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EC281
(Revised June 2014)

Body Condition Scoring Beef Cows:

A Tool for Managing the Nutrition Program for Beef Herds

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Body condition scores (BCS) describe the relative fatness of a cow through the use of a nine-point scale and is an effective management tool to evaluate nutritional status of the herd. The body condition scoring system allows producers to visually assess their cow herd using a number system that objectively describes the amount of condition or fat reserve of an animal. Because cow/calf producers do not weigh cows on a regular basis, they need a management technique to evaluate their cow herd as it relates to productivity and profit potential. Cow body condition score is closely related to reproductive efficiency, especially for spring-calving females, and is a more reliable indicator of nutritional status of a cow than is body weight.

This extension circular describes the nine-point body condition scoring system, relationship between body condition and productivity of the cow herd, and use of body condition as a management tool to development and monitor nutritional programs. Incorporation of body condition scoring as a management tool can increase the profit potential of the cow/calf enterprise.

Body Condition Scores Reflect Body Fat

The beef cow can store energy in the form of fat when energy intake exceeds her nutrient requirements, and then draw on these energy reserves when her requirements exceed the nutrients supplied by the diet. This stored energy reserve can be managed to level out the peaks and valleys of a seasonal feed supply. Body fat also insulates the cow against the effects of severe cold weather, thus reducing heat loss. The amount of body fat associated with each BCS, as a percent of body weight, is shown in *Table 1*. A cow in BCS 3 has 11.3 percent body fat and a cow in condition score 6 has 22.6 percent body fat.

As a rule of thumb, one BCS equates to about 75 to 80 pounds of live weight in cows. Thus, if a cow weighed 1,100 pounds at BCS 4, this same cow would be expected to weigh 1,175 pounds at BCS 5 and 1,250 pounds at BCS 6. It is important to remember that these weight changes do not include weight of the fetus, fetal membranes, or fetal fluids, which in total amounts to about 125 to 155 pounds for cows in late gestation. With this concept in mind, remember a cow that is maintaining weight during late gestation is actually losing body weight and, possibly, body condition because the fetus is growing at least one pound per day.

Table 1. Percent Body Fat Associated With Each Body Condition Score

BCS	% Body Fat
1	3.8
2	7.5
3	11.3
4	15.1
5	18.9
6	22.6
7	26.4
8	30.2
9	33.9

Nutrient Requirements of Beef Cattle, 7th Revised Edition, 2000. National Academy Press, Washington, DC.

Body Condition Scoring Beef Cows

Body condition scoring can be done using visual indicators or a combination of visual and palpation of key bone structures for amounts of fat during routine processing of cows through a chute. Key areas for evaluation are the backbone, ribs, hips, pinbones, tailhead, and brisket (*Figure 1*). Palpating cows for fatness along the backbone, ribs, and tailhead will help refine skills to visually score body condition.

If body condition scoring is new to you, focus on separating cows into thin, moderate, and fat groups without worrying about the numerical score. With experience, you will connect the "look and feel" of your cows to a body condition score that you can consistently determine. Body condition scores should be monitored and recorded at various times of the year so that links to productivity and herd management can be examined. Several years of such information should reveal nutritional status patterns for your herd. This information can be useful for managing the feeding program of your herd, identifying a sire group of females that simply don't fit your resources, or implementing weaning and/or supplementation strategies.

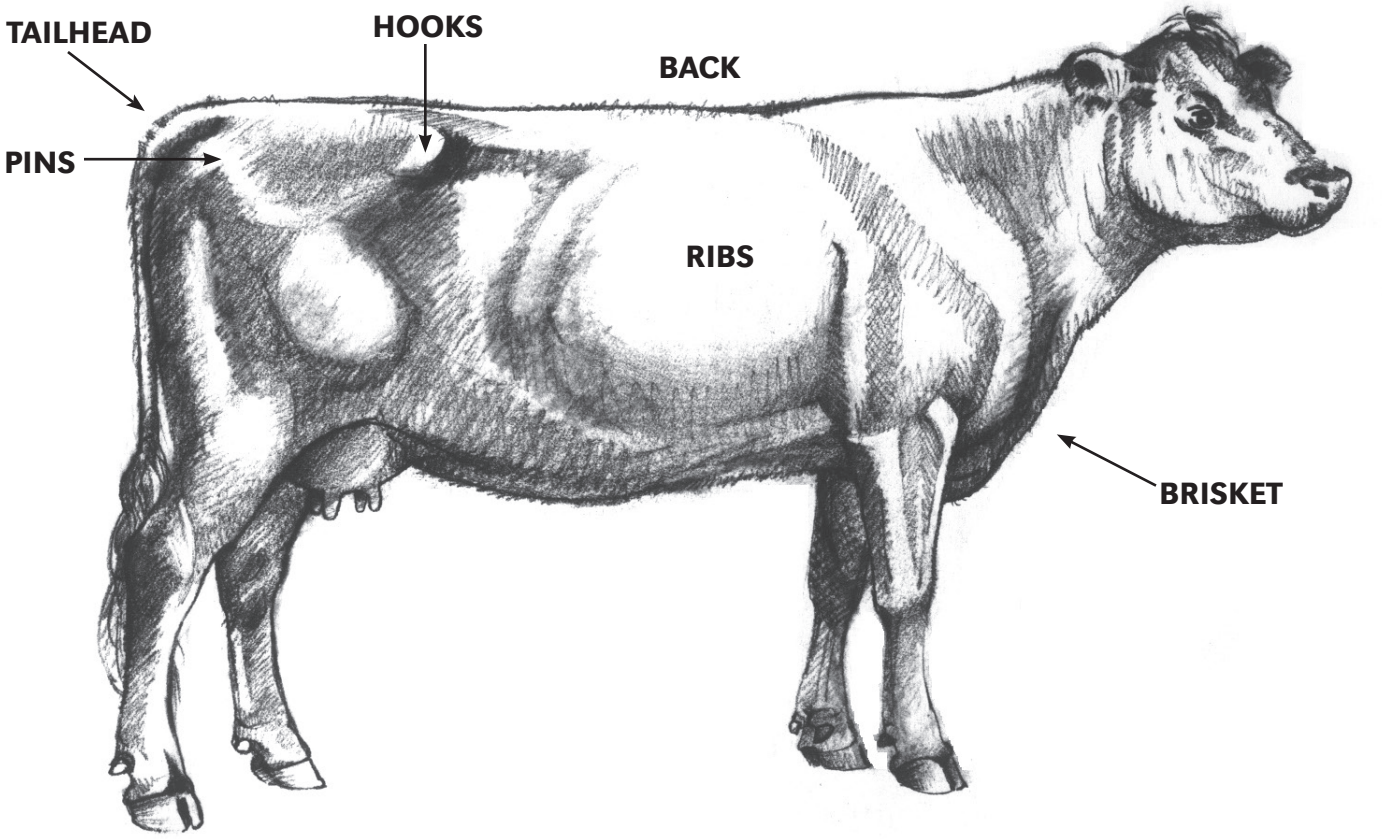


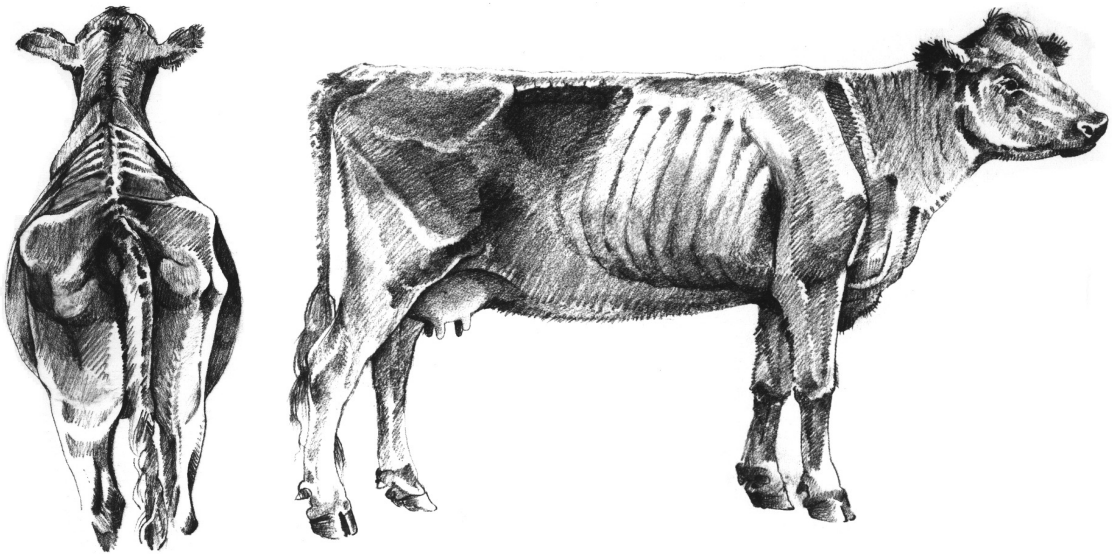
Figure 1. Key areas for evaluation on the beef cow are the backbone, ribs, hips, pinbones, tailhead, and brisket. Drawings courtesy of Elanco.

When visually scoring body condition, it is important to take into account muscle and hair coat on cows, especially a long winter hair coat. You may be surprised at the impact hair coats can have on visual scores. Long, thick winter hair coats are obviously highly desirable in the Northern Plains. Thus, when practical, palpating cow for fatness along with visual scores may produce more consistent, more accurate body condition scoring. When possible, it is good training exercise to re-evaluate body condition scores when cows are wet because the hair coat is matted down making it easier to evaluate body condition. *Figure 2* includes drawings of what cows look like without hair and are in BCS 3, 5, and 7.

Other factors, in addition to hair coat, that can affect visual body condition scores are age of cow, rumen fill, stage of pregnancy, time since last took a drink (dehydration), cold, heat, length of time held in a corral while working the cattle, trailing, and other factors. The goal is to evaluate cow condition independent of these factors. At first, one or more of the above factors may mislead you, but careful study of your herd through the production year will sharpen your focus so that body condition can be scored independent of other factors.

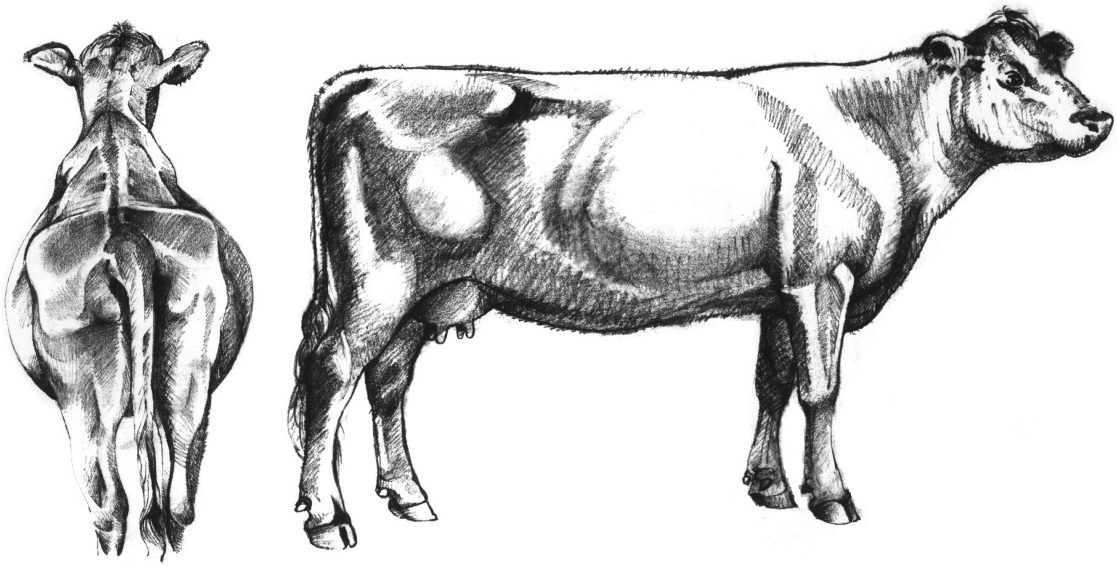
BCS = 3

Liveweight: 980 lbs
11% Body Fat



BCS = 5

Liveweight: 1,130 lbs
19% Body Fat



BCS = 7

Liveweight: 1,280 lbs
26% Body Fat

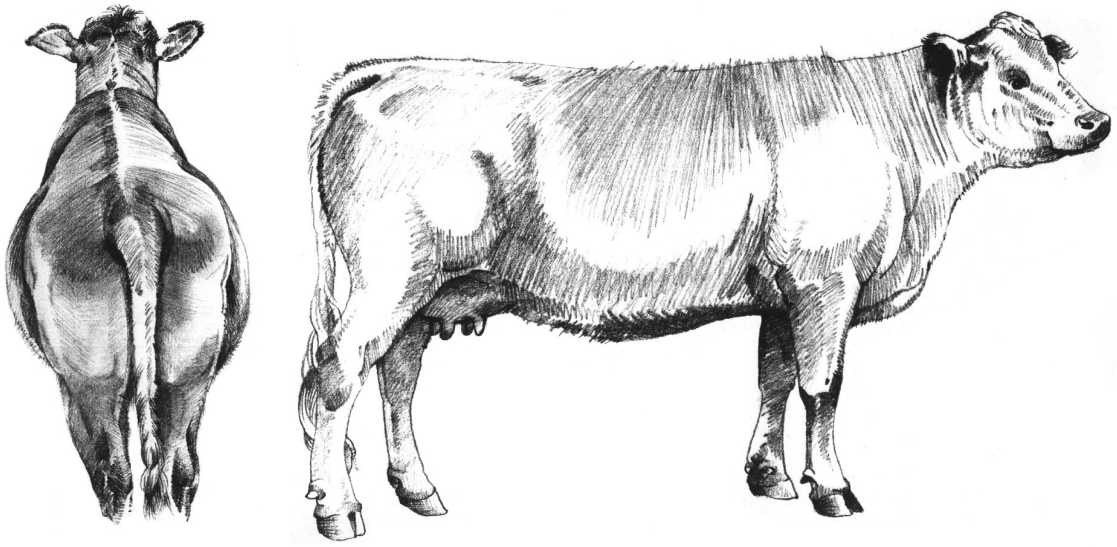


Figure 2. Drawing of what beef cows look like without hair and are in BCS 3, 5, and 7. Drawings courtesy of Elanco.

Nine Point Body Condition Scoring System

Following is a description of the 1 to 9 body condition scoring system where a BCS 1 cow is extremely thin and emaciated and a BCS 9 cow is very fat and obese. Assign a cow a condition score in whole numbers (3, 4, 5, etc.).

Group	BCS	Descriptions
	1	Bone structure of shoulder, ribs, back, hooks, and pins are sharp to the touch and easily visible. No evidence of fat deposits or muscling.
Thin	2	No evidence of fat deposition and there is muscle loss especially in the hindquarters. The spinous processes feel sharp to the touch and are easily seen with space between them.
	3	Very little fat cover over the loin, back, and foreribs. The backbone is still highly visible. Processes of the spine can be identified individually by touch and may still be visible. Spaces between the processes are less pronounced. Muscle loss in hind quarter.

BCS 3 — Rear view

BCS 3 — Side view

Borderline	4	Foreribs are slightly noticeable and the 12th and 13th ribs are still very noticeable to the eye. The transverse spinous processes can be identified only by palpation (with slight pressure) and feel rounded rather than sharp. Slight muscle loss in hind quarter.

BCS 4 — Rear view

BCS 4 — Side view

Moderate

5 The 12th and 13th ribs are not visible to the eye unless the animal has been shrunk. The transverse spinous processes can only be felt with firm pressure and feel rounded but are not noticeable to the eye. Spaces between the processes are not visible and are only distinguishable with firm pressure. Areas on each side of the tailhead are starting to fill.

6 Ribs are fully covered and are not noticeable to the eye. Hindquarters are plump and full. Noticeable springiness over the foreribs and on each side of the tailhead. Firm pressure is now required to feel the transverse processes. Brisket has some fat.

BCS 5 — Rear view

BCS 5 — Side view

BCS 6 — Rear view

BCS 6 — Side view

BCS 7 — Rear view

BCS 7 — Side view

Fleshy

7 Ends of the spinous processes can only be felt with very firm pressure. Spaces between processes can barely be distinguished. Abundant fat cover on either side of the tailhead with evident patchiness. Fat in the brisket.

8 Animal takes on a smooth, blocky appearance. Bone structure disappears from sight. Fat cover is thick and spongy and patchiness is likely. Brisket is full.

9 Bone structure is not seen or easily felt. The tailhead is buried in fat. The animal's mobility may actually be impaired by excessive fat. Square appearance.

Table 2. Visual Description of Key Body Locations Associated With Each Condition Score

Reference Point	Body Condition Score								
	1	2	3	4	5	6	7	8	9
Physical weak	yes	no	no	no	no	no	no	no	no
Muscle atrophy[a]	yes	yes	yes	slight	no	no	no	no	no
Outline of spine visible	yes	yes	yes	slight	no	no	no	no	no
Outline of ribs visible	all	all	all	3-5	1-2	0	0	0	0
Fat in brisket and flanks	no	no	no	no	no	some	full	full	extreme
Outline of hip and bones visible	yes	yes	yes	yes	slight	no	no	no	no
Patchy fat around tailhead	no	no	no	no	no	slight	yes	yes	yes

[a]Muscles of loin, rump, and hindquarter are concave, indicating loss of muscle tissue.
Adapted from Pruit and Momont, South Dakota State University, 1988.

Table 2 outlines what can be seen and felt as body condition of the cow changes. Notice that cows in BCS 1, 2, and 3 have had to mobilize fat stores and muscle tissue to meet their maintenance requirements because the nutritional management has not been sufficient for maintenance. Muscle atrophy is not evident in cows with a BCS of 5 or greater.

Body Condition and Cow Herd Productivity

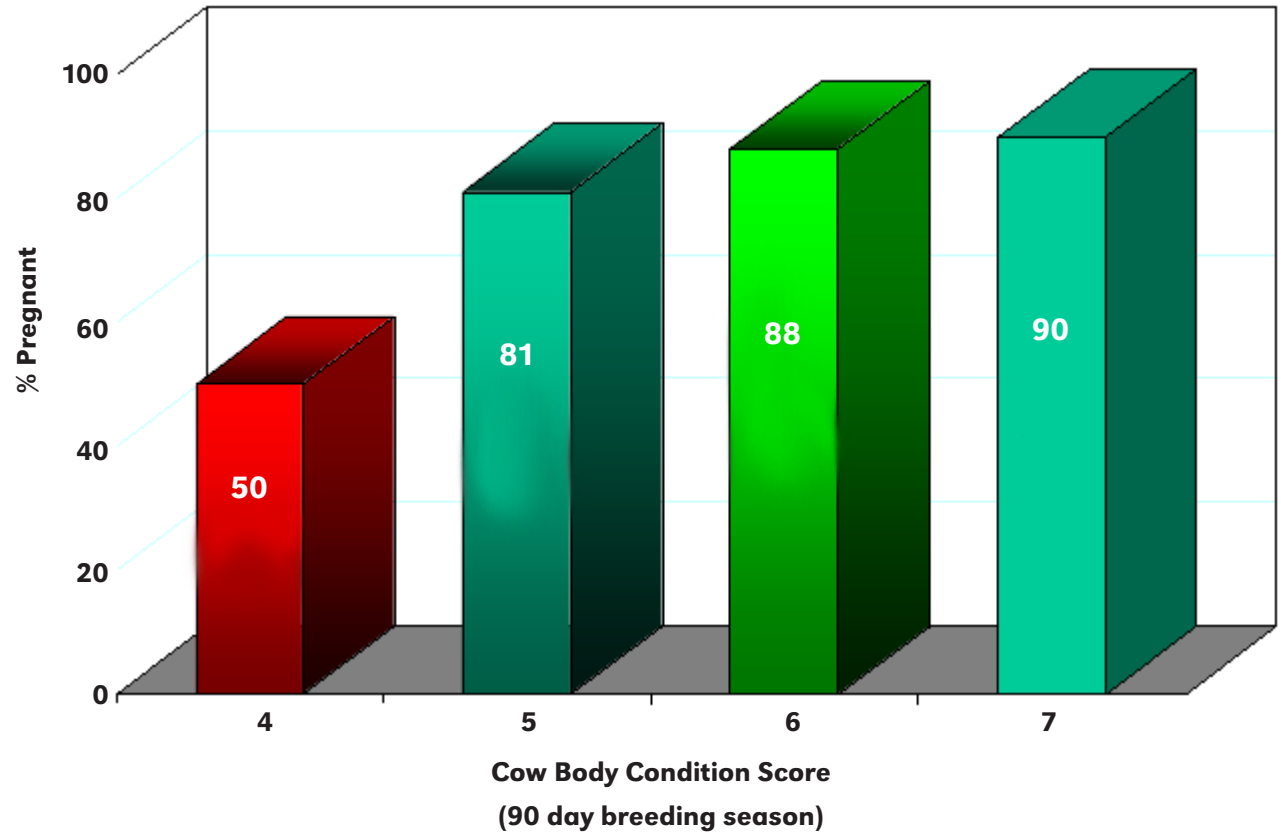
Body condition of beef cows that calve in the spring influences productivity of the herd. As body condition of a cow increases at calving for March calving cows, the interval from calving to the first estrus, known as the postpartum anestrous interval, is reduced (*Table 3*). Thin (BCS 4 or less) cows are slower to rebreed after calving compared to cows in moderate body condition. For a cow to maintain a 365-day calving interval, she must rebreed by 83 days after calving (282 day gestation + 83 day postpartum interval = 365 days). Average length of the postpartum interval for cows that calve in a condition score of 3 and 4 is 80 days compared to 55 days for cows that calve in BCS 5 and 6. The average postpartum interval for cows that calve in BCS 7 is less than cows in moderate body condition, but it is not economical to feed cows harvested forages so they calve in a BCS 7.

Table 3. Relationship Between Body Condition and the Average Interval From Calving to First Heat After Calving

Body Condition Score	Average Postpartum Interval[a], days
3	89
4	70
5	59
6	52
7	31

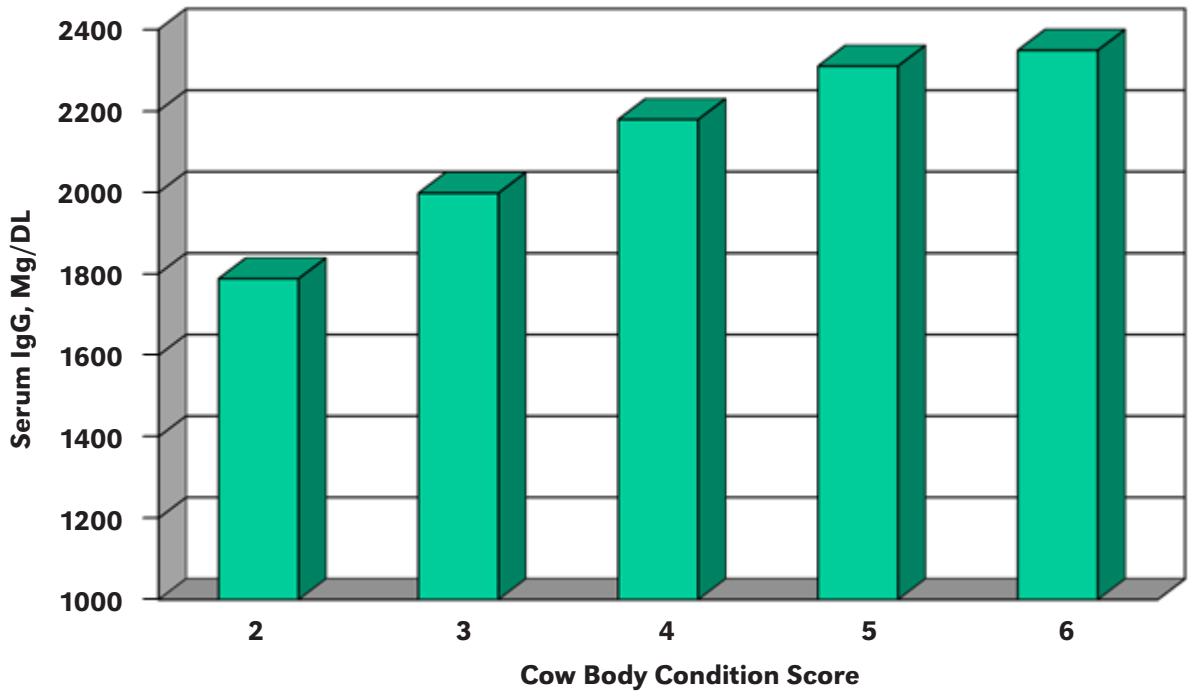
[a]Postpartum interval is the interval from calving to first heat or estrus after calving.
Houghton et al., 1986. Purdue University

Body condition at calving for spring-calving cows also influences pregnancy rates during the subsequent breeding season (*Figure 3*). As BCS increases to 5 at calving, pregnancy rate increases. Analysis of records from a large commercial cow/calf operation in Wyoming illustrates the relationship between body condition score at weaning and subsequent reproductive performance (*Table 4*). As BCS at weaning increases, pregnancy rate during the next breeding season also increases. Postweaning implementation of management strategies to economically increase body condition to at least 5 before calving in the spring will positively impact reproductive performance during the next breeding season. For mature cows that calve in the early



Selk at. al, 1986 Oklahoma State University.

Figure 3. Effect of cow body condition score at calving on pregnancy rate



Odde et. al, 1986 Colorado State University.

Figure 4. Effect of cow body condition score at calving on concentration of IgG in serum of calves 24 hours old

Table 4. Relationship of Body Condition Score at Weaning and Pregnancy Rate for Spring Calving Cows

	Body Condition Score				
	<3	4	5	6	>6
Total Cattle	3,415	23,811	37,970	26,213	9,654
% of Herd	3.4	23.6	37.6	25.9	9.5
% Pregnant	75.7	85.4	93.8	95.6	95.6

Cherni, 1995: Padlock Ranch - Dayton, Wyo.
9 year summary (1986-1994) 101,063 total observations.

summer, body condition at calving can be less and still achieve respectable reproductive performance. There are data that indicate that summer calving cows that are BCS 4 to 4.5 at calving have a high rebreeding rate. These females are grazing vegetative grass pasture for at least 45 days prior to the start of the breeding season. Finally, cows that calve in thin body condition may give birth to calves that are less vigorous and are slower to stand to nurse for the first time.

There is some evidence that thin (BCS 4) **mature cows** at calving in March can achieve a high pregnancy rate during the subsequent breeding season. If thin **mature cows** are not challenged after calving with inclement weather conditions, further nutritional restriction, or if **mature cows** are consuming/grazing a high quality diet such as an immature range or pasture for a short time (three to five weeks) prior to the start of the breeding season, productivity will likely not be reduced. However, in years when harsh weather results in lower body condition at calving, it may not be economical to calve **mature cows** in a BCS 4. We would not recommend March calving **mature cows** at BCS 4, but reproductive performance could be satisfactory. This management strategy is risky.

There is less flexibility for low BCS at calving for first-calf heifers. Target bred heifers to calve in BCS 6. The greater body condition is warranted because they are lactating for the first time, repairing the reproductive tract for re-breeding, and are still growing. The interval from calving to the time of their first estrus after calving (postpartum interval) is longer than that of mature cows. These young cows lactating for their first time will need a high quality diet before and after calving so that they calve in a BCS of 6 and maintain that condition until the start of the breeding season.

When to Condition Score Cows

The greatest single factor influencing rebreeding performance of beef cows is body condition at calving. However, if producers wait until calving to manage body condition of their cow herd, they will find it very difficult and expensive to increase the body condition of a lactating cow.

For cows on range, late summer/early fall is the time to monitor body condition and determine management strategies to get cows in the target body condition before calving economically. This may mean using management tools such as early weaning, supplementation, or both. For producers that have cool-season pastures and crop residues, late summer/early fall condition score may not be as critical. However, it may be important in dry years. Then, early weaning or supplementation may be management options. The period from late summer to 90 days pre-calving is the time to get serious about body condition scoring and planning the nutrition/management program because the manager's strategy can have great impact on profit potential. The period from calving to breeding may help explain the productivity, or lack thereof, but it is probably too late to make nutritional changes which will have an impact on herd productivity and profitability.

Grouping Cows By Body Condition For Feeding

The ideal BCS for mature cows (4 years and older) prior to calving in the spring is 5 and should be one condition score higher for first-calf two-year-old heifers. The higher condition score is warranted for the younger cattle because after

When to Body Condition Score the Cow Herd

Although evaluation of body condition can be looked at as an ongoing process, there are key times when body condition scoring should be considered:

Time	Reason
Late Summer	Condition scoring the cow herd at this time may be used in planning management strategies such as early weaning or supplementation programs for cows grazing warm-season pastures or range that are decreasing in quality. Scoring cows at this time is probably more important in range areas as compared to areas that would have both cool- and warm-season pastures and crop residues. Young cows need to be examined closely, as they are likely to be the females that are losing condition, and early weaning this group may be the management option. Also, if pasture quality and quantity is decreasing at a rapid rate due to environmental conditions, weaning the whole calf crop may be necessary.
Fall	Condition scoring cows in the range area in the fall is critical. Because of feed resources, it is more difficult to get condition back on cows prior to calving in the range area where the feed resources are primarily warm-season grasses. Condition scoring cows at this time will help in planning an economical winter supplementation program to get females back to the target BCS. If young females are thin, consider early weaning their calves to allow them to regain condition.
Weaning Time	Pay particular attention to young cows weaning their first calves, as they are most likely to be thin at this time. In areas where crop residues are part of the feed resource, thin cows will typically regain condition.
45 Days After Weaning	Gives a good idea how fast cows are "bouncing back" after weaning. Thin cows should be gaining back condition if cow type is matched with the feed resources. This is especially true if cows have both warm- and cool-season pastures or crop residues to graze. It will take longer for cows grazing dry native range to gain back body condition.
90 Days Before Calving	Last opportunity to get condition back on cows economically. This would be the time to separate thin cows from cows in good condition and feed them separately. Pay attention to young cows.
Calving	If cows are thin, you may want to change the pre-calving feeding program or weaning date. Thin mature cows at calving may indicated a mismatch between genetics and feed resources, especially if cows received adequate diets and they are thin. It also may mean that calving and/or weaning are not matched with the resources or genetics. It is difficult to economically get condition on cows after calving. It takes large amounts of high quality feed.
Breeding	Thin cows at this time may indicate a poor match of calving season to feed resources. Maybe calving occurs too early in the spring.

calving they are still growing while suckling a calf plus preparing for rebreeding.

Economically it's much easier to get condition back on cows before calving because the nutrient requirements are lower compared to after calving. It is also more economical to get condition back on cows through grazing or grazing along with supplementation, when needed, as compared to hauling high energy feeds to cows to get them in the target body condition. The supply or amount of dormant season grazing will determine if this is an option.

If cows are not in the condition desired, then two feeding groups starting about 90 days before calving would be a good strategy: one group for mature cows in good condition (BCS 5) and a second group for thin cows (BCS 4). Often the thin cows are three-year-olds, pregnant with their second calf, and are thin because they lost body condition while nursing their first calf and didn't recoup their lactation weight loss in the fall after weaning. It may be possible to feed the thin cows with the first-calf two-year-olds because the objective for both groups is weight gain while the objective in mature cows in good condition is simply to maintain condition. Also, the feedstuffs used for bred heifers are generally more energy dense (grain, grain byproducts, corn silage, alfalfa, etc.), as opposed to the common foodstuffs used to feed mature cows in good condition (winter range, hay, crop residue).

The most economical management strategy to get females in the target condition before calving is through grazing opportunities as compared to hand-feeding high energy feeds. This is especially true for extended grazing systems that incorporate native range areas. The key is to have females in adequate BCS going into the winter and then maintain condition during the winter with low input supplements. Females grazing native range may need to be supplemented during the late summer while they are lactating, weaning calves from only thin females, or weaning calves from all females in late summer or early fall before forages cannot support putting condition back on. Mature cows that have access to crop residues typically can gain back body condition without supplementation, especially if there is some grain left in the field after harvest.

If mature cows are consistently in the thin group, a thorough re-evaluation of the breeding management program is in order. It could be that the genetic production level of the cows simply does not fit the feed resource.

Developing Feeding Programs to Increase Body Condition

In order to increase body condition, the ration must meet the nutrient requirements for metabolizable protein, minerals, and vitamins, but exceed the requirement for energy for a given stage of production. Thus, to increase body condition, more energy must be fed and in a dense enough form that the cow has the capacity to consume it on a daily basis.

Management practices that allow cows to gain body condition by grazing would always be more desirable than feeding harvested forages; however,

Table 5. Energy Requirements of Beef Cows in Different Stages of Production

	Net Energy Required Mcal/day				
Month	Maintenance	Growth	Lactation	Pregnancy	Total
March	10.3	0	4.8	0.00	15.1
April	10.3	0	5.7	0.00	16.0
May	10.3	0	5.2	.01	15.5
June	10.3	0	4.1	.03	14.4
July	10.3	0	3.1	.07	13.5
August	10.3	0	2.2	.16	12.7
September	8.5	0	0	.32	8.8
October	8.5	0	0	.64	9.1
November	8.5	0	0	1.18	9.7
December	8.5	0	0	2.08	10.6
January	8.5	0	0	3.44	11.9
February	8.5	0	0	5.37	13.9

Assumes 1,170 pound five-year-old cow calving March 1 with average milk production. Nutrient Requirements of Beef Cattle, 7th Revised Edition. 2000. National Academy Press, Washington, DC.

Table 6. Energy Reserves for Different Body Sizes and Condition Scores of Cows

	Mcal Net Energy for Various Cow Weights			
BCS	1100	1200	1300	1400
2	139	151	164	177
3	157	172	186	200
4	180	196	212	229
5	207	226	245	264
6	242	264	286	308
7	285	311	337	363
8	342	373	405	436
9	418	456	494	532

The numbers in the body of the table represent the energy required to move a cow from the next lower BCS to the present one. Nutrient Requirements of Beef Cattle, 7th Revised Edition, 2000. National Academy Press, Washington, DC.

striving for a BCS greater than 6 for mature cows by either route would likely not be economical.

When developing feeding programs, remember that as cows near calving, nutrient requirements increase as a percent of the ration and in total pounds. It is wise to feed lower quality forages in mid-gestation and save higher quality forage for late gestation and after calving. Lactating cows, for example, will not have the rumen capacity to consume enough low quality forage to meet their needs.

Table 5 shows the partitioning of energy needed for a mature cow throughout the production year. Note that maintenance energy drops and energy for lactation ceases at weaning, and that energy for fetal growth accelerates rapidly in late gestation. This table is only appropriate for a cow that produces about 20 pounds of milk at peak production (about 60-80 days post calving) and additional energy for maintenance and lactation would be required for high milking cows.

Notice also in *Table 5* the relatively low energy demand of the fetal calf in the first and second trimester of gestation. The post-weaning period thus becomes the logical target to increase body condition of cows because that period (September-October-November in this case) represents the cow's lowest nutrient demand.

Table 6 illustrates the amount of energy in megacalories (Mcal = 1 million calories) required to change body condition of cows. For example, if the goal was to increase the body condition of an 1,100 pound cow from a BCS 4 to a BCS 5, the cow would need a total of 207 Mcal of energy beyond her daily maintenance needs (*Table 6*). This 207 Mcal of additional energy could be supplied by an energy-dense feedstuff such as dried distillers grains that has 1.22 Mcal of NE_m per pound (*Table 7*). If 3 pounds of dried distillers grains on a dry matter basis were added to the existing ration, it would take 57 days (207 Mcal / (3 lb dried distillers grains x 1.22 Mcal NE_m per lb of dried distillers grains) = 56.6 days) to elevate the cow's body condition from a BCS 4 to a BCS 5. The cow would have to gain about 1.3 pounds per day, not including fetal weight gain, to achieve this change in body condition (75 pounds divided by 57 days = 1.32 pounds per day).

Table 7. NE_m for Some Common Feedstuffs

Feedstuff	NE_m Mcal/lb
Corn, cracked	1.02
Corn gluten feed	.87
Dried distillers grains	1.22
Wheat, middlings	.92
Milo, rolled	.91
Corn silage/40% grain	.69
Alfalfa hay	.60
Prairie hay, early bloom	.58

Feedstuffs listed, other than corn, have less energy and would require larger amounts be fed in order to affect a change of one body condition score. Alfalfa hay, for example, fed at 5 pounds per day beyond daily maintenance needs, would require 69 days of feeding to change the cow mentioned above from a BCS 4 to a BCS 5. Thus, energy density of the supplemental feed is a critical factor in feeding cows to change body condition. To change cow body condition during late gestation will require some form of energy dense concentrate such as grain. If feeds with a lower energy density are used, more days will be required to change cow body condition score. Ration concepts developed in the previous paragraphs will only be successful if the female (mature cows or heifers) is in her thermal-neutral zone. Energy demands increase during extremely cold environmental conditions.

Time of Calving and Time of Weaning

The choice of calving season in relation to peak forage production for a given location is critical to the cost of maintaining adequate body condition on mature cows. Calving before spring/summer grazed forage production leads to the use of more harvested forage and drives up total feed costs. Calving about two weeks ahead of available grass or up to four weeks after first grass growth would substantially reduce harvested feed to cows and also reduces labor at calving and early calfhood health problems. Late spring/early summer calving systems result in lighter calves at weaning in the fall compared to a traditional March calving system and to optimize profit potential, ownership of calves needs to be retained for some time after weaning. The advantage of a late-spring or early-summer calving program is to force the cow to graze for most, if not all, of her nutrient needs and eliminate feeding harvested forages. A Nebraska study conducted in the Sandhills indicates March calving cows were fed 3,182 pounds of hay per year while June calving cows were fed 30 pounds of hay per year. June calving cows were fed more protein supplement compared to March calving cows to maintain body condition. Strategic planning of the nutritional program for young cows when the calving season is changed to a later date is essential.

Adjusting the weaning date, particularly for first-calf two-year-olds, can be used to allow for lactating two-year-olds to graze their way back to a higher body condition prior to winter. Weaning calves at 120-150 days can give first-calf females an opportunity to recover body condition so they won't be thin at their second calving and not have a long postpartum interval, or fail to rebreed during the next breeding season.

Summary

Take time to record body condition scores well before calving with particular attention to age groups of your cows. Plan a sound nutritional program with an eye toward optimizing profit. Keep an open mind for ideas such as early weaning or calving season adjustments, but ask questions and get documentation before implementing. Body condition scores are simply a tool that may help you or your customer do a better job of producing beef. It also can be used as a risk management tool in beef production systems.

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