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The Effect of Milk Foam on Dairy Calves

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The Effect of Milk Foam on Dairy Calves

by

Thomas M. Olson

Many dairymen who would prefer to feed calves skim milk direct from the cream separator are reluctant to do so, because of the effects the foam, which normally accumulates on separated milk, may have on the calves.

Despite this more or less prevalent opinion among calf raisers regarding the harmful effects of foam, the literature seems to contain no experimental work either refuting or corroborating this opinion.

The foam on skim milk may affect calves in several ways:

1. In the physical appearance of the calves.
2. In the height of the calves at the withers.
3. In the gain in live weight.
4. In the general health.

There is no definite and accurate measurement of the physical condition and general health of calves, except daily observations. Such observations may be very inaccurate, but it is believed that these observations are helpful in interpreting the data.

The growth, as indicated by the increase in height at the withers, affords a definite means of comparing the experimental calves with calves on a normal ration and calves which are making normal growth.

The weight of the experimental calves is also a definite measurement of growth, which makes possible a comparison of experimental calves with normal calves.

Accordingly data were secured on these objectives, and the results interpreted on that basis.

Plan of Procedure

Six calves from the college dairy herd were chosen and placed in one division or pen of the calf quarters. Three of the calves were fed a definite amount of skim milk direct from the cream separator. The other three calves were fed an equal weight of skim milk and foam. That is, the calves which received the foam, not only received the foam which naturally accumulates when the whole milk is separated, but in addition received the foam which was skimmed off from the skim milk given to the three calves on skim milk. The foam-fed calves received, therefore, approximately twice the amount of foam which would normally collect on the quantity of milk they received.

Grain was kept before the calves in a container, so they could eat at will. Hay, water, salt and bone meal were also kept before the calves at all times.

The calves were handled in the same manner as our herd calves, except for the feeding of the foam to three of the six calves.

The calves were weighed at ten-day periods and measured at thirty-day intervals. Calves which had been on skim milk for some time were chosen for the first trial. As table 1 shows, the calves were older than calves ordinarily put on skim milk.

Because the calves in the first two trials were rather old when they were started on the experiment a third group of calves was placed on

skim milk and foam at an age when calves usually are put on skim milk, viz., at three weeks of age.

Aside from the fact that the calves in the third trial were younger than the calves in the two previous trials, the plan of the third trial followed that of the two previous trials. The calves received the foam which normally collects on separating whole milk. The skim milk and foam were weighed at each feeding and the calves were fed immediately after the milk was separated.

Discussion of Results

Notes were made on any abnormal conditions observed in the appearance of the calves, such as bloating, scours, roughness of hair, physical appearance, etc.

The only significant observations were that the calves on skim milk and foam appeared uncomfortable after drinking. They were somewhat bloated, which no doubt was the cause of their uncomfortable condition. The bloated condition would soon subside and the calves seemed entirely normal. This condition was repeated in the case of some calves at each feeding.

In a few cases, a mild case of scours was observed. This corrected itself without any extra attention. Most of the calves were normal and showed no evidence of any unusual feeding conditions.

Frequently visitors were asked to select the calves receiving foam from the regular skim milk fed calves. Their replies indicated that there was no discernable physical differences in the lots of calves. Occasionally if a calf was showing 'pot bellied' it would be picked out as a foam fed calf, indicating that was the condition expected when foam was fed.

Table 1 contains the records of the calves on the various trials. The calves used in the first and second trials averaged older than calves or-

Table 1.—Record of Calves

Number	Sex	First Trial			Birth Wt. lbs.
		Age at Beginning of Trial	Breed		
1*	Male	50 days	Holstein Ayrshire cross		83
2*	Male	71 days	Holstein Ayrshire cross		75
3*	Male	61 days	Holstein Jersey cross		89
4	Female	35 days	Holstein Jersey cross		77
5	Male	89 days	Holstein		100
6	Female	86 days	Holstein		83
Av.		63.5 days			83
Second Trial					
1*	Female	46 days	Holstein		58
2*	Female	57 days	Holstein		95
3	Female	46 days	Holstein		93
4	Female	34 days	Jersey		65
5	Male	38 days	Jersey		51
6*	Male	34 days	Jersey		40
Av.		42.5 days			67
Third Trial					
1*	Female	21 days	Holstein		91
2*	Female	19 days	Holstein		93
3*	Female	27 days	Jersey		43
4*	Female	20 days	Ayrshire cross		85
5*	Female	28 days	Guernsey		63
Av.		23 days			75

* Calves which received foam and skim milk.

dinarly started on skim milk. The calves in the third trial averaged 23 days of age at the beginning of the trial, or the age at which calves are usually started on skim milk.

Table 2, showing the weight of the calves, indicates a satisfactory gain in weight of all calves. The range in daily average gain is from 1.44 pounds per day to 2.96 pounds per day. The average for all calves in the skim milk trials is 2.17 pounds per head per day, and in the foam and skim milk groups 2.03 pounds per head per day.

Table 2.—Weight of Calves by Ten Day Periods

10-day Periods	First Trial						Av. of Skim Milk Calves	Av. of Foam and Skim Milk Calves
	Calf 1*	Calf 2*	Calf 3*	Calf 4	Calf 5	Calf 6		
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.		
Initial Wt.	123	185	159	105	268	221	198	156
1	145	209	175	115	280	240	212	176
2	162	238	198	145	322	268	245	199
3	175	252	220	165	345	280	263	216
4	190	285	235	175	388	298	287	236
5	214	300	258	188	408	338	311	257
6	215	302	270	190	429	340	320	262
7	239	338	295	218	470	370	353	291
8	270	370	330	235	500	400	378	323
9	280	390	355	255	535	420	403	342
Av. Daily Gain	1.74	2.27	2.18	1.67	2.96	2.21	2.29	2.07
				Second Trial				
Initial Wt.	121	181	168	101	103	87	124	130
1	136	205	188	114	117	101	140	147
2	152	232	212	130	129	116	157	167
3	177	254	243	150	141	130	178	187
4	189	266	264	154	166	144	195	200
5	211	294	278	166	182	159	209	221
6	234	330	306	187	204	180	232	248
7	255	347	331	202	220	193	251	265
8	281	382	358	226	248	220	277	294
9	303	405	385	240	263	233	296	314
10	322	437	415	262	278	255	318	338
11	355	448	435	275	298	273	336	359
12	376	475	460	300	331	296	364	382
13	403	505	485	320	363	330	389	413
14	436	537	523	335	379	348	412	440
Av. Daily Gain	2.25	2.54	2.53	1.67	1.97	1.86	2.06	2.21
				Third Trial				
Initial Wt.	123	123	74					106
1	132	133	83					116
2	150	150	95	115				128
3	163	165	106	122	87			129
4	181	190	122	130	101			145
5	206	213	138	156	109			164
6	221	227	149	166	118			176
7	243	254	163	185	132			195
8	278	286	176	203	142			217
9	292	304	196	219	162			235
10	311	322	212	245	177			253
11	336	361	235	266	201			280
12	358	388	248	293	220			301
13	375	408	264	314	236			319
14	401	455	285	353	252			349
15	408	465	303	365	260			360
Av. Daily Gain	1.90	2.28	1.53	1.92	1.44			1.81

* Calves which received foam and skim milk.

Table 3.—Gain in Weight by Ten Day Periods

Skim Milk Fed Calves						
Number of Calves	Ten Day Period	First Trial lbs.	Second Trial lbs.	Av. for Two Trials lbs.		
6	1	14	16	15.0		
6	2	33	17	25.0		
6	3	18	21	19.5		
6	4	24	17	20.5		
6	5	24	14	19.0		
6	6	9	23	16.0		
6	7	33	19	26.0		
6	8	25	26	25.5		
6	9	25	19	22.0		
3	10		22	22.0		
3	11		18	18.0		
3	12		28	28.0		
3	13		25	25.0		
3	14		23	23.0		
140 days			av. daily gain		2.18	
Skim Milk and Foam Fed Calves						
Number of Calves	Ten Day Period	First Trial	Second Trial	Third Trial	Av. for Three Trials	
11	1	20	17	10	15.6	
11	2	23	20	12	18.3	
11	3	17	20	1	12.6	
11	4	20	13	16	16.3	
11	5	21	21	19	20.3	
11	6	5	27	12	14.6	
11	7	29	17	19	21.6	
11	8	32	29	22	27.6	
11	9	19	20	28	22.3	
8	10		24	18	21.	
8	11		21	27	24.	
8	12		23	21	22.	
8	13		31	18	24.5	
8	14		27	30	28.5	
5	15			11	11.	
150 days			av. daily gain		1.99	

The small difference between the weight of calves in the skim milk and foam groups is not significant. In both groups the weight is above normal.

When compared to the average gain in weight of the calves at Kansas State college dairy herd (1) it is noted that in all cases the experimental calves were above the average for the first six months.

Table 4.—Weight of Normally Fed Calves (1)

	Jersey	Guernsey	Holstein	Ayrshire	
At Birth	53.1	66.5	92.9	78.0	
1 mo.	84.6	81.9	121.4	97.1	
2 mo.	93.1	107.5	159.1	128.0	
3 mo.	124.2	139.2	205.1	168.0	
4 mo.	162.2	178.9	253.2	209.1	
5 mo.	204.9	222.1	310.5	257.8	
6 mo.	248.9	271.5	368.4	308.5	
Av. Daily Gain		1.09	1.14	1.53	1.28
7 mo.	296.4	322.9	424.9	367.8	
8 mo.	340.2	377.6	483.6	420.7	
9 mo.	377.2	416.2	539.3	474.5	
10 mo.	417.1	461.1	590.3	514.9	
11 mo.	450.8	503.2	646.6	566.6	
12 mo.	498.8	548.9	698.2	589.7	
Av. Daily Gain		1.24	1.34	1.68	1.42

(1) Data from Prof. Fitch, Kan. Sta.

The increase in height at the withers according to table 6 shows an average daily gain of .176 cm. for the foam and skim milk calves as against .172 cm. for the check lot or skim milk calves.

In some recent data submitted by Fitch, Kansas State college¹ in which the weight and height at withers of the calves dropped in the Kansas State college dairy herd were taken, and on calves presumably raised under normal conditions, the average height of the three breeds, Jersey, Holstein, and Guernsey is as follows:

Table 5.—Height at Withers (1)

	Jersey cm.	Guernsey cm.	Holstein cm.	Ayrshire cm.
At Birth	64.5	68.8	74.9	70.9
1 mo.	68.9	73.6	79.4	74.7
2 mo.	73.1	77.1	83.6	78.7
3 mo.	76.4	81.6	87.7	82.9
4 mo.	82.0	85.7	92.1	87.5
5 mo.	86.4	90.4	97.0	91.8
6 mo.	91.0	94.5	101.2	96.2
Av. Daily Gain	.147	.143	.146	.141
7 mo.	94.3	98.1	104.8	100.2
8 mo.	97.4	101.4	107.8	103.3
9 mo.	99.8	104.5	111.0	106.1
10 mo.	102.5	106.8	113.4	108.4
11 mo.	104.7	109.3	116.6	111.1
12 mo.	107.0	111.3	119.1	112.3
Av. Daily Gain	.118	.118	.123	.115

(1) Data from Prof. Fitch, Kan. Sta.

Table 6.—Height at Withers of Experimental Calves

Date	First Trial						Av. of Skim-Milk and Foam cm.	Av. of Skim Milk cm.
	Calf 1*	Calf 2*	Calf 3*	Calf 4	Calf 5	Calf 6		
	cm.	cm.	cm.	cm.	cm.	cm.	cm.	cm.
6-20-30	77.5	81.3	83.2	77.5	91.5	90.2	80.67	86.40
7-11-30	80.5	90.5	83.5	80.0	95.5	91.0	84.83	88.83
7-12-30	83.0	91.5	84.5	82.0	96.0	94.0	86.33	90.67
8-20-30	87.3	96.5	89.3	88.0	102.0	98.5	91.03	96.16
9-17-30	93.5	99.0	95.0	94.5	106.0	102.5	93.83	101.0
Av. daily Gain	.177	.196	.131	.189	.161	.136	.146	.162
Second Trial								
1-17-31	74.5	84.5	86.0	71.0	72.5	68.5	75.83	76.50
2-15-31	83.3	90.7	90.5	78.1	79.0	76.5	83.50	82.53
3-17-31	87.3	96.5	96.5	84.2	86.0	81.6	88.47	88.90
4-16-31	93.5	103.0	102.5	90.0	91.5	87.5	94.67	94.67
5-16-31	99.0	107.0	108.0	94.5	96.5	93.0	99.67	99.67
6-5-31	102.0	110.5	110.5	97.0	98.5	95.7	102.73	102.00
Av. daily Gain	.196	.186	.175	.186	.186	.194	.192	.182
Third Trial								
1-22-32	81.4	77.	69.1				75.8	
2-17-32	85.0	82.8	73.0	75.3	73.2		77.9	
3-18-32	92.3	88.1	79.4	83.5	77.3		84.1	
4-17-32	97.3	94.1	84.4	86.8	84.2		89.4	
5-18-32	98.0	102.8	89.8	94.0	90.2		95.0	
6-16-32	107.2	107.7	94.7	100.2	96.3		101.2	
Av. daily Gain	.172	.204	.171	.207	.193		.189	

* Calves which received foam and skim milk.

Table 7.—Milk Consumption by Ten Day Periods

Ten Day Periods	First Trial					
	Calf 1*	Calf 2*	Calf 3*	Calf 4	Calf 5	Calf 6
1	100	100	100	100	100	100
2	160	160	160	160	160	160
3	160	160	160	160	160	160
4	200	200	200	200	200	200
5	200	200	200	200	200	200
6	200	200	200	200	200	200
7	200	200	200	200	200	200
8	200	200	200	200	200	200
9	200	200	200	200	200	200
	Second Trial					
1	160	160	160	140	140	140
2	160	160	160	140	140	140
3	160	160	160	140	140	140
4	160	160	160	140	140	140
5	160	160	160	140	140	140
6	180	180	180	160	160	160
7	180	180	180	160	160	160
8	180	180	180	160	160	160
9	180	180	180	160	160	160
10	180	180	180	160	160	160
11	180	180	180	160	160	160
12	180	180	180	160	160	160
13	180	180	180	160	160	160
14	180	180	180	160	160	160
	Third Trial					
1	160	160	120			
2	160	160	120			
3	160	160	120	160		
4	160	160	140	160	120	
5	160	160	140	160	120	
6	160	160	160	160	120	
7	160	160	160	160	140	
8	160	160	160	160	140	
9	200	200	160	200	160	
10	200	200	160	200	160	
11	200	200	160	200	160	
12	200	200	160	200	160	
13	200	200	160	200	160	
14	200	200	160	200	160	
15	200	200	160	200	160	

* Calves which received foam and skim milk.

Table 5 shows the daily rate of gain for the first 180 days (6 months) and the 360 days (12 months). It is noted that the average daily rate of gain in height at withers is greater the first six months than the second. Inasmuch as the experimental calves come within the six months age limit the daily rate of gain should be compared at the six months period rather than for the year. In this comparison the experimental calves exceeded the rate of gain of the normal calves reported by Fitch, in both the skim milk and foam, and skim milk lots.

The experimental calves of pure breeding show an average daily gain of .176 cm. for Holsteins, .184 cm. for Jerseys, and .193 cm. for Guernseys. In all cases the average daily gain in height at the withers exceeded that of normally fed calves.

The number of experimental calves was few. However in no case was the average daily gain of the experimental calves as low as the average obtained by Fitch, of calves raised in the college herd.

Summary and Conclusions

The calf raiser is more or less reluctant about feeding the foam which normally collects on separated milk, because of the ill effects it may have on the calves.

No experimental data on effects of foam are found in the literature which are based on controlled experiments.

Opinions of practical calf raisers are not in agreement on the effects of foam on calves.

The data secured in three trials at this station seem to justify the following conclusions:

1. If the skim milk and foam are fed to the calves in a definite weighed amount the calves on skim milk and foam will make as good gains in body weight as skim milk fed calves, and will increase in height at the withers at the same rate as normally fed calves.
2. The calves may bloat slightly after drinking the skim milk and foam, but no bad after effects are apparent.
3. The hair on some calves receiving skim milk and foam may at times be more rough, indicating not as good a physical condition as calves receiving skim milk.
4. The trials indicate that it is a safe practice to feed calves the foam which normally collects on separated milk provided a definite amount by weight is fed.
5. It is believed that most of the trouble from the feeding of skim milk with foam results from over feeding rather than from the foam itself.