

Managing Body Condition to Improve Reproductive Efficiency in Beef Cows

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The economics of the beef cattle industry forces cow-calf operations to produce efficiently, and percent of calf crop weaned (really a measure of reproductive efficiency) has a big influence on how efficient production will be. One way to improve reproductive efficiency is to shorten the number of days from calving to rebreeding (postpartum interval, or PPI). If cows are to maintain a yearly production cycle, they must breed back within 80-85 days after calving, but research shows that PPI can range from 30 to 170 days.

Many factors influence PPI, including the cow's age and nutritional status, suckling of the calf, and difficulty in delivery. Some are not easily influenced by management, but nutritional status can be controlled both before and after calving. Since most reproductive failures can be attributed to improper nutrition and thin body condition, control of nutritional status may have dramatic effects on how efficiently cows rebreed.

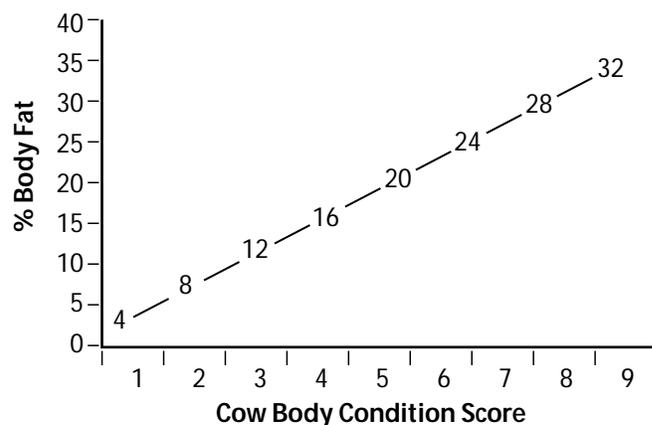
Live weight does not adequately reflect nutritional status. Two animals with similar weights may be different in their body condition. For example, an 1,100-pound cow could be a 1,000-pound cow that has gained 100 pounds of body fat or a 1,200-pound cow that has lost 100 pounds of body fat.

Nutritional status can be most easily determined by evaluating the body condition score (BCS) of cows, which can lead to improved management and feeding. A quantitative body condition scoring system was developed to quantify changes in cow nutritional status so economical nutritional programs could be implemented logically. A 9-point (1 through 9) scale can be successfully used.

A cow with a BCS of 1 is emaciated, and a cow with a BCS of 9 is extremely obese. It is generally estimated that for each change in condition score, the cow must gain between 70 and 100 pounds of body weight. As a cow

increases in BCS, total body fat also increases (Figure 1). A cow with a BCS of 6 would have approximately 20% body fat compared to a cow with a BCS of 4, which would have approximately 12% body fat.

Figure 1. Relationship of BCS and percent body fat in beef cows.



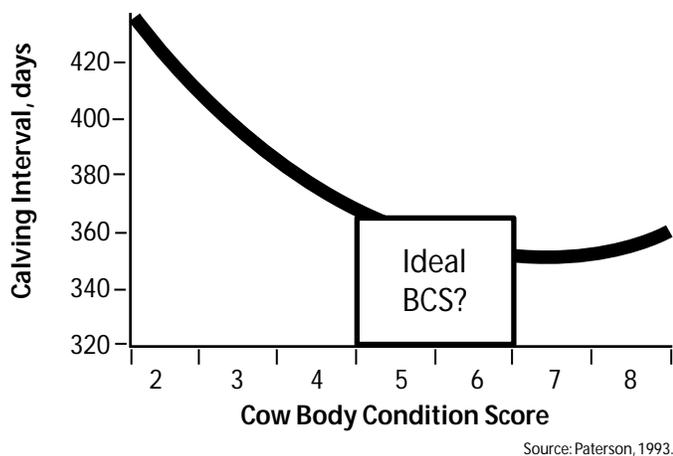
Source: Paterson, 1993.

Score Before Calving

The precalving BCS has a tremendous influence on reproductive efficiency. As precalving BCS decreases, the number of days from one calving to the next (calving interval) increases in beef cows (Figure 2). Females with a precalving BCS of less than 5 tend to have production cycles greater than 1 year. For example, cows with a precalving BCS of 3 would be expected to have a calving interval of approximately 400 days, while a cow with a precalving BCS of 6 would have a calving interval of approximately 360 days.

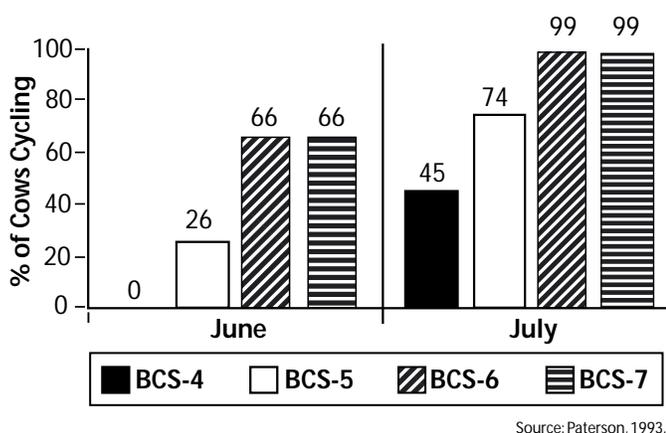
See pages 4 and 5 for illustrations of the Body Condition Scoring System.

Figure 2. Effect of cow body condition score on calving interval.



Cows with a lower precalving BCS reproduce less efficiently because their PPI is longer. South Dakota research illustrates the influence of precalving BCS on the percentage of cows that initiated estrous cycles after calving (Figure 3). This experiment demonstrated that the percentage of thin cows that were cycling in the first month of the breeding season (June) was considerably lower than for cows that were in more moderate body condition. During the second month of the breeding season, 55% of the cows with a BCS of 4 had still not initiated estrous cycles, while more than 90% of the cows in more moderate condition had begun to cycle. Thin cows need a longer breeding season, which results in more open cows in the fall. They may also result in lighter calves to sell the next year because the calves from these thin cows will be born later in the calving season.

Figure 3. Effect of BCS on percentage of cows cyclic during the first (June) and second (July) month of breeding.



Basically, cows that calve in good body condition return to estrus sooner (Table 1) and are more likely to conceive during the breeding season (Table 2) than cows that calve in thinner body conditions. This likelihood is extremely important in Kentucky, where most cows calve in the spring and are grazing fescue, generally with a high endophyte level, during the breeding season.

Cows need to conceive early in the breeding season, before periods of heat stress begin. When cows are wintered on low-quality hay, body condition (fat reserves) suffer, and cows may not regain condition quickly enough to conceive before periods of heat stress start to occur (usually late June).

The effect of precalving BCS on pregnancy rates is enhanced in younger cows (Table 3). Only 53% of first-calf heifers with a BCS of 4 conceive during the breeding season, compared to 72% of mature cows.

Parturition BCS of cows affects PPI and pregnancy rate and results in an increase in production efficiency and profitability (Table 4). Thin cows (BCS = 3 or 4) were less likely to conceive, and weaned younger calves which were lighter as compared to more moderately conditioned cows (BCS = 5 or 6). Because of the weaning of lighter calves, the thin cows generated less income per calf and less yearly per-cow income for the producer.

Table 1. Effect of BCS at calving on PPI in beef cows

Calving BCS	< 4	> 5
PPI, days	61	49

Source: Richards et al., 1986.

Table 2. Effect of BCS at calving on pregnancy rates in beef cows.

Calving BCS	< 4	5	> 6
Number of Cows	122	300	619
Pregnancy Rate (%)	58	85	95

Source: Paterson, 1993.

Table 3. Relationship of parity and BCS to pregnancy rate.

Parity	Body Condition Score			All
	< 3	4	> 5	
1	20	53	90	84
2	28	50	84	71
3	23	60	90	85
4-7	48	72	92	87
> 8	37	67	89	74
All	31	60	89	82

Source: Rae et al., 1993.

Table 4. Effect of BCS on beef cow performance and profitability.

BCS	Pregnancy Rate (%)	Calving Interval, (days)	Calf Age at Weaning, (days)	Calf Daily Gain (lb)	Calf Weaning Weight (lb)	Calf price \$/100 (lb)	Income (\$/calf)	Yearly ^a Income (\$/cow)
3	43	414	190	1.60	374	96	359	142
4	61	381	223	1.75	460	86	396	222
5	86	364	240	1.85	514	81	416	329
6	93	364	240	1.85	514	81	416	356

Source: Rae et al. 1993.

^a Calculated by multiplying the pregnancy rate by the income per calf.

Score After Calving

Maintaining BCS of cows after calving also affects reproductive efficiency. Cows that calve in moderate body condition need to be fed to maintain their BCS in order to obtain a short PPI (Table 5).

Research in Scotland (Table 6) indicated that cyclic activity can be increased in thin cows by feeding them a high energy diet that increases weight gain and BCS. The percentage of thin cows that had initiated estrous cycles after being fed a diet to increase weight (high feeding level after calving) was 34% greater than thin cows that were fed a diet resulting in weight loss (low feeding level after calving). Surprisingly, fat cows that were allowed to lose weight after calving had reduced cyclic activity.

Although the percentage of thin cows that initiated estrous cycles after being fed a diet to increase weight was high, little was gained in terms of pregnancy rates. These thin cows were still thin at breeding (only gaining 19 pounds). As BCS at breeding increases, conception rates increase (Figure 4). Therefore, it is *not* a good strategy to let cows become thin at calving and then attempt to increase their BCS after calving.

Figure 4. Relationship of BCS at Breeding to the Probability of Conception in Beef Cows.

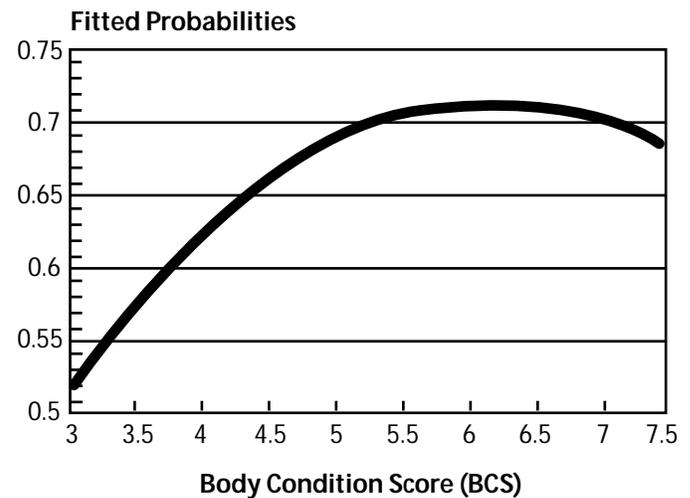


Table 5. Effect of change in BCS after calving on PPI.

Change in BCS	PPI (days)
Lost	60
Maintained	32
All cows	43

Source: Rutter and Randel, 1984.

Table 6. Effect of change in BCS after calving on cyclic activity.

Condition at Calving	Thin		Fat	
	Low	High	Low	High
Feeding Level after Calving				
Calving Weight (lb)	1,027	981	1,159	1,133
Weight Change after Calving	-127	19	-180	-38
Percentage Cyclic	58	92	77	91

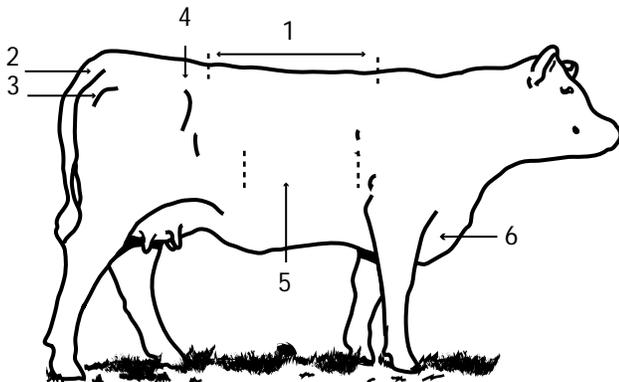
Source: Paterson, 1993.

Body Condition Scoring System

Score cows using the body conditions that follow. Use the figure below to help you identify the anatomical areas described.

- Bone structure of shoulder, ribs, back, hooks, and pins are sharp to the touch; little evidence of fat deposits or muscling (Score = 1).
- Little evidence of fat deposits but some muscling in hindquarters (Score = 2).
- Beginning of fat cover over the loin, back, and fore-ribs. Backbone still highly visible (Score = 3).
- Foreribs not noticeable; 12th and 13th ribs still noticeable to the eye (Score = 4).
- 12th and 13th ribs are not visible to the eye unless animal has been shrunk. Areas on each side of the tail-head are fairly well filled but not mounded (Score = 5).
- Ribs fully covered, not noticeable to the eye. Hindquarters are plump and full (Score = 6).
- Abundant fat cover on either side of tailhead with some patchiness evident (Score = 7).
- Animal taking on a smooth, blocky appearance; bone structure disappearing from site (Score = 8).
- Bone structure not easily seen or felt. Tailhead buried in fat. Animal's mobility may be impaired (Score = 9).

Anatomical regions used for determining BCS.



- | | | |
|-----------|---------------|-------------|
| 1 = Back | 2 = Tail Head | 3 = Pins |
| 4 = Hooks | 5 = Ribs | 6 = Brisket |

Examples of Body Condition Scores



Score = 1.



Score = 2.

(Examples of body condition scores continue on page 5.)



Score = 3.



Score = 6.



Score = 4.



Score = 7.



Score = 5.



Score = 8 or 9.

Summary

Body condition plays a vital role in reproductive efficiency. Managing according to body condition score can greatly improve profitability of a beef cow-calf operation. The optimum BCS prior to calving and breeding is 5 or greater. Cows that are thin (BCS less than 5) at calving have much longer PPI than cows that calve in moderate body conditions (BCS greater than 5). After calving, cows in which BCS is maintained initiate estrous cycles earlier, breed back faster, and calve earlier the next year. These earlier-calving cows wean heavier calves and are more profitable. Feeding programs should be designed to obtain and maintain cows at a BCS of 5 or greater from precalving (usually during the winter feeding period) through rebreeding.

References

- Rae, D.O., W.E. Kunkle, P.J. Chenoweth, R.S. Sand, and T. Tran. 1993. Relationship of parity and body condition score to pregnancy rates in Florida beef cattle. *Theriogenology* 39:1143.
- Kunkle, W.E., R.S. Sand, and D.O. Rae. 1994. In: *Factors Affecting Calf Crop*, First Edition, p. 167, CRC Press, Inc.
- Richards, M.W., J.C. Spitzer, M.B. Warner. 1986. Effect of varying levels of postpartum nutrition and body condition at calving on subsequent reproductive performance in beef cattle. *J. Anim. Sci.* 62:300.
- Rutter, L.M. and R.D. Randel. 1984. Postpartum nutrient intake and body condition: Effect on pituitary function and onset of estrus in beef cattle. *J. Anim. Sci.* 58:265.
- Paterson, J.A. 1993. Effects of Body Condition on Reproductive Performance. In: *1992-1993 Regional Beef Meetings, Management for Efficient Reproduction*, p. 32, University of Missouri Press.