Fig. 2.—No. 220, One year later than Fig. 1. Calving in this condition she averaged 3.63% fat for seven days beginning the same length of time after calving as for the record given under Fig. 1.

means the cows were under quite different conditions during the seven day test from those showing the abnormally high fat content. According to the common teaching concerning the influence of the period of lactation upon the richness of milk, instead of the high per cent of fat being found in a seven day period soon after freshening, the conditions should be reversed and the higher fat content found in the total production for the year. A similar study of records from the same breed association will show that at least four cows out of five having an official test reported for both seven days and thirty days show a higher per cent of fat for the seven days than for the thirty days, although the seven day period is included within the thirty day period.

The possibilities along this line are illustrated by data from a Holstein cow No. 220 owned by the University of Missouri. In December 1910 this cow calved, being at that time in the condition shown by Fig. 1. An official seven day test was begun on the tenth day after parturition. The per cent of fat by milkings during these seven days ranged from 4.2 to 9.3 with an average for the week of 5.1. The averages by days are found in Table 6.

In December, 1911, this cow calved again in the condition regarding flesh as illustrated by Fig. 2. In seven days beginning the same length of time after calving as did the first seven days record, the average per cent of fat in the milk was 3.63. The total quantity produced, it might be said, was 249 lbs. in seven days when the per cent of fat was 5.1, and 224 lbs. in seven days when the per cent of fat was 3.63.

Table I gives the per cent of fat by days in the beginning of two lactation periods for the same animal owned by the University of Missouri. In 1908 at parturition this cow was in normal flesh for an animal of this breed, or perhaps rather thinner than the normal. The amount of milk produced and the per cent of fat contained is shown in the first part of the table. Previous to the beginning of the milking period starting in 1910 this cow was kept dry for about 3 months and was fed a liberal grain ration so that

TABLE II.
RECORD OF COW No. 207 FOR FIRST 17 DAYS
TWO LACTATION PERIODS.

Days After Calving	1908		1910	
	Milk Lbs.	Fat Per cent.	Milk Lbs.	Fat Per cent.
3	.....	.....	.....	5.68
4	.....	.....	57.2	5.35
5	.....	.....	53.1	4.81
6	69.0	2.8	58.7	4.13
7	59.0	2.4	60.0	4.34
8	68.5	3.9	65.8	4.16
9	65.8	3.5	64.2	3.87
10	70.8	2.8	67.3	3.89
11	74.1	2.6	74.7	3.63
12	67.8	3.1	79.4	3.28
13	69.3	2.7	88.2	3.11
14	83.5	3.03	84.5	2.85
15	81.9	2.65	88.0	3.20
16	80.4	2.69	90.5	3.00
17	77.4	2.80	93.9	2.80
Average for Year.....	2.80.....		2.76	

at the time of parturition she was excessively fat, weighing approximately 200 lbs. more than in the beginning of the lactation period reported for 1908. The amount of milk and the per cent of fat contained for the first 17 days is shown in the table. Under these conditions this cow was entered in the Advanced Registry with an official test of 4.09% fat, although her average for the year was 2.76%. It will be noticed that the third day the per cent of fat was 5.68, from which point it declined rapidly until it reached a normal for this animal at the seventeenth day, and the average for the year was practically the same as for the previous lactation period reported.

Table 3 is the record of an experiment with a Jersey cow. This animal was fed liberally when dry in order that she might be decidedly fat at parturition. The condition of the animal at that time is shown in Fig. 3. Following the birth of the calf she was put on a ration that was calculated to be sufficient only to maintain her body weight and she was continued under this condition for thirty days. The grain ration fed was a mixture of corn 4 parts, bran 2 parts, and oilmeal 1 part. With this was fed the best quality of alfalfa hay. The amounts of each given is shown in the table. At the beginning she produced 21 lbs. milk per day and during the

TABLE III.
EFFECT OF UNDERFEEDING UPON THE PER CENT
OF FAT IN MILK.
JERSEY COW No. 20.

Days After Calving	Per Cent Fat	Yield of Milk	Grain Fed Lbs.	Alfalfa Hay Fed Lbs.	Weight Lbs.
2	4.37	22.2	3.5	7	830
4	5.80	20.9	3.5	7	807
6	6.89	22.3	3.5	7	790
8	7.21	23.1	3.5	7	787
10	6.60	22.6	3.5	7	785
12	5.86	21.5	3.5	7	780
14	6.82	20.0	3.5	7	765
16	6.00	19.1	3.5	7	755
18	5.07	21.8	3.5	7	755
20	4.94	17.2	3.5	7	730
22	6.37	19.0	3.5	7	730
24	6.82	19.6	3.5	7	725
26	5.70	19.1	3.5	7	720
28	6.26	17.8	3.5	7	720
30	5.60	19.9	3.5	7	710
32	5.53	20.4	5.5	11	690
34	4.74	24.4	7	11	710
36	4.28	25.4	7	14	710
38	4.49	25.0	7	14	720
40	4.45	25.0	7	14	710
42	3.98	27.2	7	14	715
44	4.83	26.7	7	14	740
46	4.27	26.1	8	16	700
48	3.80	25.9	8	16	735
50	4.23	27.0	8	16	747
52	.....	25.6	8	16	725
54	4.01	25.7	8	16	715
56	4.47	23.7	8	16	720
58	4.37	24.3	8	16	740

thirty days the decline was slight. At the end of thirty days she was producing 19½ lbs. per day. During this time the live weight decreased 115 lbs. The per cent of fat in the milk was taken by extraction after the usual chemical method on each second day. The results are shown in the table. It will be noted that the per

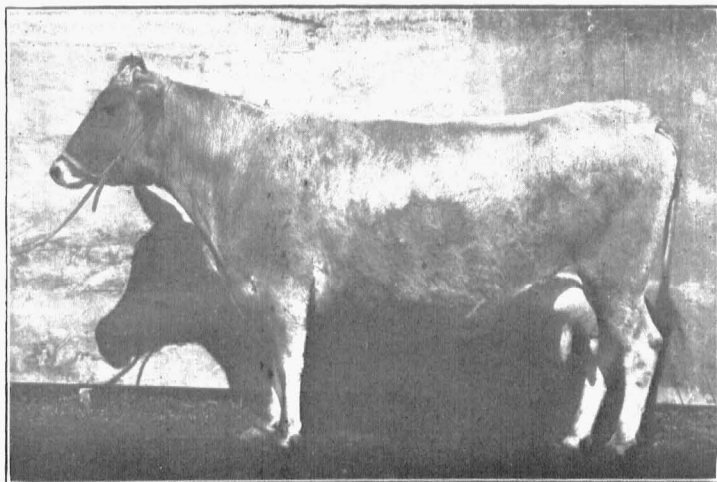


Fig. 3.—No. 20, Showing condition at beginning of experiment reported in Table 3, in which she was underfed for 30 days. Her average per cent of fat for the 30 days was 6.01. Average for the entire year 4.8%.

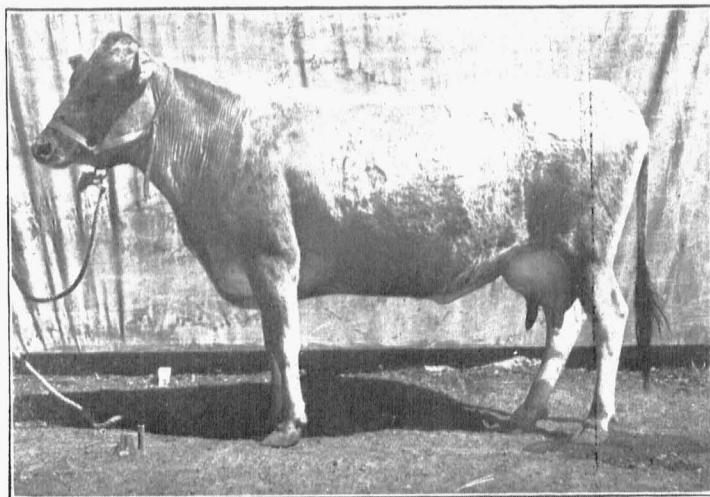


Fig. 4.—No. 20, Showing condition at end of experiment reported in Table 3. During the 30 days she lost 120 pounds in live weight.

cent of fat is unusually high down to the twenty-fourth day. As soon as the feed was raised to near normal amount the per cent of fat immediately dropped from between 5.5 and 6.0 to close to 4.5. It will be noted further that the per cent of fat remained low from the thirty-fourth day to the fifty-eighth. During the remainder of this lactation period this animal was kept on a normal ration and the per cent fat for the third month, that is the next following, the figures given, was 4.0%. The fourth month was 4.10; fifth month 4.5; sixth month 5.2; seventh month 5.2; eighth month 5.6; ninth month 5.5%. The average for the entire year was 4.8%. It will be seen from this that the per cent of fat during this first thirty days' period was entirely abnormal for this animal. Records are available for the same cow for three complete lactation periods in addition, during which she varied from 4.6 to 5.3 as an average.

TABLE IV.
EFFECT OF UNDERFEEDING UPON THE PER CENT OF
FAT IN MILK.
HOLSTEIN COW NO. 206

Time After Calving	Per Cent Fat	Lbs. Milk per day	Grain Fed Lbs.	Hay Fed Lbs.	Weight of Cow.
Days					
1	3.5	28.4	4.5	9	1370
3	3.35	31.2	4.5	9	1235
5	3.87	35.4	4.5	9	1280
7	4.47	25.8	4.5	9	1260
9	3.64	30.7	4.5	9	1255
11	3.40	34.0	4.5	9	1225
13	3.86	33.2	4.5	9	1187
15	4.03	30.7	4.5	9	1170
17	3.76	30.6	4.5	9	1145
19	4.39	26.5	4.5	9	1130
21	4.07	25.4	4.5	9	1130
23	3.86	26.6	6.5	13	1132
25	3.83	31.0	9	18	1145
27	3.35	31.2	9	18	1165
29	3.24	30.1	9	18	1152
31	4.03	27.5	9	18	1135
33	3.63	27.4	10	20	1120
35	3.43	29.1	10	20	1122
37	3.52	29.8	10	20	1160
39	3.23	30.1	10	20	1110
41	2.89	37.4	10	20	1200
Months					
3	2.90	30.8	.....	.....	.....
4	2.70	33.7	.....	.....	.....
5	2.60	34.1	.....	.....	.....
6	2.60	31.4	.....	.....	.....
7	2.80	27.4	.....	.....	.....
8	3.00	22.4	.....	.....	.....
9	2.80	20.1	.....	.....	.....
10	2.80	22.1	.....	.....	.....
11	3.20	14.6	.....	.....	.....
Year	2.99	9809	.....	.....	.....

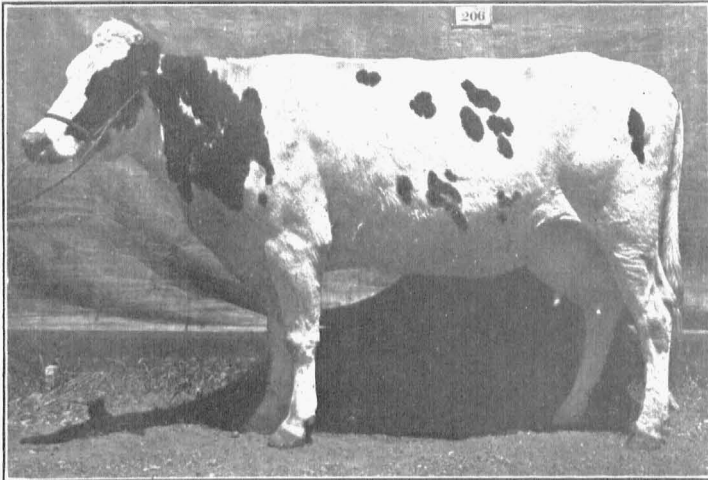


Fig. 5.—No. 206, Showing condition at beginning of experiment reported in Table 4, in which she was underfed for 23 days. During this period her average per cent of fat was 3.85, while the average for the year was 2.99%.

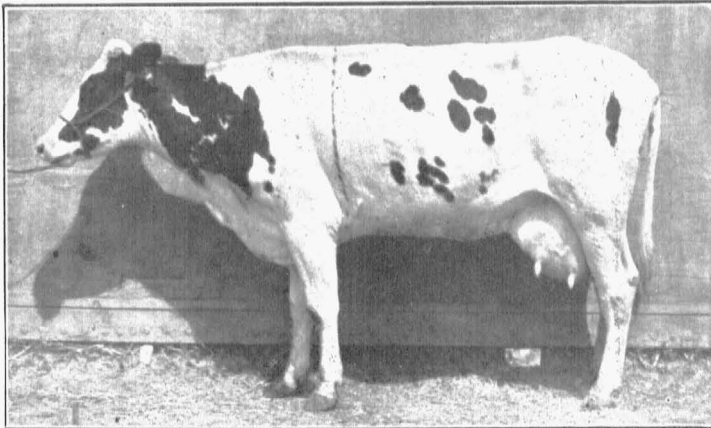


Fig. 6.—No. 206, Showing condition at end of 30 days as reported in Table 4. During this 30 days she lost nearly 200 pounds in live weight.

Table 4 gives the data taken concerning a Holstein cow. The conditions were also a duplicate of those described in connection with Table 3. That is, to say, this cow was fed liberally when dry and after parturition was given a ration calculated to be sufficient for body maintenance only. The table shows the amount of feed supplied and also the per cent of fat as found by chemical analyses in samples taken every second day. The results correspond to those given in Table 3. The average per cent of fat and the average pounds of milk per day for the remainder of the lactation period is given in the lower part of the table and will be noted that at no time did the fat in the milk of this animal approach that of the first thirty days. Complete records are also available for six lactation periods for this cow and the average fat content varies from 2.99 to 3.2 showing that at no time did this animal produce milk having anything like the fat content of that contained during the first thirty days of the lactation period as reported in Table 4.

TABLE V.
EFFECT OF UNDERFEEDING UPON THE PER CENT OF FAT IN MILK.
AYRSHIRE COW No. 300.

Time After Calving	Per Cent Fat	Milk Yield Lbs.	Grain Fed Lbs.	Hay Fed Lbs.	Green Alfalfa Fed Lbs.
Days					
1	4.25	24.4	4	10	30
3	4.29	31.9	4	10	30
5	4.32	36.0	4	10	30
7	4.36	35.8	4	10	30
9	4.40	32.8	6	6.5	40
11	4.30	40.4	5	10	22
13	3.95	40.7	6	10	30
15	3.85	39.9	6	10	30
17	3.60	40.4	6	10	30
19	3.60	37.3	8	10	30
21	3.90	40.5	10	10	30
23	3.55	39.6	.....	.....	.....
25-31	3.23	44.7	.....	.....	.....
34	3.43	46.6	.....	.....	.....
36	2.61	45.9	.....	.....	.....
38	3.20	45.5	.....	.....	.....
Months					
3	2.7	43.9	.....	.....	.....
4	2.7	39.5	.....	.....	.....
5	3.6	31.6	.....	.....	.....
6	3.4	21.0	.....	.....	.....
9	3.9	20.5	.....	.....	.....
11	4.0	18.9	.....	.....	.....
Year	3.55	9274	.....	.....	.....

Table 5 is a repetition of the same experiment using an Ayrshire cow, except that in this case the ration fed was larger than in

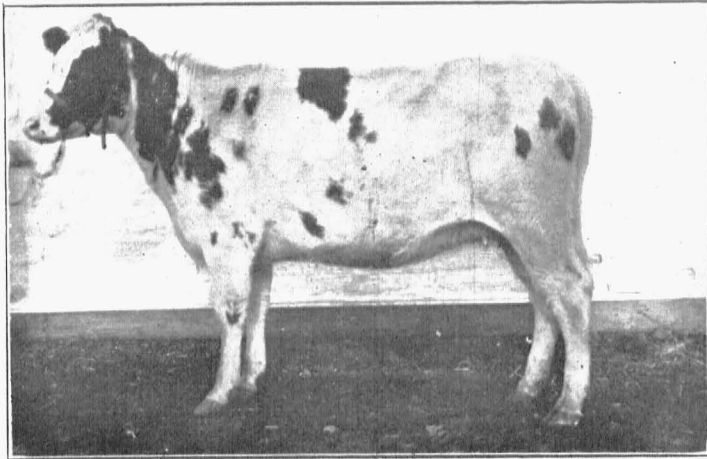


Fig. 7.—No. 306, Ayrshire cow calved in above condition. Percent of fat as shown in Table 6 was above 5% for the first twelve days. Average for year 3.83%.

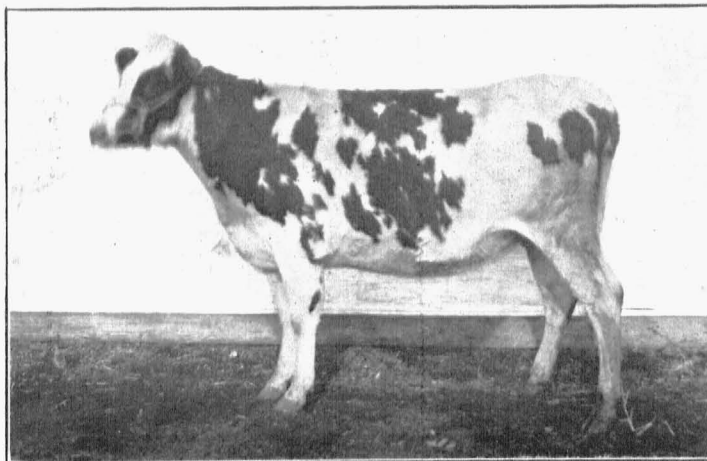


Fig. 8.—No. 307, Ayrshire cow, calved in condition as shown. Per cent of fat less than 3.5 for first three months. See Table 7.

the two preceding. It was planned to feed such an amount as would be necessary to supply maintenance and half enough in addition to support the milk production. This amount was estimated by making use of tables such as those prepared by Armsby and Haecker and also making use of data from our previous investigations along the same line. It will be noted here that the results are the same as with the two previous animals with the exception that they are not quite so extreme. As soon as the ration was increased the per cent of fat declined. The per cent of fat given for the remainder of the lactation period shows that the fat content during the first twenty-five days was abnormally high.

TABLE VI.
SHOWING THE HIGH FAT CONTENT DURING THE
FIRST TWENTY DAYS.

Cows Fat.

Time After Calving	No. 207	No. 208	No. 209	No. 210	No. 211	No. 212	No. 213	No. 214
Days								
1	.....	.....	.....	.....	.....	.....	3.9	.....
2	5.8	.....	.....	4.4	.....	.....	4.5	.....
3	5.7	.....	.....	4.2	.....	.....	4.1	.....
4	5.4	.....	5.4	4.0	.....	.....	4.0	5.4
5	4.8	5.5	.....	4.2	.....	.....	4.2	5.9
6	4.1	5.9	4.6	3.6	.....	3.4	4.5	5.4
7	4.3	5.8	4.9	3.7	.....	3.8	4.6	5.3
8	4.2	6.0	4.3	3.8	4.8	4.0	4.4	5.5
9	3.9	5.5	4.4	3.7	4.2	4.1	4.4	5.2
10	3.9	7.1	4.2	3.5	4.2	4.0	4.1	5.4
11	3.6	5.5	4.2	3.7	4.1	3.8	4.2	5.3
12	3.3	4.8	3.7	3.6	3.8	4.0	3.7	5.0
13	3.1	4.6	3.6	3.4	4.0	4.0	4.0	4.6
14	2.9	4.5	3.8	3.2	4.0	3.8	4.1	4.5
15	3.2	4.8	3.6	3.7	.....	3.6	3.9	4.5
16	3.0	.....	4.2	3.3	.....	3.7	3.6	4.3
17	2.8	.....	3.4	3.2	3.6	3.6	3.6	4.1
18	2.5	.....	3.4	3.2	3.2	3.7	3.4	4.4
19	2.9	.....	3.8	3.4	3.4	3.6	3.7	4.1
20	2.5	.....	3.8	.....	3.2	3.7	3.6	.....
Months								
3	2.6	3.0	4.0	3.0	3.1	3.2	3.6	3.6
4	2.5	3.0	3.4	3.1	2.9	2.7	3.4	3.5
5	2.8	2.8	3.6	3.6	2.8	3.0	3.9	3.7
6	2.4	3.0	3.5	3.5	3.2	2.8	4.0	4.1
7	2.7	2.7	.....	3.3	2.9	.....	4.3	4.2
8	3.1	2.8	.....	3.4	3.0	.....	3.8	4.5
9	3.0	3.2	.....	3.4	3.6	.....	.....	4.9
10	3.4	3.4	.....	3.6	3.6	.....	.....	4.9
11	3.3	3.5	.....	4.1	3.4	.....	.....	.....
12	3.3	4.0	.....	4.1	3.5	.....	.....	.....
Av. for Year	2.8	3.3	.....	3.4	3.1	.....	3.55	3.83

In Table 6 is gathered the records from a series of animals, all

of which were in good condition and some of them excessively fat at calving time. The records in some cases are not quite complete which is indicated by the absence of some figures. The first six animals represent the Holstein breed and the last two the Ayrshire. It will be noticed by studying these that in each case the per cent of fat starts in high and gradually comes down. The records for the remainder of the lactation period are given in the lower part of the table by months. By comparing the per cent of fat in the milk for the first twenty days with these records for the remainder of the lactation period it will be observed that the results correspond to those already given. That is to say, all are abnormally high. In the case of Nos. 221 and 225, the average for the year is not given since the lactation period has not at this time been completed.

A portion of these animals, namely, Nos. 220, 221, 217, 225, and 306, happened to be unduly fat at the beginning of their first lactation period on account of the fact that they were used in an investigation under way concerning the development of dairy heifers. In this experiment it is part of the plan to feed a portion of them in such a manner that they will be excessively fat in order to determine the influence of this condition upon the dairy qualities of the animal. All the animals reported in Table 7 are animals used in the experiment above described, although this group represents those that received a light ration. They were raised from birth to six months of age with skim milk and hay and had no grain until coming in milk and being at that time rather thin in flesh. Some of them would be described as moderate in flesh and some of them less than moderate. The conditions of these animals in this respect are shown by Figs. 8, 10, 11, for the thin group, and Figs. 1, 7, 9, for the fat group.



Fig. 9.—No. 221, Showing condition before calving. She was entered in the Advanced Register on a seven day test with an average of 4.34% of fat. From the second to the sixth month she averaged 3.6 per cent. Record for year not yet complete. See Table 6.

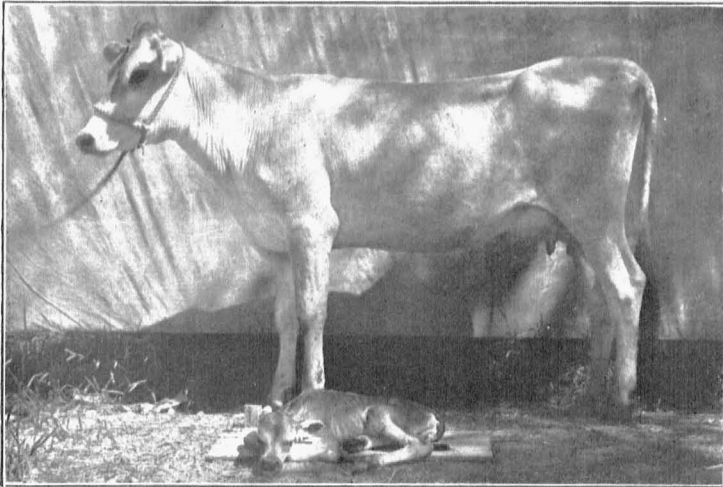


Fig. 10.—No. 57, Showing condition at beginning of lactation period given in Table 7. In this thin condition she averaged 4.41 per cent of fat for the first three months. Average for the year 5.33%

Table 7 gives data concerning the per cent of fat found in the milk of these cows that were thin in flesh at calving time. This data is introduced for the purpose of comparing it with the table preceding. It might be assumed from the data so far presented that it is a natural thing for all cows to show a high fat content in the beginning of a lactation period and then gradually decline. Except for No. 39 and No. 2 the figures given in Table 7 represent weeks

TABLE VII.
SHOWING FAT CONTENT NORMAL TO LOW IN BEGINNING OF LACTATION PERIOD.

Cows Moderate to Thin in Flesh.

Time After Calving	No. 57	No. 215	No. 304	No. 39	No. 55	No. 307	Time After Calving	No. 39	No. 2
Weeks							Days		
1	.....	3.2	3.5	.....	3.6	3.2	12	3.5	.....
2	.....	3.0	3.4	.....	4.6	3.0	13	3.6	.....
3	.....	3.2	.....	3.8	4.1	.....	14	3.5	4.68
4	3.2	3.15	3.4	4.0	4.5	.....	15	3.6	4.58
5	4.0	3.1	3.4	.....	3.8	3.12	16	4.0	4.40
6	4.4	3.2	3.7	3.8	.....	.....	17	3.4	4.44
7	4.7	3.2	4.1	4.0	3.9	.....	18	3.3	4.19
8	4.5	3.0	3.5	4.2	.....	.....	19	3.7	4.23
9	4.2	3.2	3.2	4.7	.....	4.20	20	3.6	4.23
10	5.6	3.2	3.9	5.0	4.3	.....	21	3.4	4.68
11	4.5	3.2	3.9	4.5	.....	.....	22	3.6	4.07
12	4.6	3.3	4.0	.....	.....	3.53	23	3.6	4.57
	.....	.....	.....	.....	.....	.....	24	3.7	5.64
Months									
4	5.9	3.2	4.0	5.6	4.7	3.30	.....	.....	.....
5	5.8	2.9	3.9	5.2	5.8	3.67	2	3.6	5.00
6	5.8	3.5	3.6	5.3	5.8	3.80	3	4.4	4.85
7	5.2	3.4	4.0	5.3	5.6	3.85	4	4.3	5.00
8	5.3	3.0	4.7	5.0	6.3	4.19	5	5.4	5.00
9	5.5	2.8	5.0	5.1	6.4	.....	6	5.6	4.9
10	5.1	3.2	5.2	5.6	5.9	.....	7	5.5	4.7
11	5.1	2.9	.....	5.0	6.1	.....	8	5.8	5.3
12	.....	3.4	.....	5.9	.....	.....	9	5.6	5.3
							10	6.0	.....
Year	5.33	3.29	4.01	5.11	5.18	.....	11	7.1	.....
	.....	.....	.....	.....	.....	.....	12	5.3	.....
							Year	4.97	4.89

rather than days as in Table 6. The reason for putting this in a different form was that most of the data here reported was taken in the form of weekly composite samples and records by days was not available except in the case of No. 39 and No. 2.

A study of this table will show clearly that there was no tendency toward a decline in the per cent of fat in the beginning of a lactation period as shown by the previous tables. On the other hand there was a distinct tendency for a gradual increase from the

beginning and in no case did the animals test higher during the first four weeks than the average for the year. These animals after freshening were fed what was considered to be a normal ration, that is to say, they were fed all the nutrients required to maintain the animal and to supply sufficient nourishment for the milk produced and some allowance was also made for the growth of the animals since these all represent animals not mature.

TABLE VIII.

SHOWING THE INFLUENCE OF THE CONDITION OF THE COW UPON THE RICHNESS OF THE MILK.

Per Cent of Fat by Months.

Month	Cows Fat at Calving.				Cows Moderate to Thin at Calving.			
	Average 5 Jerseys	Average 5 Holstein	Average 2 Ayrshire	Average of all 12	Average 7 Jerseys	Average 4 Holstein	Average 2 Ayrshire	Average of all 13
1	5.4	4.0	4.9	4.7	4.2	2.9	3.3	3.7
2	5.1	3.6	3.9	4.3	4.2	2.9	3.3	3.7
3	5.0	3.4	3.9	4.2	4.6	3.1	3.9	4.0
3	5.2	3.2	3.8	4.1	5.1	3.1	3.8	4.3
4	5.3	3.3	3.7	4.2	5.2	2.9	3.7	4.3
5	5.2	3.3	3.8	4.2	5.5	3.0	3.8	4.5
6	5.5	3.2	3.9	4.5	5.6	3.2	3.7	4.6
7	5.5	3.3	4.1	4.6	5.7	3.1	4.0	4.6
8	5.8	3.6	4.5	4.9	6.0	3.2	4.5	5.0
9	6.1	3.6	4.6	5.1	5.7	3.1	5.0	5.0
10	6.1	3.8	5.1	5.2	5.6	3.6	5.2	5.0
12	6.1	4.1	5.2	5.4	6.1	3.6	.....	5.4

Table 8 gives a summary showing the influence of the condition of the cow at parturition using all the records available from the animals used in our investigation previously referred to regarding the development of dairy heifers. The twelve that are reported in the left hand side of the table were animals that would have been called fat by the practical man and some of them excessively fat. It will be noted here that the average of all shows a decline during the first four months with a period almost stationary, then with a rise to the end of the lactation period. This is found to be true for the three breeds reported, and it can be said further that it is true of every individual although it is not considered necessary to give these figures in any greater detail.

On the right side of the table is given corresponding figures for thirteen animals representing the other group, that is, those that received only skim milk and hay up until they came in milk. It will be noticed here that the conditions regarding the point under consideration are exactly the reverse of those in the other group.

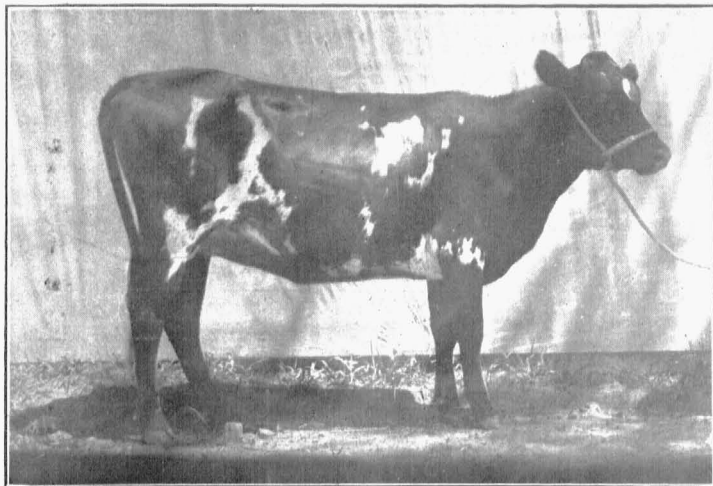


Fig. 11.—No. 304, At the beginning of first lactation period. Represents condition of those supplying data in Table 7. This cow averaged 3.63% of fat for first three months and 4.01% for the year. In this condition of flesh the per cent of fat is lower in the beginning of the lactation period than the average for the entire period.

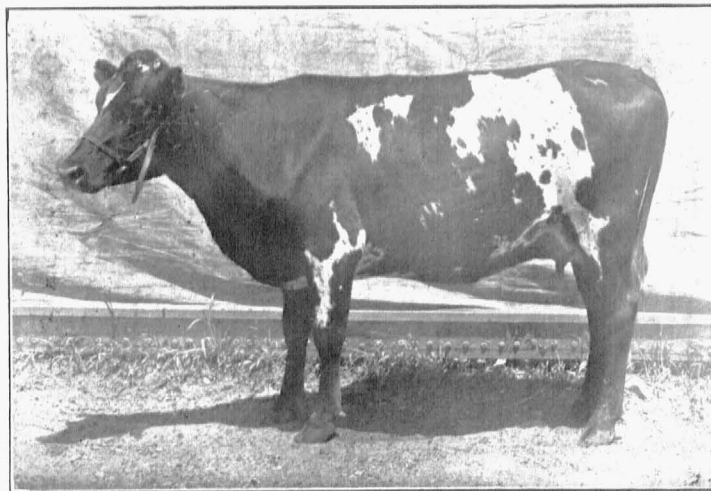


Fig. 12.—No. 304, At beginning of second lactation period in which she averaged over .5% fat more for first three months than in first lactation period.

That is to say, with each breed as well as with the average for all, the per cent of fat starts off low and shows a gradual increase throughout the entire lactation period corresponding to the results as presented in previous tables.

TABLE No. 9.

COMPARISON OF FATE IN MILK, FIRST AND SECOND LACTATION PERIODS.

Per cent of Fat by Months.

Month	7 Cows		8 Cows	
	First Period	Second Period	First Period	Second Period
	Fat	Normal	Thin	Normal
1	4.8	4.5	4.0	4.6
2	4.7	4.4	3.9	4.5
3	4.7	4.3	4.3	4.8
4	4.8	4.3	4.8	4.7
5	4.9	4.4	4.7	4.9
6	4.7	5.1	4.9	5.1
7	4.8	4.7	5.1	5.0
8	4.9	5.1	5.3	5.4
9	5.3	5.5	5.5	5.6
10	5.5	5.6	5.4	5.6
11	5.7	5.4	5.2	5.9
12	5.7	5.4	5.7	5.8

Table 9 is a summary using such records as are available for animals in the two groups given in Table 8 that have two lactation periods. It should be said further that in carrying on the investigation referred to in which these animals were included they were all fed practically the same as soon as they came in milk. Therefore, when they came in milk the second time they were all in practically the same condition and the effect of treatment previous to the first lactation period had been removed.

The left part of this table gives the records of seven cows for the first lactation period beginning in a fat condition. The second column marked "Normal" gives the average fat content in the corresponding months of the second lactation period when these animals were in a normal condition regarding the amount of flesh stored on the body. It is shown here that in the second lactation period the average per cent of fat for the first five months was lower with this group in the second lactation period after which it was practically the same. That is to say, apparently the fat condition of the animals at the first parturition continued to influence the