

THE EFFECTS OF CONDITION SCORE ON THE PERFORMANCE OF EARLY LACTATION HOLSTEIN COWS

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INTRODUCTION

Body condition scores are a useful field tool for estimating changes in cow body weight and body tissue reserves, and for evaluating dairy rations and management practices. The standard condition scoring system for dairy cows uses a 1 to 5 scale where a score of 1 represents an extremely thin cow and a score of 5 represents an extremely obese cow. Normally, cows should lose condition in early lactation, resume gaining weight by mid-lactation and should be returning to optimum condition by drying-off or calving. As described by condition scores, mature cows should have a score of 3.5 to 4.0 at calving, 2.5 to 3.0 at 30 days postpartum, 3.0 at mid-lactation and 3.5 to 4.0 by drying-off. Heifers should calve at about 3.5 and follow similar patterns of condition loss and gain as mature cows.

Since feed consumption usually lags behind milk yield, condition loss during early lactation is a normal occurrence for high-producing dairy cows. As a rule, one pound of weight loss provides enough energy to generate seven pounds of milk. One body condition score loss equals about 120 pounds of body weight and, therefore, would provide energy for production of 840 pounds of milk through mobilization of body reserves. Research indicates that the optimal condition loss for a cow in early lactation is from .5 to 1.0 condition score. Loss of less than .5 condition score has been associated with lowered milk yield, while losses greater than 1.0 are associated with reduced reproductive efficiency. The objectives of the present report are to document body condition scores of a component-fed (forage and grain fed separately) dairy herd at the Southeast Research Station (SERS) and to relate condition scores at calving and early lactation condition losses to overall performance of Holstein cows.

METHODS AND FINDINGS

Using the scoring system described above, cattle in the 160-cow SERS herd were scored at calving (days 1 to 7 postpartum), early lactation (days 50 to 57), breeding (days 100 to 107), late lactation (days 225 to 232) and at drying off. Only data taken at the first three scorings are presented in this report. PCDART was used to generate weekly scoring lists based on days in milk. Only cows that calved from 1992 to 1995 and completed a full lactation were used in the evaluation. Condition scores from animals treated for retained placenta/metritis (6.2 % of cows studied), severe mastitis (3.0%), milk fever (2.4%), ketosis (1.2%), acidosis (1.0%), lameness (1.0%) and udder edema (0.4%), during the first thirty days postpartum, were not included in the data set.

Milk yield, feeding management, cow housing, genetics and environment are major factors affecting cow condition. From 1992 to 1995 the peak milk among second or later lactation cows increased from an average of 91 to 96 lbs per cow and rolling herd average increased from 18,827 to 19,800. During that time period, feeding practices were relatively constant. Dry cows received 5.0 lbs of grain which was increased to 10.0 lbs thirty days prior to calving. The amount of grain offered to lactating cows varied depending on silage quality but, in most instances after calving, the amount of grain offered was increased gradually over a 7 to 10 day period to a maximum of 22 lbs per cow. This amount of grain was maintained until day 40 days postpartum when it was increased to 26 lbs per cow daily for cows producing over 90 lbs per day. As cows reached 100 days in milk, grain intake was lowered to the level needed for each individual cow's milk yield with an allowance for weight gain in late lactation. Unless cattle were on a research study, corn silage, ryegrass haylage or a combination of the two were fed year-round. Whole cottonseed was fed with silage at an average rate of 5.0 lbs/cow daily throughout the evaluation period. Ryegrass pastures were usually grazed in the morning and silage fed in the evening from December 1 through May 15 of each year.

Heifers were raised on permanent summer pastures that consisted primarily of bermudagrass, crabgrass and signalgrass. Ryegrass pasture was usually available for heifers from December through April. Bermudagrass hay was fed when pasture availability was low. Heifers received 5.0 lbs/head daily of a 20% protein grain mix year-around.

Condition score at calving. Calving condition score averaged 2.84 for the 429 cow observations obtained from 1992 to 1995 (Table 1). Although over 80% of the cows calved at a score of 2.5 or greater, only 9.0 % of all cows achieved the "optimum" score of 3.5 or more at calving. First-calf heifers were about a quarter of a score better conditioned at calving than were mature cows (3.0 vs 2.75). Calving condition score averages for first calf heifers increased from 2.68 in 1992 to 3.22 in 1995 . These improvements in body condition likely resulted from improved parasite control and enhanced pasture quality and quantity. No consistent improvements in milk yield were observed with increasing condition of heifers, but first service conception rate increased from 17.4% in 1992 to an average of 46.2% from 1993 to 1995.

Table 1. Effect of lactation number on production parameters of Holstein cows calving at the Southeast Research Station from 1992 to 1995					
Item	Lactation No. ¹				
	1	2	3	4 ⁺	All Cows
Cow observations	157	121	87	64	429
Peak milk, lbs/d	72.3 ^A	89.9 ^B	97.2 ^C	95.8 ^C	86.0
305-day milk, lbs	17843 ^A	20693 ^B	21632 ^C	21148 ^C	19831
Services/preg.	2.85	2.96	2.67	2.75	2.80
1 st serv preg. rate, %	37.7 ^B	32.4 ^A	44.8 ^B	32.2 ^A	37.1
Overall preg. rate, %	92.4 ^A	92.3 ^A	88.7 ^A	84.4 ^B	90.2
Days to 1st service	81.2	81.5	82.4	81.0	81.5
Days open	132.9	131.1	132.4	147.5	133.3
Calving difficulty ²	1.90 ^A	1.26 ^B	1.08 ^B	1.15 ^B	1.40
Calving CS ³	3.00 ^A	2.75 ^B	2.79 ^B	2.72 ^B	2.84
Day 50 post-part. CS	2.63 ^A	2.38 ^B	2.22 ^C	2.36 ^B	2.44
Day 100 post-part. CS	2.59	2.40	2.28	2.32	2.43
CS loss, 0-50	0.37	0.38	0.57	0.36	0.42
CS loss, 50-100	0.03	-0.02	-0.06	0.04	0.00
CS loss, 0-100	0.40	0.35	0.51	0.40	0.41
Weight, lbs.	1222.0 ^A	1394.0 ^A	1453.0 ^B	1445.0 ^B	1350.7

¹Different superscript letters indicate that averages for peak milk, milk yields, pregnancy rate, etc. are statistically different.

²Based on 1=no birthing difficulty to 5=extremely difficult birth.

³CS=Condition score, where 1=extremely thin cows to 5=extremely overconditioned cows.

Scores of second- and third-lactation cows tended to remain constant from 1992 to 1995, while cows with four or more lactations appear lower. When considered over all lactations, calving condition score has remained about 2.85 since 1993.

The low number of cows with a calving condition score of 3.5 prevented us from drawing conclusions about the effect of calving cows with less than the recommended amount of condition. However, when “fatter” cows calving with condition scores of 3.0 or more were compared with “thinner” cows with scores of less than 3.0, there were no major differences in lactation performance or reproduction (Table 2).

Table 2. Effect of condition score at calving on lactation performance of Holstein cows at the Southeast Research Station		
Item	Condition Score Group	
	3.0 and greater	less than 3.0
Cow observations	130	299
Calving condition score	3.27	2.51
Condition loss		
Day 0-50	.43 ^A	.33 ^B
Day 50-100	.04 ^A	-.02 ^B
Day 0-100	.47 ^A	.29 ^B
Body weight at calving, lbs	1407.1	1367.0
Peak milk, lbs/cow/d	88.8	89.3
Milk yield, lbs 305d FCM	19458	20001
Days to first service	78.9	82.7
Days open	133.9	133.0
First service preg. rate, %	32.3	39.1
Overall preg. rate, %	90.3	88.7
Services/preg.	2.84	2.77
Calving difficulty score	1.27	1.38
^{AB} Different superscript letters indicate that averages differ significantly.		

Cows with condition scores greater than 3.0 were, on the average, 40 lbs heavier at calving than those with scores of less than 3.0. The .76 unit difference between the high and low condition score group translated to only 53 lbs more body weight per increase in condition score. The body weights of heifers and second-lactation cows at calving were similar, regardless of the condition score group, although mature cows in the high condition group were heavier (1506 vs 1426 lbs). For mature cows, the difference in condition score between the high and low group was .71. This translated into 112 more pounds of body weight per unit of condition score. This is similar to the 120 pounds of body weight associated with each unit of condition score reported by other researchers.

There were no major differences in calving difficulty, days to first service or first service conception rate between calving condition score groups; however, pregnancy rate was lower (75.0 vs 93.8%) for cows with four and more lactations that calved in thin condition.

From this discussion it appears that most of the cows in this herd are calving in thinner condition than recommended. One question posed by this information concerns the relationship between calving condition score and season of calving. About 70% of cows in the SERS herd calve in late summer and fall. Are these cows thinner due to the effects of heat stress? A plot of calving condition score vs calving date (Figure 3) reveals that all cows scoring 3.5 or greater calved from summer to fall. Many of these are obviously heifers, because heifers accounted for 55% of the cows with scores 3.5 or above. When these two calving groups are examined (Table 3), we observe that cows calving from summer to fall had slightly higher condition scores and body weights at calving; but, there were no differences in milk yield. The fact that cows calving from winter to spring are thinner than those calving from summer to fall suggests that dry cow nutrition may play a more dominant role than heat stress in influencing the condition of these cows at calving. Cows calving from summer to fall had plentiful high-quality grazing, whereas those calving from winter to spring relied primarily on average quality summer hay. Cow calving from winter to spring began receiving limited amounts of corn silage along with their hay in 1994. It may be recommendable to increase the amount of silage fed to dry cows in the late fall and winter, in order to maintain body condition. However, the task of increasing the condition of thin cows is likely best accomplished by holding grain 2 to 4 lbs higher in late lactation for those cows that fail to meet target condition scores for a given number of days in milk or days pregnant.

Condition score loss. When averaged for all cows, the condition loss from calving to day 50 postpartum was .42 units (Table 1). This is a fairly modest level of condition loss for a herd with high genetic merit. The cows in the SERS herd, on the average, reached maximum condition loss by day 50 with little additional condition loss from days 50 and 100 postpartum. Condition loss was not greatly effected by lactation number; however, there was a trend for third-lactation cows to lose more condition in early lactation than other groups. This greater condition loss was likely because these cows had the highest peak and total milk production of all lactation groups. Generally, condition loss has been positively associated with body condition score at calving. That is, the more condition a cow has at calving, the more fat that will be mobilized for milk production in early lactation and the greater condition score loss will be. This is particularly evident among cows with high genetic merit. The fact that the condition score of mature cows averaged only 2.75 at calving, rather than the desired 3.5, may have minimized condition loss but likely lowered milk yield in the SERS herd. Average early lactation condition loss increased each year from a low of .22 in 1992 to a high of .45 units per cow in 1995. Again, cows with the most condition to give up, such as first-calf heifers and those cows with the highest milk yield (third-lactation cows), mobilized the most body condition.

The relationship between condition loss from calving to day 50 postpartum and performance of Holstein cows was examined by grouping cows into those that: 1) gained condition, 2) lost up to .5 units or more of condition, or 3) lost .5 units or more of condition (Table 4). Cows that lost .5 units or more of condition (average loss=.77) peaked 3.9 lbs/day higher and produced 949 lbs more fat-corrected milk per lactation than those cows that lost between 0 and .5 units (average loss = .31). The effect of the greater condition loss on milk yield was especially evident among the first-lactation heifers (producing 1676 lbs more milk) and third-lactation cows (producing 1031 lbs more milk) than those cows that either gained weight or lost modest levels of condition in early lactation.

Table 3. Effect of calving season on body condition, milk yield and reproduction of Holstein cows at the Southeast Research Station		
Item	Calving Season ¹	
	Winter/Spring	Summer/Fall
Cow observations	130	298
BCS at calving ²	2.73 ^A	2.85 ^B
BCS day 50 post-calving	2.28 ^A	2.45 ^B
BCS day 100 post-calving	2.25 ^A	2.47 ^B
Condition loss, day 0-50	0.43 ^A	0.34 ^B
Condition loss, day 50-100	0.03	-0.01
Condition loss, day 0-100	0.46 ^A	0.33 ^B
Weight at calving	1363	1386
Peak milk, lbs/h/d	92.4	87.7
Milk yield, lbs 305d FCM	20243	20441
Days to first service	84.1	80.3
First service preg. rate, %	38.7	35.0
Overall preg. rate, %	92.6	87.1
Services/preg.	2.99	2.75
Days open	151.3 ^A	127.3 ^B
Calving difficulty score	1.42	1.33

¹Winter/spring calving season was from Dec. 1 through Apr. 30 and summer/fall calving season was from May 1 through Nov. 30.

²Different superscript letters indicate that averages are statistically different.

In general, greater condition loss was not associated with poorer reproductive performance (Table 4), but few cows in this herd lost more than the 1.0 unit of condition loss that previous research has associated with reduced conception rates. It is possible that, had our cows calved closer to the desired condition score of 3.5, we may have recorded greater condition loss in early lactation and a more negative effect on reproduction. We did observe that those second-lactation cows that experienced high condition loss did have reduced first service conception rates, possibly related to the carry-over effects of high milk yield as heifers and lowered condition at calving. In contrast, third-lactation cows in the high condition loss group actually exhibited higher first service conception rates and lower services per conception than those third-lactation cows that gained condition in early lactation.

The season of calving did influence the amount of condition lost in early lactation. Overall, cows that calved from winter to spring lost more condition than those calving from summer to fall (Table 3). The higher condition loss among cows calving from winter to spring was associated with higher peak milk, but this did not translate to more milk over the entire lactation, suggesting that persistency of milk yield was inferior for cows calving from winter to spring. This may have resulted from the fact that cows calving during this time of year grazed ryegrass in the mornings. That may have led to early and high peak milk but, because of limitations in intake, availability of condition reserves, and, in some cases, the onset of heat stress, milk yield dropped rapidly after peak lactation. Also, cows calving from winter to spring remained in negative energy balance later in lactation (until at least day 100 postpartum) than those calving from summer to fall. This longer period of negative energy balance, possibly coupled with high soluble nitrogen in ryegrass pastures, may have led to the 24 day increase in days open for cows calving from winter to spring compared with those calving from summer to fall.

SUMMARY AND APPLICATIONS

Most cows in the SERS herd calved at below the recommended body condition score. These cows then appeared to lose less condition, probably due to lower fat reserves, than would have been expected for optimum milk yield. Reproduction was low for first-calf heifers that calved in thin condition, but calving condition was not highly correlated with reproduction for mature cows. Increased condition loss was associated with a higher peak and 305-day milk yield. Condition loss in early lactation did not have a negative effect on reproduction, except among second-lactation cows who had reduced first service conception rates. Based on this information, at least two changes in our feeding management seemed warranted. First, low scores at calving suggest the need for increased energy supplementation of mid- to late-lactation cows that fail to meet target condition scores. Secondly, especially low condition among cows calving in the late fall and winter suggests a need for increased forage and (or) grain supplementation for these cows during the dry period.

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Further Reading

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Table 4. Effect of condition loss from calving to day 50 postpartum on performance of Holstein cows at the Southeast Research Station

Item	Condition Loss Groups		
	Gained condition	Loss up to .5	Loss greater than .5
Cow observation			
Lactation 1	15	55	25
Lactation 2	19	38	21
Lactation 3	7	28	21
Lactation 4	9	25	11
All cows	50	146	78
Avg BCS change			
Lactation 1	.07	.30	.78
Lactation 2	.1	.31	.76
Lactation 3	.07	.34	.79
Lactation 4	.19	.29	.75
All cows	.10	.31	.77
Peak milk, lbs/cow/d			
Lactation 1	71.8 ^A	70.7 ^A	77.6 ^B
Lactation 2	89.5 ^A	87.4 ^A	95.3 ^B
Lactation 3	95.3	98.0	99.7
Lactation 4	96.3	98.0	97.1
All cows	88.2	88.5	92.4
Milk, 305 day FCM			
Lactation 1	17843.0 ^A	17339.0 ^A	19015.0 ^B
Lactation 2	20724.0	20098.0	21731.0
Lactation 3	21175.0 ^A	21667.0 ^A	22698.0 ^B
Lactation 4	20919.0	21485.0	20931.0
All cows	20165.0 ^A	20145.0 ^A	21094.0 ^B
Days to 1st service			
Lactation 1	81.9	77.0	88.4
Lactation 2	78.1 ^A	80.4 ^A	93.6 ^B
Lactation 3	84.7	83.4	76.7
Lactation 4	78.2	86.0	77.1
All cows	80.7	81.7	83.9
Days open			

Lactation 1	148.1 ^A	107.3 ^B	159.1 ^A
Lactation 2	121.0	130.3	132.1
Lactation 3	144.2	134.7	118.2
Lactation 4	139.5 ^A	158.7 ^A	110.2 ^B
All cows	138.2	132.8	129.9
1st service preg, %			
Lactation 1	39.0	38.2	36.0
Lactation 2	38.7 ^A	39.5 ^A	19.0 ^B
Lactation 3	23.7 ^B	53.6 ^A	57.1 ^A
Lactation 4	32.1	28.0	36.3
All cows	33.4	39.8	37.1
Overall preg. rate, %			
Lactation 1	90.9	94.5	92.0
Lactation 2	91.9	92.1	90.5
Lactation 3	92.1	96.4	85.7
Lactation 4	82.1	76.0	81.8
All cows	89.3	89.8	87.5
Services/preg.			
Lactation 1	3.42 ^A	2.35 ^B	2.68 ^B
Lactation 2	2.71	2.55	3.42
Lactation 3	3.13 ^A	2.57 ^{AB}	2.00 ^B
Lactation 4	2.50	3.00	2.70
All cows	2.94	2.62	2.70
Calving difficulty			
Lactation 1	1.89	1.85	2.04
Lactation 2	1.35	1.16	1.19
Lactation 3	1.03	1.07	1.20
Lactation 4	1.25	1.00	1.27
All cows	1.38	1.27	1.43
^{AB} Different superscript letters indicate that averages differ significantly.			