

Importance of Body Condition Scoring in Dairy Cattle

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It is doubtful that many of today's dairy herds, fed rations balanced to NRC standards, experience reproductive problems solely because of nutrition. Nutrients and how their deficiencies and excesses affect reproduction have been reviewed.¹⁻⁶ Further research is needed to investigate combinations of nutrients and the subsequent effect on reproduction.

Some veterinary practitioners are convinced that there are profound interrelationships between the nutritional status of dairy cattle and their reproductive performance. This clinical impression was fostered because in many cases regular reproductive tract examinations alone were not adequate to ensure good herd reproductive health and reproductive efficiency. In some cases this impression is justified, but in many cases nutrition is the scapegoat for environment, stress, disease and the main problem of missed heats and other poor reproductive management practices.

This paper will discuss body condition scoring cows on a large dairy farm in north Florida, and its effect upon reproductive performance and 305-day mature equivalent four percent fat-corrected milk (ME 305).

Nutrition Requirements

Recommendations for meeting the nutritional requirements of a dairy cow are based on meeting the cow's maintenance needs at a given weight as well as the additional requirements for milk production, growth, gestation and restoration of lost body weight. Body condition, especially in relation to frame size, has been given little consideration. A dairy cow may need to gain or maintain weight during the latter stage of lactation to be in proper body condition for parturition and lactation.

The Scoring System

The body condition scoring method used in this study for dairy cows was adapted from the systems reported by Wildman⁷ and by Mulvany.⁸ The inclusion of half points between body condition scores of 1 through 5 were deemed to be of practical value to dairy farmers and their consultants as compared to using a scoring system of 1 through 10.⁹ On a scale of 1 through 5, condition score 1 indicates severe undercondition and 5 indicates severe overcondition. This scoring system was devised for use at any point during the production cycle and is not to be influenced by a cow's frame

size, milk production, and health status.

Body condition scores are estimates of the quantity of fatty tissue under the skin of certain areas of a cow's body and are an indication of body reserves. The scoring method is an arbitrary scale of assessing the fatness at the tailhead and loin.

When to Score Cows

The aggressive, forward-thinking dairyman is looking for tools and/or strategies that can be used to enhance the future productivity of each cow. Body condition scoring should be used to manage the high producing cow rather than as a monitoring approach, which occurs after the fact.

Condition scoring of cows during the production cycle provides an opportunity for dairymen to observe body reserves in terms of changes associated with milk production, reproduction, and health. It is highly desirable to condition score cows at least five times during a single production cycle. These checkpoints are: (1) at 100 to 60 days before drying off, (2) at drying off, (3) at calving, (4) at 21 to 40 days postpartum (prebreeding examination) and (5) at pregnancy examination (90 to 110 days postpartum).

Scoring at 100 to 60 Days Before Drying Off

Condition scoring at this pre-drying off period in the production cycle provides the dairyman with the opportunity to use the method as a tool for effective management of a dairy cow's nutritional program. Effectively managing nutrition enables optimal production in the subsequent production cycle as well as through termination of the present one.

It is usually inconvenient for dairymen to body condition score cows at 100 to 60 days before drying off; however, condition scoring dairy cattle during that period is critical because it is still possible to correct deficiencies in body condition if necessary. Cows needing a change in body condition can be fed accordingly during the latter stages of lactation to meet a specific condition score goal at drying off.

Cattle that require additional body reserves are most efficient at depositing these stores during late lactation. Deposited fat is metabolized for milk production with an efficiency of 84%, and this body fat is replaced during late lactation with an efficiency of 75%. The net efficiency of milk production from metabolizable energy derived from stored fat is 63%. If the fat is replaced during the dry period, net

efficiency is decreased from 63% to 48%. Body tissues lost during early lactation can be more economically replaced during late lactation than during the dry period.¹⁰

Scoring at Drying Off

At drying off, a cow's body condition score should be the same as that expected at calving (3.0 to 4.0). Because they gain weight more efficiently during late lactation than during the dry period, cows should attain optimum body condition before drying off.¹⁰

It may be necessary for a dairy to maintain separate groups of fat and thin dry cows and feed them differently. Computerized feeders or magnet feeders can aid this approach, especially in smaller herds where separating multiple groups that have varying needs within the herd is impractical.

Cows with a score of 4.0 at drying off should not lose condition during the dry period. Increased mortality and post partum complications may occur in cows showing weight loss and decreased feed intake during the dry period.¹¹ To avoid weight gain in cows that are at their optimum weight, they should be fed long-stem grass hay, which also helps to maintain the ruminal fill. To minimize infectious and metabolic diseases, major changes in diet should be made slowly, beginning two to three weeks before expected parturition.

Scoring at Calving

Cows need to be in optimum body condition to achieve maximum peak milk yields. They reach peak milk production before they attain peak dry matter intake. Mobilization of body reserves is essential in early lactation to achieve peak milk yield. Each pound of body fat can provide enough energy for production of seven pounds of milk.¹⁰ If cows are not in optimum body condition (scores of 3.0 to 4.0) milk production may suffer.¹²

A condition score of 3.0 to 3.5 is recommended for first-lactation heifers. When body condition scores are above 3.5, calving difficulties increase.^a Fat deposited in the heifer's pelvic (perivaginal) area restricts passage of the fetus at parturition. Consequences of the difficult delivery may be death of the fetus, perivaginal bruising, tearing of the vulvar lip, and nerve trauma resulting in locomotor dysfunction.

Scoring at 21 to 40 Days Postpartum

Daily loss of one to one and one-half pounds of body weight is expected during early lactation. If body condition score drops more than 1.5 points during early lactation, the amount of dry matter intake is probably not optimum. The goal is to maintain body condition score of greater than or equal to 2.5 during early lactation.

Scoring at Pregnancy Examination

During pregnancy, cows should be maintaining their

optimum weight. After 120 days postpartum, they should be storing lost condition at a rate of one half to one pound per day.¹³

Methods

A large commercial dairy herd in northern Florida enrolled in the Dairy Herd Improvement Association, was selected for one of our studies. The Association records show a rolling herd average of 15,000 pounds of milk produced over the 12-month period covered by this study (1984-1985). Cows were housed outdoors and fed a diet consisting of by-product feeds and Coastal Bermuda grass hay. Lactating cows were grouped according to milk production level (high, medium or low), and dry cows were grouped as the "early dries," and the "close-up dries (three weeks before expected calving date). Heifers in their last three weeks of gestation were commingled with the cows grouped as close-up dries.

Condition scoring was conducted on cows at drying off, at calving, at pre-breeding (18-32 days) and peak lactation (60-90 days), Table 1. First lactation heifers were not included in this study since they did not have a drying-off score prior to lactation. Cows in lactation seven or greater were not included in this study due to the few number of animals. Scoring was performed by one individual at drying-off and calving, and another individual at prebreeding and peak. These two individuals consulted biweekly, and were experienced in the use of the system.

TABLE 1. Frequency distribution of body scores for pregnant cows (lactation 2-6).

Condition score	Number of Observations			
	Dry-off	Calving	Pre-breeding	Peak
5.0	7	0	0	0
4.5	13	0	0	0
4.0	57	35	0	0
3.5	232	383	14	174
3.0	85	172	103	122
2.5	12	10	66	14
2.0	0	0	10	0
	406	600	193	310

Analysis

Evaluation of the effect of condition score on the reproductive efficiency of a cow was measured as follows:

A. Reproductive efficiency of cows as measured in terms of days to 1st service and days open.

The effect of condition score on days to 1st service and days open was evaluated using analysis of variance. The condition scorings were performed at dry-off, calving, pre-breeding and at the peak of production. Pairwise

^aBraun RK, Donovan GA, Bliss, EL: Personal observations, 1978-1984.

comparison of mean days to 1st service and mean days open of the various scores of each condition scoring period were made. All statistical analyses were performed using the Statistical Analysis System (SAS).

B. Evaluation of the change in condition score between dry-off and calving, and between calving and pre-breeding on days to 1st service, days open, breedings per conception, and ME 305 was performed using analysis of variance.

C. The significance of the same above mentioned four condition scoring periods on breedings per conception were evaluated using chi-square as a measure of statistical association and the relative risk to measure the strength of association. The condition scorings were recorded into two categories according to the following scheme:

1. If the condition scores at the beginning of the dry period or at calving was 3 or 3.5, the cow was considered to be in a satisfactory condition. Cows with scores outside of this range were considered to be in an unsatisfactory condition.
2. If the condition scores at pre-breeding or at the peak of milk production was 2.5 or 3, the cow was considered to be in a satisfactory condition. Cows with scores outside this range were considered to be in an unsatisfactory condition.

Cows were classified into a satisfactory breeder or an unsatisfactory breeder according to the number of breedings per conception. Satisfactory breeders were those cows which conceived in three or less breeding attempts, while unsatisfactory breeders were those cows which did not conceive in three breeding attempts.

Results and Discussion

Condition scoring at calving, pre-breeding, and peak was significantly associated with days to 1st service. The condition scores were grouped into satisfactory and unsatisfactory. Grouping was based on significance of difference in means of days to 1st service for scores at calving, pre-breeding and peak (Figure 1). The figure showed that the satisfactory scores at calving, pre-breeding, and peak had mean days to 1st service of 65, 61 and 67 respectively.

Condition scoring at calving, pre-breeding and peak were significantly associated with days open. The condition scores were grouped into satisfactory and unsatisfactory. Grouping was based on significance of differences in means of days open for scores at calving, pre-breeding and peak (Figure 2). The figure showed that the satisfactory scores at calving, pre-breeding and peak had mean days open of 109, 119 and 104 respectively.

Cows were assigned to one of three categories according to their change in condition score between dry-off and calving (Table 2). These categories were gain condition, stable condition and lost condition. ME 305 was the only parameter which was significantly associated with the

FIGURE 1. Condition Score vs Days to 1st Service.

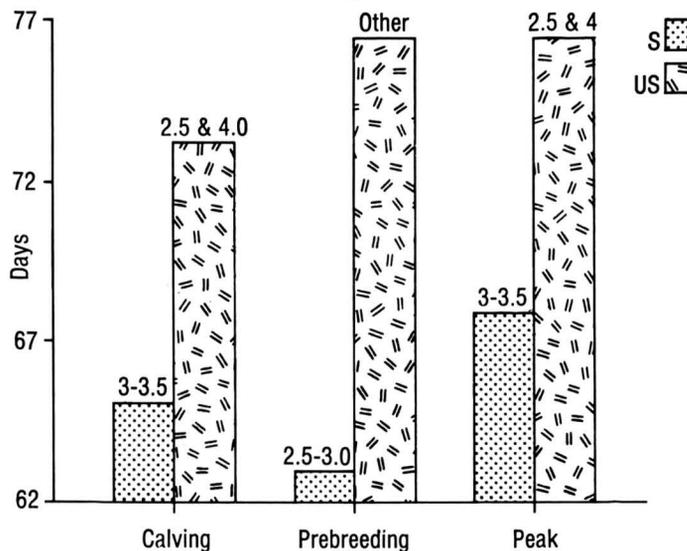


FIGURE 2. Condition Score vs Days Open

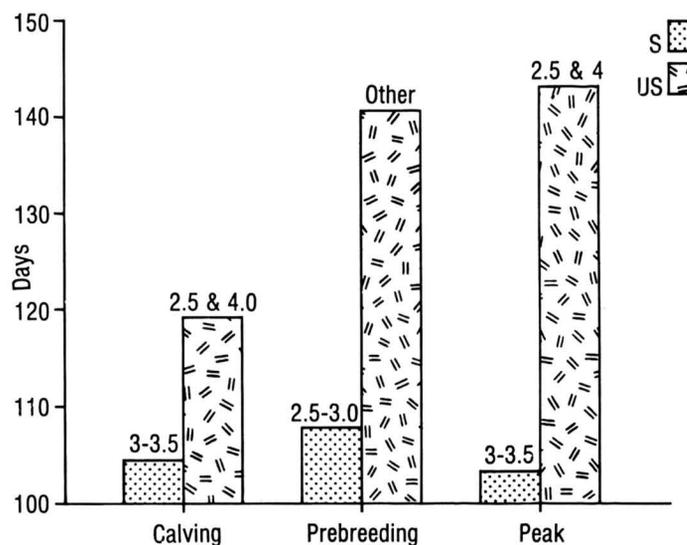


FIGURE 3. Change of Condition Score from Dry-off to Calving.

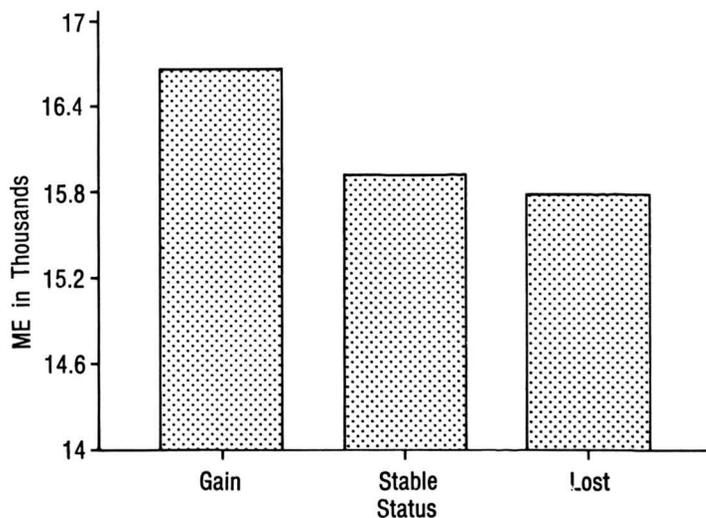


TABLE 2. The effect of change in condition score (CS) from beginning of dry period to calving in pregnant cows.

Change of CS	Days to 1st service	Days open	Breedings/conception	ME305
Gain condition:				
2.5—3.0	69.83	92	1.7	17309
2.5—3.5	66.80	78	1.6	15546
3.0—3.5	65.19	97	2.1	16825
3.5—4.0	67.22	108	2.4	15565
Stable condition:				
3.0—3.0	64.25	109	2.4	16583
3.5—3.5	65.89	102	2.2	15780
4.0—4.0	75.00	141	3.3	16214
Lost condition:				
3.5—3.0	66.12	108	2.4	16016
4.0—3.0	64.75	93	2.3	15329
4.0—3.5	61.84	101	2.1	15571
4.5—3.5	27.36	122	2.6	15000

TABLE 3. The effect of change in condition score (CS) from dry-off to calving in pregnant cows.

Change of CS	Days to 1st service	Days open	Breedings/conception	ME305
Gain condition	66	98	2.1	16661
Stable condition	66	105	2.3	15920
Lost condition	62	109	2.3	15786

Gain was significantly different from the one which lost weight ($P < 0.05$) in ME305. Gain is also different from stable at ($P < 0.08$).

TABLE 4. The effect of change in condition score (CS) from calving to prebreeding in pregnant cows.

Change of CS	Days to 1st service	Days open	Breedings/conception	ME305
Gain condition				
2.5—3.0	87.19	87	1.0	16759
3.0—3.5	69.83	116	3.0	13782
Stable condition:				
3.0—3.0	54.67	98	2.1	16851
3.5—3.5	72.80	148	3.0	17318
Lost condition:				
3.0—2.5	77.10	122	2.3	16730
3.0—2.0	103.17	176	3.5	17947
3.5—3.0	53.05	100	2.1	16467
3.5—2.0	82.50	143	2.8	19441
4.0—3.0	81.67	127	2.7	16110

TABLE 5. The effect of change in condition score (CS) from calving to prebreeding pregnant cows.

Change of CS	Days to 1st service	Days open	Breedings/conception	ME305
Gain condition	62	114	2.3	14965
Stable condition	59	110	2.9	17047
Lost condition	67	115	2.3	16540

Gain is significantly different from stable ($P < 0.09$), and from lost at ($P = 0.19$). No significant difference between stable and lost condition.

change in condition score among the three categories (Table 3). Cows in category gain condition had a significantly higher ME 305 (16661) from other categories, stable and lost condition (ME 305 = 15920 and 15786 respectively) (Figure 3).

A lack of change in reproductive performance for cows changing condition score between dry-off and calving was expected. The change in ME 305 for these cows was unexpected. It was anticipated that cows within a satisfactory body condition group would show an advantage for ME 305 if in the stable condition category. However, the cows in category gain condition had a significant increase in ME 305 compared to categories stable and lost condition (Table 3). It is possible that the high-producing cows were unable to replace body reserves during late lactation and did so during the dry period.

Cows were assigned to one of three categories according to their change in condition score between calving and prebreeding (Table 4). These categories were gain condition, stable condition and lost condition. ME 305 was the only parameter which was significantly associated with the change in condition score among the three categories (Table 5). Cows in category stable condition had a significantly higher ME 305 (17047) from other categories: gain and lost condition (ME 305 = 14965 and 16540 respectively) (Figure 4). However, cows in category stable condition were also significantly higher from category lost condition.

For changes in condition score from calving to prebreeding, the comparison of ME 305 for cows in category gain condition to the other two categories, stable and lost condition, was expected. Cows gaining condition in early lactation will most likely be poor producers (Table 5). Cows with lost body condition would be expected to attain peak milk and highest ME 305 as compared to cows remaining in stable condition. Possibly the cows with stable condition were the most efficient converters of feedstuffs resulting in that category providing the greatest ME 305 (Table 5).

FIGURE 4. Change in Condition Score from Calving to Prebreeding.

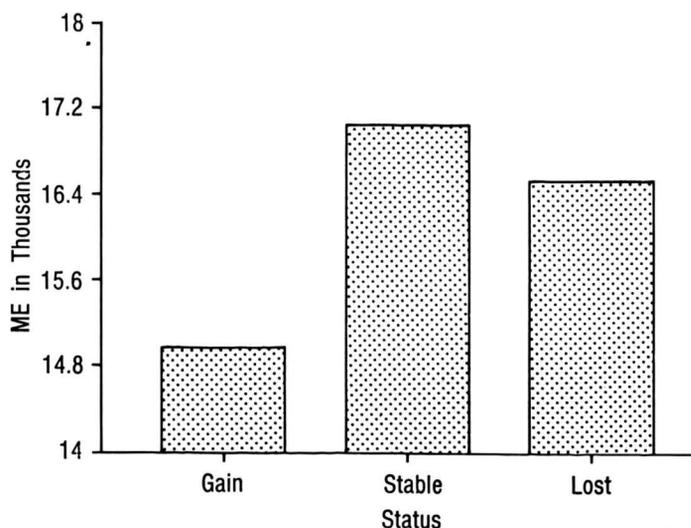


TABLE 6. Association between unsatisfactory condition score and breeding efficiency as measured in days open or breedings per conception.

	Days open		R R	Repeat breeder		R R
	Conceived	Open		Normal	Abnormal	
Dry	S	399	71	238	62	
	US	26	7	1.4	165	51
Calving	S	838	124	742	175	
	US	19	7	2.1*	54	17
Prebreed	S	216	35	201	66	
	US	15	10	2.0*	11	11
Peak ^a	S			190	41	
	US			228	50	1.0

RR : Relative risk

S : Satisfactory

US : Unsatisfactory

* : Significant association

a : Not evaluated due to few observations

The result of association between breedings per conception or remaining open are shown in Table 6. There was a significant association between condition score at calving and the risk of remaining open. Cows which have an unsatisfactory calving condition score had twice the risk of remaining open compared to cows with a satisfactory condition score. However, the data did not show any significant association between condition score at calving and the risk of becoming a repeat breeder.

There was a significant association between the risk of remaining open and pre-breeding condition score (Table 6). Cows with unsatisfactory condition score had twice the risk of remaining open compared to cows with a satisfactory condition score. Cows with an unsatisfactory pre-breeding condition score had twice the risk of becoming a repeat breeder compared to cows with satisfactory condition score.

Conclusion

The results reported from data collected during this trial should be considered preliminary. The data other than ME 305 have not been corrected for season of the year, nutrition, previous days dry, disease or herd comparisons.

Condition scoring is a useful tool to predict reproductive performance. Cows with a satisfactory condition score at calving, pre-breeding or peak are most likely to have normal days to 1st service. Cows with a satisfactory condition score at calving, pre-breeding or peak are most likely to have normal days open. Cows which gain condition between dry-off and calving are most likely to be good producers compared to cows in stable or lost condition. Cows in stable or lost condition between calving and pre-breeding are most likely to be good producers compared to cows which gained condition. Cows with unsatisfactory condition score at calving or pre-breeding were most likely to remain open. Cows with an unsatisfactory condition score at pre-breeding are most likely to be repeat breeders.

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