

Body Condition Scoring as a Tool for Dairy Herd Management

College of Agriculture
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PENNSSTATE



Introduction

Body condition scoring is a method of evaluating fatness or thinness in cows according to a five-point scale and using the score to fine-tune dairy herd nutrition and health. Research and field experiments have shown that body condition influences productivity, reproduction, health, and longevity. Thinness or fatness can be a clue to underlying nutritional deficiencies, health problems, or improper herd management. If done on a regular basis, body condition scoring can be used to troubleshoot problems and improve the health and productivity of the dairy herd.

Over-conditioning, or fatness, may result from poor nutrition or reproduction management. A fat cow is more susceptible to metabolic problems and infections and is more likely to have difficulty at calving. Over-conditioning usually begins during the last three to four months of lactation, when milk production has decreased, but grain and total nutrient levels have not been reduced accordingly. Other causes of over-conditioning are prolonged dry periods or overfeeding during dry periods.

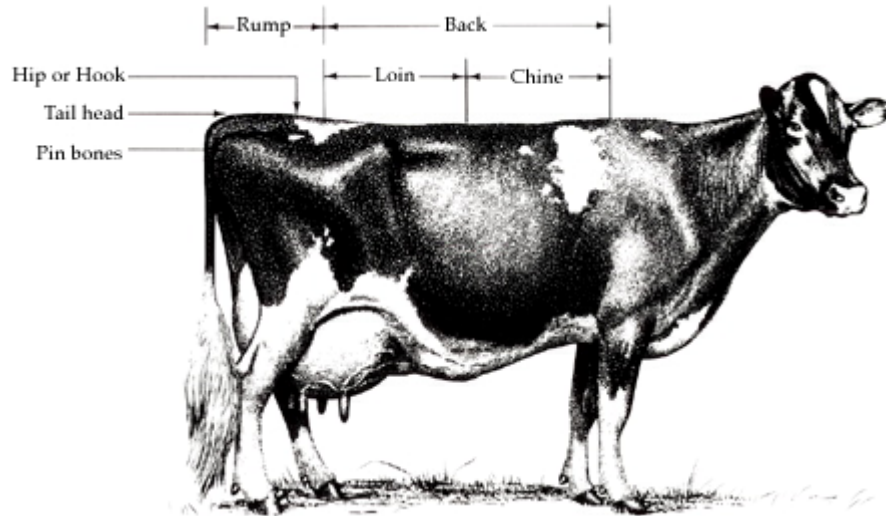
Under-conditioning, or thinness, can frequently lower production and milkfat levels because of insufficient energy and protein reserves. Thin cows often do not show heat or conceive until they start to regain--or at least maintain--body weight. In feeding these animals, care must be taken to maintain production while increasing body reserves.

Body condition scoring is also useful in dairy heifer feeding management. Thin heifers may not grow rapidly enough to reach puberty by 13 to 15 months of age. They may also be too small to calve at 23 to 25 months or to carry enough weight to maintain a normal first lactation. On the other hand, fat heifers have been shown to produce less milk when they enter the milking herd, especially if they have been fat at puberty.

Body Condition Scoring Scale

On a five-point scale, a score of 1 denotes a very thin cow, while 5 denotes an excessively fat cow. These are extreme scores and should be avoided. The average, 3, is the most desirable for the majority of the herd. A score with a plus or minus indicates a borderline body condition.

For accurate scoring, both visual and tactile appraisals are necessary. The following diagram illustrates the dairy cow's major bone and muscle groups and shows the areas of concern in scoring.



Score of 1

- Individual short ribs have a thin covering of flesh.
- Bones of the chine, loin, and rump regions are prominent.
- Hook and pin bones protrude sharply, with a very thin covering of flesh and deep depressions between bones.
- Severe depression below tail head and between pin bones. Bony structure protrudes sharply, and ligaments and vulva are prominent.

Score of 2

- Individual short ribs can be felt but are not prominent.
- Ends of ribs are sharp to the touch but have a thicker covering of flesh.
- Short ribs do not have as distinct an "overhanging shelf" effect.
- Individual bones in the chine, loin, and rump regions are not visually distinct but are easily distinguished by touch.
- Hook and pin bones are prominent, but the depression between them is less severe.
- Area below tail head and between pin bones is somewhat depressed, but the bony structure has some covering of flesh.

Score of 3

- Short ribs can be felt by applying slight pressure.
- Altogether, short ribs appear smooth and the overhanging shelf effect is not so noticeable.
- The backbone appears as a rounded ridge; firm pressure is necessary to feel individual bones.
- Hook and pin bones are rounded and smooth.
- Area between pin bones and around tail head appears smooth, without signs of fat deposit.

Score of 4

- Individual short ribs are distinguishable only by firm palpation.
- Short ribs appear flat or rounded, with no overhanging shelf effect.
- Ridge formed by backbone in chine region is rounded and smooth.
- Loin and rump regions appear flat.
- Hooks are rounded and the span between them is flat.
- Area of tail head and pin bones is rounded, with evidence of fat deposit.

Score of 5

- Bony structures of backbone, short ribs, and hook and pin bones are not apparent; subcutaneous fat deposit very evident.
- Tail head appears to be buried in fatty tissue.

Related Research

Recent research demonstrates the relationship of body condition to health, reproduction, feed intake, and milk production. In a 1986 study at Cornell University, three groups of dry cows were monitored to determine the effect of body condition during the dry period on subsequent reproductive performance. Scores for the three groups represented typical below-average, average, and above-average body conditions for dry cows:

- Group 1 --- 3.7
- Group 2 --- 4.1
- Group 3 --- 4.5

Cows were monitored closely through the dry period and into the following lactation. It was found that Group 3 cows, the fattest, had a longer interval to first ovulation, a higher number of days to first heat and conception, and the lowest first-service conception rates (Table 1). For the farmer, these factors mean lost dollars.

Table 1. Effect of body condition in dry cows on subsequent reproductive performance.

	Group 1	Group 2	Group 3
<i>Intervals between calving and</i>			
• First ovulation (days)	27	31	42
• First heat (days)	48	41	62
• Conception (days)	74	90	116
<i>First-service conception rate</i>	65%	53%	17%

Source: J. Dairy Sci. (Supplement 1), p. 245, 1986.

The study also showed that body condition affects dry matter intake (Table 2). Of the three groups, fat cows had the lowest dry matter intake. Although milk production appears unaffected by body condition, a lower dry matter intake can lead to ketosis, a

displaced abomasum, or other consequences of nutritional stress. Such problems are more common in fat cows because they must use more body fat to meet their energy needs. Body fat mobilization, in turn, produces ketones and fatty acids, which can have damaging results. Ketones build up in the blood and, if not broken down rapidly, cause ketosis. Fatty acids in the blood aggravate the problem because they tend to reduce appetite.

Table 2. Effects of body condition on dry matter intake and milk production.

	Group 1	Group 2	Group 3
Dry matter intake (lb)	44.2	43.6	40.9
Daily milk production, first 14 weeks of lactation (lb)	63.1	66.2	67.1

Source: J. Dairy Sci. (Supplement 1), p. 245, 1986.

Researchers in England studied the effect of body condition at calving on dairy cow health. The study involved two groups of cows, one in desirable condition and the other over-conditioned. As before, results showed a lower dry-matter intake among the fat group. Lower dry-matter intake is often the result of metabolic problems, and weight losses in fat cows following calving can set the stage for additional infections and noninfectious health problems. In fact, the fat group had more cases of disease than the desirable group (Table 3). An increase in metabolic problems--5 to 10 percent or more--is a signal to check body condition.

Table 3. Cases of disease recorded during lactation.

Disease	Group^a	
	Desirable	Fat
Mastitis	3	11
Retained placenta	1	2
Endometritis	2	2
Cystic ovaries	0	1
Ketosis	2	5
Milk fever	1	2
Hypomagnesemia	0	1
Lameness	4	7
<i>Total</i>	<i>13</i>	<i>33</i>

Source: Anim. Prod. 43, pp. 1-6, 1986.

^aEach group consisted of nine cows.

How to Score for Body Condition

In scoring a cow, the areas to examine are the tail head and loin. The following cross-sectional views illustrate the lack or overabundance of fatty tissue for each score. Photographs of the tail head and loin show how these areas should look for each animal.

Score 1

Body condition

- Very poor

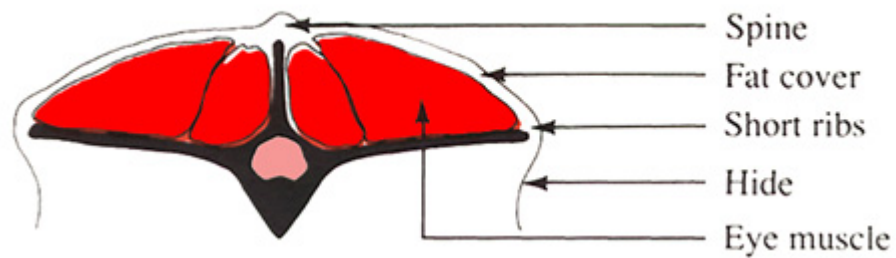
Tail head

- Deep cavity under tail and around tail head.
- Skin drawn tight over pelvis, with no tissue detectable in between.

Loin

- No fatty tissue felt.
- Pins, hooks, and short ribs can be seen; edges feel sharp.
- Animal appears emaciated.

Cross-section, score 1



Back view, score 1



Side view, score 1



Score 2

Body condition

- Poor

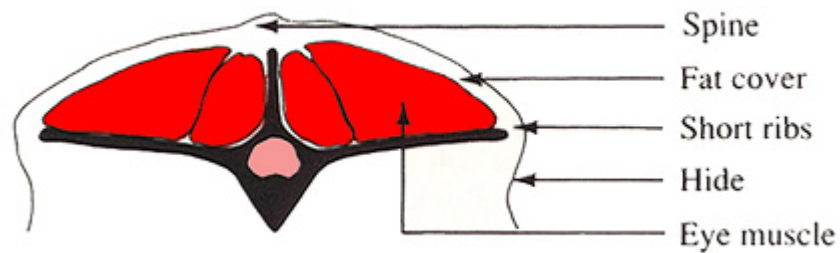
Tail head

- Cavity evident around tail head but less prominent.
- No fatty tissue felt between skin and pelvis, but skin is supple.

Loin

- Ends of short ribs are sharp to the touch, but individual ribs can no longer be seen.
- While bones are less prominent, they are still angular and can be easily distinguished by touch.

Cross-section, score 2



Back view, score 2



Side view, score 2



Score 3

Body condition

- Good

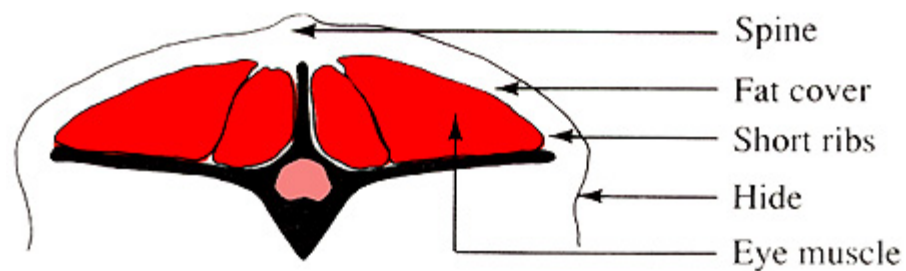
Tail head

- Slight cavity lined with fatty tissue apparent at tail head.
- Area between pins has smoothed out.

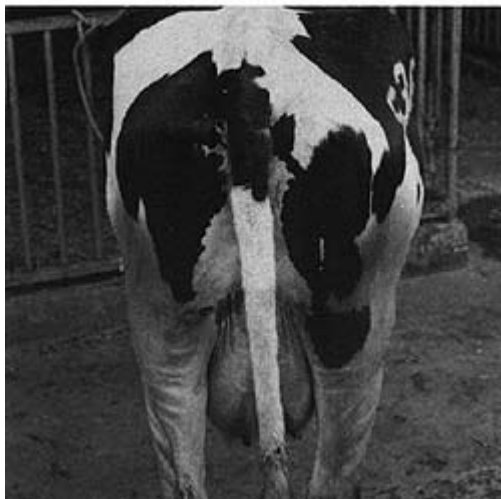
Loin

- Ends of short ribs can be felt with moderate pressure.
- Slight depression visible in loin area.
- Hooks and pins can be felt but have some covering of flesh.
- Hook, pin, and back bones have lost angularity and appear smooth.

Cross-section, score 3



Back view, score 3



Side view, score 3



Score 4

Body condition

- Fat

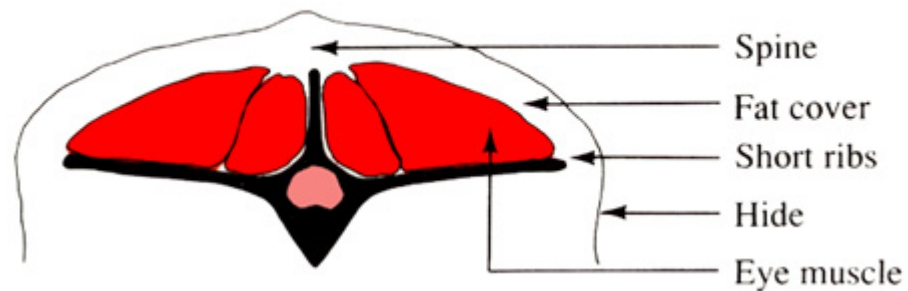
Tail head

- Depression between pins and tail head filling in.
- Patches of fat apparent under skin.
- Pelvis felt only with firm pressure.

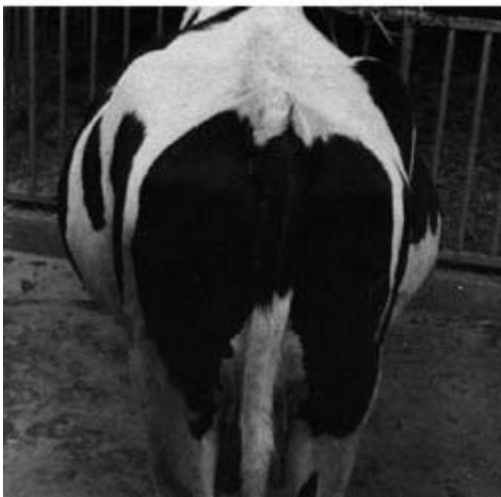
Loin

- Short ribs cannot be felt even with firm pressure.
- No depression visible in loin between backbone and hip bones.
- Back and area between hooks and pins appear flat.

Cross-section, score 4



Back view, score 4



Side view, score 4



Score 5

Body condition

- Grossly Fat

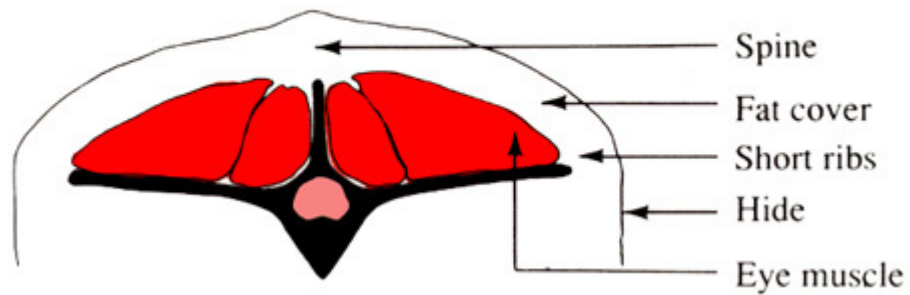
Tail head

- Tail head buried in fatty tissue.
- Area between pins and tailbone rounded, skin distended.
- No part of pelvis felt, even with firm pressure.

Loin

- Folds of fatty tissue over short ribs.
- Bony structure cannot be felt.
- Hooks, pins, and backbone almost disappear.

Cross-section, score 5



Back view, score 5



Side view, score 5



Target Scores for Stages of Lactation

Below are target scores for each stage of lactation and hints for troubleshooting by altering rations and feeding strategies (adapted from Perkins et al., "Body Condition Scoring," New York Dairy Management Fact Sheet, 1985). Pluses and minuses indicate borderline body conditions.

Cows at Calving

Recommended score: 3+ to 4-

Nutritional objective: Allow cows to calve with adequate, but not excessive, body fat reserves.

Red flags:

- Scores below 3+ indicate that cows received an inadequate energy supply during late lactation and/or the dry period. Failure to replenish energy reserves will limit milk production during the upcoming lactation.
- Scores above 4- indicate that energy intake was too high during late lactation and/or the dry period. Separate dry cows from the milking herd and feed them a low-energy ration with adequate, but not excessive, protein, minerals, and vitamins.

Early Lactation

Recommended score: 3- to 3

Nutritional objective: Maximize intake of a high-energy ration to minimize changes in body condition and counteract negative energy balance. Ration must contain adequate protein to support peak milk production.

Red flags:

- Scores below 3-
 - Very high producers may drop to 2+ and are not a problem.
 - Thin cows that are not high producers are not getting enough energy. Be sure that all nutrients are balanced properly and that dry-matter and water intakes are adequate.
- Cows have good body condition (3 to 3+), but production is not as high as expected. Check for inadequate intakes of protein, minerals, or water.

Mid-Lactation

Recommended score: 3

Nutritional objective: Maintain body condition at this score to maximize milk production.

Red flags:

- Scores below 3 indicate that cows are receiving inadequate energy. Check early lactation ration, because problem began there.

- For scores above 3+, reduce energy intake to avoid over-conditioning.

Late Lactation

Recommended score: 3 -- Aim for 3+ to 4- at time of dry off.

Nutritional objectives:

- Replenish energy and fat reserves to prepare cow for next lactation.
- Avoid over-conditioning.

Red flags:

- Scores below 3+ at dry off mean cows are receiving inadequate energy. Check to see that early- and mid- lactation cows are receiving enough energy, since problem may have begun there.
- For scores above 4- at dry off, reduce energy intake during late lactation.

Dry

Recommended score: 3+ to 4-

Nutritional objectives:

- Maintain body condition in recommended range.
- Feed low-energy ration that provides adequate, but not excessive, amounts of protein, vitamins, and minerals.

Red flags:

- Scores below 3+
 - Increase energy intake. Inadequate body fat reserves can decrease milk production in upcoming lactation.
 - Increase energy content of late-lactation ration. Body fat reserves should be replaced at that time.
- Scores above 4-
 - Reduce energy intake of dry cows while maintaining adequate levels of protein, vitamins, and minerals.
 - Reduce energy intake of late-lactation cows, because the problem may have begun there.

Heifers

Recommended score: 3- to 3+

Nutritional objectives:

- Maintain body condition in recommended range.
- Feed a balanced ration that provides adequate but not excessive amounts of energy, protein, vitamins, and minerals.

Red flags:

- Scores below 3- may indicate a nutritional problem. If heifers are allowed to become too thin, they will not grow at the proper rate and may have reproductive problems later on.

- Scores above 3+ have been shown to be associated with a greater fat infiltration in the mammary glands of heifers at puberty. When these heifers freshen, they will not produce to their full genetic potential

Table 4 summarizes dairy cow body condition scores and potential problems. By scoring cows on a regular basis, producers can adjust rations, determine group changes, maximize milk production, and prevent reproductive problems.

Table 4. Body condition scores for dairy cows.

Score	Condition
1	Skin and bones.
2 to 2- (low 2) ^a	Severe negative energy balance in cow in early lactation. A problem Either exists or may be developing.
2+ (2 high) ^b	High producer in early lactation.
3	Milking cow in good nutrient balance.
3+ to 4- ^c	Late lactation dry cow in good condition.
4	Over-conditioned; an inefficient milk producer; a cow with an extremely long lactation if milking and a potential calving problem if dry.
5	Severely over-conditioned; a candidate for fat cow syndrome.

^aBorderline 1. Indicates potential problem.

^bBorderline 3.

^cBorderline 4. Check your feeding program to avoid a future problem.

Troubleshooting

When metabolic problems occur because animals are not in proper condition, the first thing to check is the feeding program. The following nutritional checklist may help diagnose certain problems.

- First, check dry-matter intake, especially of forage. Forage should account for at least 45 percent of a cow's total dry-matter intake. Check feeding sequences, fiber level, feeding frequency, and ration palatability. Problems in these areas are easily overlooked.
- Second, check protein, energy, mineral, and vitamin levels by testing forage and balancing rations for each group of cows. Examine feed quality by checking forage and grain for fineness of chop or grind, smell, acceptability, and pH level. Check rations for amounts of bypass and soluble protein and for levels of starch, fats, and oils.

Once the cause of the problem has been determined, the next step is to keep it from reoccurring. Avoid rapid fluctuations in body condition. Pay close attention to cows during lactation, especially the later part, and during the dry period.

When large amounts of forage are consumed or if grain is not fed properly, animals may become over-conditioned and are more susceptible to health problems. In dry-cow rations, these factors are more often overlooked.

To keep dry cows in proper condition, feed a daily hay-equivalent intake of 1.8-2.0 pounds per hundred pounds of body weight. This is the minimum intake of forage, and it should be maintained even in times of a forage shortage or high forage prices. Some long, dry hay should be incorporated into the diet, especially if silage or haylage is being fed. A complete ration of forages and grain for dry cows should be between 85 and 88 percent forage dry matter. If necessary, control feed intake to hold dry-matter intake to 2 percent of body weight.

The main objective during the dry period is to get the animal properly conditioned, starting in the previous three to four months of lactation. Once the cow is dry, her condition should be maintained through a balanced feeding program so that she freshens in good condition. Upon entering the milking herd, a cow can lose from 100 to 150 pounds during the first 60-80 days (1-2 pounds per day), but a weight loss of 3-4 pounds per day may lead to metabolic disorders. A cow should start replenishing her fat reserves 80-120 days after calving, at .75-1.0 pounds per day. (A few cows, about 5-10 percent, either never put on much flesh or usually tend to be obese.) Proper conditioning, then, can be accomplished by body condition scoring, paying close attention to the animals, and ensuring that their nutrient requirements are being met, but not exceeded.

Summary

Research demonstrates that a cow's body condition relates to the animal's overall performance and that body condition scoring can be an important tool in dairy herd management. In scoring a cow, the tail head and loin are the major areas to evaluate. Target scores help determine what condition to aim for during the different stages of lactation. If done on a regular basis, body condition scoring can improve dairy herd nutrition, health, and production.

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