Thin Condition

Moderate Condition

Good Condition

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

Feeding Your Cows by Body Condition

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Numerous factors influence the profitability of a commercial beef cattle operation. These factors can be grouped into four principal areas: (1) calf weaning weights, (2) percent of cows weaning calves, (3) cost of maintaining the cow per year, and (4) price of calves.

When the components of each of these four profit factors are analyzed, feed cost is one of the key items influencing profitability. Therefore, as we focus on low-cost production systems in the future, feed costs become a key component.

Research and economic studies in various states show that well-formulated diets and efficient use of the forage resource base generally reduce the feed cost. One system of monitoring effectiveness of nutritional programs currently used by many producers, university personnel and veterinarians is body condition scoring. The concept really is not new. For years, cowherd operators have based their feeding program on the fact that the "eye of the master influences the size of the feed bucket." Body condition scoring puts a quantitative score on a procedure many cow-calf producers have followed for years to formulate sound nutrition programs, allowing us to formulate a more balanced diet, particularly if we want the cows to gain weight during critical periods.

Nutritional Requirements of the Cowherd

Producers must recognize the nutritional requirements of cows and how these requirements change during the course of the year. Size of the cow, stage of production, level of production, environment, and body condition influence these nutritional requirements.

Cow nutritional requirements as currently published by the National Research Council (NRC) do a good job of taking cow size, stage and level of production, and environment into account. Unfortunately, little has been done up to this point to include body condition as a factor that influences cow nutritional requirements. This bulletin will address some key questions that pertain to body condition.

What are Body Condition Scores?

Body condition scores are numbers used to suggest the relative fatness or body condition of the beef cow. The most commonly used system in the United States is one that ranges from 1 to 9, with a score of 1 representing very thin body condition and 9, extreme fatness. A cow with a body condition score of 5 should be in average flesh and represents a target that many cattlemen strive for. The 9-point body condition scoring system is described in Table 1 and arranged in a fashion enabling a cattleman to immediately body condition score cows. (Table 2)

Why are Body Condition Scores Important?

Body condition scores allow producers to sort cattle according to their nutritional needs, thus improving the efficiency of nutritional programs. For example, changes in body condition can be used as a guideline by cattlemen to accurately reflect the level of nutrition being received by cows without having to weigh the cows. This is possible because of the strong linkage between body condition and weight change. Thus, as the body condition score drops or increases, corresponding weight changes will occur.

Body condition is also an excellent description of animals. For example, a body condition score 3 cow (this will vary by breed) will often weigh 925 to 975 pounds if of English breeding. Characteristically, she will show no fat cover as previously described, and if slaughtered, her carcass would have approximately 9 percent fat.

In contrast, an English-bred cow with a body condition score of 5 will often weigh from 1,000 to 1,075 pounds and will have a carcass that would consist of 18 percent fat. A similar cow with a body condition score of 7 will be in the range of 1,200 to 1,275 pounds and would have a body fat content of 27 percent.

Scores are Linked to Reproductive Performance

Excellent research in recent years has linked the percentage of body fat of beef cows in specif-

Table 1. Nine-Point Body Condition Scoring System

1. Bone structure of shoulder, ribs, back, hooks and pins is sharp to the touch and easily visible. Little evidence of fat deposits or muscling.
2. Little evidence of fat deposition but some muscling in the hindquarters. The spinous processes feel sharp to the touch and are easily seen with space between them.
3. Beginning of 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.
4. Foreribs are not noticeable but the 12th and 13th ribs are still noticeable to the eye, particularly cattle with a big spring of rib and width between ribs. The transverse spinous processes can be identified only by palpation (with slight pressure) and feel rounded rather than sharp. Full, but straight muscling in the hindquarters.
5. The 12th and 13th ribs are not visible to the eye unless the animal has been shrunk. The transerse spinous processes can only be felt with firm pressure and feel rounded but are not noticeble to the eye. Spaces between the processes are not visible and are only distinguishable with firm pressure. Areas on each side of the tail head are well filled but not mounded.
6. Ribs are fully covered and are not noticeable to the eye. Hindquarters are plump and full. Noiceable sponginess over the foreribs and on each side of the tail head. Firm pressure is now required to feel the transverse processes.
7. Ends of the spinous processes can only be felt with firm pressure. Spaces between processes can barely be distinguished. Abundant fat cover on either side of the tail head with evident patchiness.
8. Animal takes on a smooth, blocky appearance. Bone structure disappears from sight. Fat cover is thick and spongy and patchiness is likely.
9. Bone structure is not seen or easily felt. The tail head is buried in fat. The animal's mobility may actually be impaired by excessive fat.

Table 2. Key Points for Condition Scoring Beef Cows[a]

	Body Condition Score								
Reference Point	1	2	3	4	5	6	7	8	9
Physical weak	yes	no	no	no	no	no	no	no	no
Muscle atrophy[b]	yes	yes	slight	no	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 extreme	no	no	no	no	no	some	full	full	
Outline of hip and bones visible	yes	yes	yes	yes	yes	yes	slight	no	no
Fat udder and patchy fat around tail head	no	no	no	no	no	no	no	slight	yes

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

ic stages of their productive cycle to reproductive performance and overall productivity.

Since body condition scores reflect the relative level of fatness of beef cows, it stands to reason that body condition scores are also related to reproductive performance.

Some of the original work that made this relationship evident was conducted in 1975 at Colorado State University by Dr. Rich Whitman. Data in Table 3 summarizes this work and shows that cows in varying body condition at calving differed greatly in how long it took them to resume cycling once they had calved.

The relationship of body condition score at calving to reproductive performance is further illustrated by a 1986 Indiana study that used mature Angus-Charolais cows. Table 4 summarizes this work and indicates longer postpartum intervals for thin cows compared to average conditioned or fleshy cows.

Table 3. Body Condition at Calving and Heat After Calving

Body Condition at Calving	No. Cows	% in Heat-Days Post-calving 60	90
Thin (1-4)	272	46	66
Moderate (5-6)	364	61	92
Good (7-9)	50	91	100

(Whitman, Colorado State University, 1975)

Table 4. Effect of Body Condition Score (BCS) at Parturition on Postpartum Interval (PPI)

BCS[a]	PPI, days
3	88.5
4	69.7
5	59.4
6	51.7
7	30.6

[a]Body condition scores have been converted from a 5-point system to a 9-point system.

(Houghton et al., Purdue University, 1986)

Cattlemen Can Use Body Condition Scores

Keep in mind that it is extremely important to strive for a body condition score at calving time that will allow the cows in your operation to be reproductively and economically efficient. This won't be the same for every operation, nor will it be the same in different parts of the country. Nevertheless, research data indicates that, on the average, cattlemen should strive for a body condition score of 5 at calving in mature cows.

In contrast, 2-year-old, first-calf heifers may need to have a body condition score of 5.5 to 6.0 simply because they have an additional nutrient requirement for growth as compared to mature cows. This slight increase in condition in young cows can help compensate for the additional nutrient demand for growth and help these cows resume cycling activity in a timely manner.

Producers also need to consider time of calving when they decide on a target body condition score at calving. For example, early calving cows can be slightly thinner than late calving cows simply because they have additional time to re-cycle and rebreed. Recent research at South Dakota State University reinforces this concept and is summarized in Table 5. These data clearly point out the relationship between body condition score, time of calving, and reproductive function. This relationship should encourage producers to sort cattle by body condition so that they might optimize nutritional and reproductive efficiency. This sorting may be done by age, which many cattlemen do anyway. In this case, 2-year-old cows are separated from the mature cows so the younger cows can be fed a higher plane of nutrition to ensure that they rebreed.

To further improve the efficiency of this system, some cattlemen are also sorting through their mature cows and putting those in thin condition with the 2-year-olds. This gives thin, mature cows an opportunity at more, and higher quality, feedstuffs which often results in improved reproductive efficiency of the total cowherd.

Finally, body condition scores allow producers to formulate nutritional diets. For example, a producer who has a set of cows that are in a body condition score of 4,

Table 5. Effect of Body Condition Score on Percentage of Cows Cycling

Body Condition Score	No. of Cows	% of Cycling May	June	July
		Early Calving Cows		
March condition score (prior to calving)				
≤ 4	45	10.0	28.2	70.5
5	84	17.8	43.5	85.6
6	43	41.9	77.5	97.5
≥ 7	25	45.9	76.6	94.7
		Late Calving Cows		
March condition score (prior to calving)				
≤ 4	14	0.0	0.0	44.7
5	41	0.0	26.0	74.4
6	22	0.0	35.3	98.5
≥ 7	6	0.0	65.8	99.1

(Pruitt and Momont, South Dakota State University, 1988)

Table 6. Needed Weight Gains in Pregnant Cows in Different Body Conditions

Body Condition		Weight Gain Needed to Calving, lbs				
At Weaning	Needed at Calving	Calf Fluids and Membranes	Body Weight	Total	Days to Calving	ADG Lbs
Thin	Moderate	100	160	260	120	2.2
Borderline	Moderate	100	80	180	120	1.5
Moderate	Moderate	100	0	100	120	.8
Thin	Moderate	100	160	260	200	1.3
Thin	Moderate	100	160	260	100	2.6

(Wiltbank, 1982)

60 to 80 days prior to the start of calving, needs to formulate a nutritional program that will allow those cows to reach average body condition by the time they calve (body condition score = 5 to 6). Most research has indicated that a cow will need to gain or lose 60 to 80 pounds of body weight to change by one body condition score.

Table 6 illustrates this concept and shows the proper weight gain necessary for cows of varying body condition prior to calving. For example, the weight gain needed by cows in moderate condition 120 days before calving is 100 pounds or 0.8 pound gain per day. In contrast, thin cows, 120 days prior to calving, must gain 2.2 pounds per day or approximately 260 pounds.

Differences are also seen in cows varying in body condition after calving. In order for thin cows at calving to be in moderate body condition by 80 days postpartum, they must gain approximately 2 pounds per day. (Table 7) It is important to remember that cows are also nursing calves at this point, which creates an extra demand for dietary energy and makes rapid weight gain difficult for cows after calving. This further emphasizes the need for cows to be in moderate to near moderate condition at calving for optimal reproductive performance.

Although Tables 6 and 7 indicate the weight gain needed by cows to reach moderate body condition during the pre- and post-calving periods, they do not take into account the energetic efficiency of thin versus fleshy cows. Recent research conducted at Purdue University examines the role of energy in cow rations in lowering, maintaining, or raising cow body condition score.

This system takes into account the initial body condition of cows and is based on the net energy system currently used in growing and finishing cattle. In the system, the energy requirements of cattle

are expressed in megacalories (Mcal). The energy units are usually expressed either as an Mcal of net energy for maintenance (NEm) or as an Mcal of net energy for gain (NEg). These measurements are valuable tools in determining required energy levels, but, unfortunately, little has been done to apply these concepts in cow nutritional programs.

An objective of the Purdue study was to identify and recommend specific energy supplementation programs that will achieve a specific amount of gain over time in beef cows. This study was conducted using Angus cows with calves. These cows were placed on four energy intake levels and were fed for 200 days with weekly measurements of gain and feed analyses. Diets were designed to achieve: (1) high energy, (2) maintenance high energy, (3) maintenance low energy, and (4) low energy rations.

Data from this study allowed the estimation of net energy necessary to change the weight of cows in varying body conditions. For example, thin cows (body condition score = 3 to 4) only need 1.73 Mcal of energy per pound of weight gain, whereas fleshy cows (body condition score = 6 to 7) need 2.87 Mcal of energy per pound of weight gain. The reason for this variance is that a pound of gain on a thin animal is primarily made up of protein and water, whereas a pound of gain on a fat animal is predominately made up of fat. Since it takes 2.25 times more energy to put on a pound of fat than a pound of muscle, it stands to reason that the net energy for gain is higher for fleshy cows than thin cows. Requirements for changing condition scores are in Table 8.

Table 9 summarizes additional data from this study and permits producers to calculate the energy needed to meet a targeted weight gain. These data permit the cross-referencing of various body weights to condition scores. In addition, the table takes into account the energy needed for fetal growth during the last trimester of gestation and the energy needed for average to superior milk production during lactation.

Table 7. Needed Weight Gains in Cows Suckling Calves in Different Body Conditions

Body Condition		Weight Gain Needed for Breeding, lbs		
At Calving	Needed at Breeding	Body Weight	Days to Breeding	ADG Lbs
Thin	Moderate	160	80	2.0
Borderline	Moderate	80	80	1.0
Moderate	Moderate	0	80	0
Thin	Moderate	160	60	2.7
Thin	Moderate	160	40	4.0

(Wiltbank. 1982)

Table 8. Net Energy Requirements of Mature Beef Cows

Cow Wt., Lbs	1,000	1,050	1,100	1,150	1,200	1,250	1,300	1,350	1,400
NEm[a], (Mcal/day)	7.57	7.86	8.13	8.41	8.68	8.95	9.22	9.48	9.75
NEc[b]									
NEI[c]									

NEc[b] Net energy for conceptus growth. Use 2.15 Mcal/day (regardless of cow weight) during the last trimester of gestation for an estimated birth weight of 80 lbs and use 2.7 Mcal/day for an estimated birth weight of 95-100 lbs.

NEl[c] Net energy for lactation. For average and superior milk production, use 3.40 and 6.80 Mcal/day, respectively. Average milk is considered to be 10 lbs of milk production per day while superior milk is 20 lbs/day. Calculation is lbs milk × .34 Mcal/lb milk. This is added to the NEm during lactation.

Practical Application of the Net Energy System

The following information provides a step-by-step procedure for calculating the energy required to improve a cow's condition from moderately thin to average, which is the most desirable condition for optimal reproductive performance.

Situation 1:

- A 2-year-old cow now weighs 1,000 pounds but needs to weigh 1,150 pounds at calving.
- Time to calving = 100 days.
- Body condition score = 4 (moderately thin).
- Desired body condition score = 6 (moderate).
- Weight difference between two body condition scores = 150 pounds.

Step-by-Step Procedure:

1. Determine the average weight of the cow for the 100-day period. Start with the 1,000-pound cow with a body condition score of 4. Add 150 pounds (75 pounds/BCS) to improve two full condition scores to a 6 (live weight = 1,150 pounds). Her average weight is (1, 000 + 1,150 ÷ 2) 1,075 pounds.
2. Calculate the average daily gain needed to change two full condition scores in 100 days. (150 pounds ÷ 100 days = 1.5 pounds/gain per day).
3. Determine the net energy for maintenance (NEm) and fetal growth (NEc) requirements for a 1,075-pound cow from Table 8. This is the simple average between the 1,050 and the 1,100 pound columns (10.01 + 10.28 ÷ 2 = 10.15 Mcal/day).
4. Determine the average net energy requirement per pound of gain from Table 9 for a cow going from a body condition score of 4 to a body condition score of 6 and average these two numbers (1.73 + 2.87 ÷ 2 = 2.30 Mcal/day).
5. Now calculate the net energy requirement for 1.5 pounds of gain per day. (1.5 pounds of gain per day × 2.30 Mcal/pound = 3.45 Mcal/day.) This calculation factors in the length of time available to achieve the desired condition score (100 days).
6. Add the values obtained in Steps 3 and 5 for the total Mcal/day requirement.

Example:

Energy Needed	Mcal/Day
Maintenance and fetal growth	10.15
For weight gain	3.45
TOTAL	13.60

7. Calculate the net energy for maintenance (NEm) and net energy for gain (NEg) values of the ration (Table 10). These numbers are calculated by multiplying the NEm and NEg values (Mcal/pound) of each feed in the ration (using NRC 1984 Feed Tables) with the corresponding amount (percent) of each feed in the ration on a dry matter basis. Sum the products of each feed in the ration and divide the resulting NEm and NEg values by 100. These calculations are identical to those used by the feedlot industry.
8. Using the calculated numbers from Steps 5 and 7, calculate the amount of ration needed per day to obtain the desired endpoint.
   A. Divide the net energy for maintenance (NEm) requirement (10.15 Mcal/day) by the NEm value (Mcal/pound) of the ration. This will give the amount of ration needed to maintain cow weight.
   B. Next, divide the net energy for gain (NEg) requirement (3.45 Mcal/day) by the NEg value (Mcal/pound) of the ration. This is the amount (pound/day) of the ration needed to produce 1.5 pounds of gain.
   C. The sum of the amounts needed for maintenance equals the amount of ration needed by the cow to reach a body condition score of 6 by calving.

Table 9. Net Energy for Gain (NEg) in Cows of Varying Body Condition

Current Body Condition Score[a]	Desired Body Condition Score 2	3–4	5	6–7	8
	Mcal/lb. of Weight Gain (N Eg)				
2	1.17	1.45	1.74	2.02	2.31
3–4		1.73	2.02	2.30	2.59
5			2.30	2.59	2.87
6–7				2.87	3.16
8					3.44

Body condition scores have been converted from a 5-point system to a 9-point system, approximately 60-80 lbs difference between condition scores.

(Lemenager et at., Purdue University, 1990)

Steps 8A. to 8C.

A. Combined NEm, c value ÷ NEm content of diet (10.15/.62) = 16.37 pounds of feed necessary to maintain cow and fetus.

B. NEg value necessary for 1.5 pounds/day gain divided by NEg content of diet (3.45/.3523) = 9.79 pounds of feed necessary.

C. Sum of steps A and B. (16.37 + 9.79) = 26.2 pounds of ration the cow must consume daily to gain 1.5 pounds/day.

According to Diet No. 1 used for this example on Table 10, the beef cow should receive the following amounts daily to gain 1.5 pounds/day:

Total DM Fed/Day		Percent in Diet	Feedstuff	Amt. DM Fed Daily (lbs/day)
26.2 lbs	×	79	Sudan	20.7
26.2 lbs	×	19	Sorghum grain	5.0
26.2 lbs	×	2	Soybean meal	0.5
			Total	26.2

Table 10. Diets for Practical Applications Example

Feedstuff	Percent in Ration	% DM	% CP	NEm[a] Mcal/lb	NEm[b] Mcal/100 lbs	NEg[a] Mcal/lb	NEg[c] Mcal/100 lbs
(Column	A	B	C	D	E	F	G)
Diet No. 1:							
Sudan hay	79	91	8	.536	42.34	.277	21.88
Sorghum grain	19	87	10	.936	17.78	.636	1.27
Soybean meal	2	89	49.9	.936	1.87	.636	1.27
					62.00[d]		35.23[d]
Diet No. 2:							
Winter grass	85	92	6	.455	38.68	.205	17.43
20% protein supplement	15	89	20	.936	14.04	.636	9.54
					52.72[e]		26.97[e]

[a]NEm and NEg content of feedstuff obtained from NRC Feed Tables.

[b]Percent of feedstuff in ration (Column A) multiplied by NEm Mcal/lb (Column D) = NEm Mcal/100 lbs (Column E).

[c]Percent of feedstuff in ration (Column A) multiplied by NEg Mcal/lb (Column F) = NEg Mcal/100 lbs (Column G).

[d]Diet No. 1 contains .62 and .35 Mcal of NEm and NEg/lb, respectively.

[e]Diet No. 2 contains .53 and .27 Mcal of NEm and NEg/lb, respectively.

A word of caution is in order. It may be necessary to reformulate the ration if the cow cannot, or will not, consume the amount of feed that has been calculated. Such reasons for this occurrence may be due to either nutrient inadequacies (protein and/or energy) of the diet or to heightened nutrient requirements as seen in beef cows during the early stages of lactation. Two examples have been developed to illustrate this point.

Example 1:

The first example pertains to a beef cow pastured on winter grass with a 20 percent protein cube as the only supplement. Situation 1 will be used again to illustrate the size of the cow and the desired change in body condition score. Using Diet No. 2 located in Table 10, we can determine the pounds of this diet required to change the BCS of this cow from a 4 to a 6.

Steps 8A. to 8C.

A. Combined NEm, c value ÷ NEm content of diet (10.15/.53) = 19.15 pounds of feed necessary to maintain cow and fetus.

B. NEg value necessary for 1.5 pounds/day gain divided by NEg content of diet (3.45/.27) = 12.78 pounds of feed necessary.

C. Sum of steps A and B. (19.15 + 12.78) = 31.93 pounds of ration DM the cow must consume daily to gain 1.5 pounds/day.

This example demonstrates that for the cow to gain 1.5 pounds/day, she must consume approximately 32 pounds (27.2 pounds winter grass and 4.8 pounds of 20 percent protein supplement) of ration dry matter per day. When one considers that normal beef cow feed intakes on dry grass range from 1.7 to 2.0 percent on a body weight basis, it becomes apparent that the cow in this example cannot possibly consume this entire amount. Thus, the projected weight gains calculated by the producer cannot be realistically achieved.

Example 2:

The second example demonstrates the "uphill battle" a producer faces when attempting to improve body condition in lactating cows.

Situation 2:

- At calving, a 2-year-old cow weighs 1,000 pounds but needs to weigh 1,150 pounds at breeding. This cow produces superior quantities of milk (20 pounds/day).
- Time to breeding season = 60 days.
- Body condition score 4 (moderately thin).
- Desired body condition score = 6 (moderate).
- Weight difference between two body condition scores 150 pounds.

Step-by-Step Procedure

The only difference between this example and the step-by-step procedure employed for Situation 1 is that energy requirements are necessary for different biological functions (conceptus growth vs. milk production).

1. Determine the average weight of the cow for the 60-day period. Start with the 1,000-pound cow with a body condition score of 4. Add 150 pounds (75 pounds/BCS) to improve two full condition scores to a 6 (live weight = 1,150 pounds). Her average weight is (1, 000 + 1,150 ÷ 2) 1,075 pounds.
2. Calculate the average daily gain needed to change two full condition scores in 60 days. (150 pounds divided by 60 days = 2.5 pounds/gain per day.)
3. Determine the net energy for maintenance (NEm) and milk production requirements (NEI) for a 1,075-pound cow from Table 8. This is the simple average between the 1,050 and the 1,100 pound columns (10.01 + 10.28 ÷ 2 – 2.15 Mcal/day [conceptus growth] = 8 Mcal/day). Add 6.8 Mcal/ day to provide the energy necessary for the cow to produce 20 pounds of milk per day (.34 Mcal/pound milk production). Total maintenance requirements are 14.8 Mcal/day.
4. Determine the average net energy requirement per pound of gain from Table 9 for a cow going from a body condition score of 4 to a body condition score of 6 and average these two values (1.73 + 2.87 ÷ 2 = 2.30 Mcal/day).
5. Now calculate the net energy requirement for 2.5 pounds of gain per day. (2.5 pounds of gain per day × 2.30 Mcal/pound = 5.75 Mcal/day.) This calculation factors in the length of time available to achieve the desired condition score (60 days).

6. Add the values obtained in Steps 3 and 5 for the total Mcal/day requirement.

Example:

Energy Needed	Mcal/Day
Maintenance and lactation	14.80
For weight gain	5.75
TOTAL	20.55

7. The calculations for this step are identical to Step 7 in Situation 1.
8. Using the calculated numbers from Steps 5 and 7, calculate the amount of ration needed per day to obtain the desired weight endpoint.

Steps 8A. to 8C.

A. Combined NEm, l value ÷ NEm content of Diet No. 1 (14.80/.62) = 23.9 pounds of feed to maintain cow and produce milk.

B. NEg value necessary for 2.5 pounds/day gain ÷ NEg content of diet (5.75/.35) = 16.4 pounds of feed necessary.

C. Sum of steps A and B. (23.9 + 16.4) = 40.3 pounds of ration the cow must consume daily to gain 2.5 pounds/day.

As seen in Example 1, this example demonstrates that the cow cannot consume enough dry diet matter to meet her body requirements and still produce 20 pounds of milk and gain 2.5 pounds per day. The diet can be formulated to become more energy dense, but this practice may prove prohibitive from both a cost as well as long-term cow health perspective.

This example further illustrates to producers the importance of keeping beef cows in moderate to good body condition prior to calving. Otherwise, cyclicity and postpartum interval will suffer, resulting in a longer than normal calving season the following year.

Calculation of NEm and NEg Values and Accuracy Problems

It is recommended to routinely submit properly collected forage samples to commercial laboratories for nutrient analysis. The information obtained will help guide you in the construction of rations that will help your livestock attain the production goals for which the ration was originally designed.

For a nominal fee, commercial laboratories can generate estimated NEm and NEg values from regression formulas based upon the acid detergent fiber (ADF) content of the particular kind of feedstuff you submit. From this standpoint, it is important to make sure that the equations employed are developed specifically for that feedstuff (legume vs. grass vs. silage) or else NEm and NEg values can be inaccurate. Comparison of your lab results with the nutrient values of several commonly used Kansas feedstuffs listed in Table 11 will assist you in determining whether your nutrient analysis results are realistic.

Summary

Cows should be sorted by body condition into thin, moderate, and fleshy groups and fed separately according to their specific nutrient needs. This requires the use of a consistent body condition scoring system at key points during the production cycle. Once cows are separated by body condition, flexible supplementation programs should be initiated to meet necessary weight changes for a group of cows based on environment, stage and level of production, and age. Every effort should be made to have cows in moderate body condition by calving. However, if cows are slightly thin at calving, they may still have a good chance to conceive by 80 days postpartum if they are provided extra energy after calving. Here are several key considerations for producers using a body condition scoring system:

1. **Keep the system simple.** Thin cows are very angular with a visible skeletal structure, whereas fat cows appear very square and smooth. Concentrate at first on separating thin, moderate, and fat cows from each other without getting too concerned about numerical body condition scores.
2. Be consistent. Since body condition scoring is subjective, your score may vary somewhat from your neighbor's scoring system. However, if one person is responsible for body condition scoring cows within a herd, relative differences can be consistently determined over a period of time.

Table 11. Net Energy (NEm + g) Dry Matter (DM) and Crude Protein (CP) Values of Selected Kansas Feedstuffs

Feedstuff	% DM	% CP	For Maintenance (NEm) Mcal/lb	For Production (NEg) Mcal/lb
Dry Roughages				
Alfalfa hay, early bloom	90	18	.62	.31
Alfalfa hay, mid-bloom	89	17	.58	.26
Alfalfa hay, full bloom	89	16	.53	.18
Bermudagrass, hay	91	9	.52	.16
Bromegrass, hay	89	10	.55	.21
Corn Stover, mature	80	5	.59	.28
Grass, hay	91	12	.58	.26
Oat, hay	89	10	.59	.28
Sundangrass, hay	89	9	.54	.28
Wheat, hay	90	9	.55	.21
Wheat, straw	91	3	.44	.01
Wheat, straw, ammoniated	85	9	.50	.12
Silages				
Corn silage, milk stage	26	8	.69	.40
Corn silage, mature, well eared	36	8	.73	.44
Sorghum silage	32	8	.59	.28
Wheat silage	33	12	.60	.30
Concentrates				
Barley, grain	89	12	.92	.61
Corn, grain, rolled	88	10	.98	.65
Cottonseed meal, solvent	91	46	.81	.52
Fat, animal, vegetable	99	0	2.45	1.87
Oats, grain	89	13	.81	.52
Sorghum, grain, ground	89	10	.89	.59
Soybean meal, solvent	91	50	.94	.64
Soybean, whole	90	41	1.04	.71
Wheat, grain	89	14	.98	.65
Wheat, middling	89	18	.89	.59
Wheat, millrun	90	17	.79	.50

3. **Take into account pregnancy, rumen fill, and age of the cow when body condition scoring.** Be sure you are evaluating body fatness when assigning a high body condition score. This requires that you become familiar with the normal appearance of your cowherd during each stage of production.
4. **Be able to look through the hair coat.** This is sometimes difficult when cattle have a long winter hair coat. If you don't feel comfortable visually appraising the body condition of cows with long hair coats, learn how to palpate for body fatness.
5. **Use body condition scoring at key times during the production cycle.** Key times would include the beginning of the last trimester of gestation, parturition and at breeding.
6. **Record body condition scores.** If you take the time to condition score your cowherd, take advantage of the information available to you. If scores are recorded, you will be able to see how individual cows respond to varying levels of body condition or fatness in terms of nutritional and reproductive efficiency.

Target Rations for Attaining a 1,200 lb. Body Condition Score = 5 Cow, 100 Days Prior to Calving

BCS[a]	Dietary Requirements	Sudan Hay Based		Prairie Hay Based	
		Diet Analysis	Ingredients and Amounts	Diet Analysis	Ingredients and Amounts
3	1,125 average weight 1.50 lbs/day daily gain 3.03 Mcal req./day	Mcal/day provided = 3.02 2.27 lbs. crude protein/day	(1) 24.75 lbs. sudan hay (2) 2.9 lbs. sorghum grain	Mcal/day provided= 3.03 2.28 lbs. crude protein/day	(1) 20.7 lbs. prairie hay (2) 6.1 lbs sorghum grain (3) .94 lbs. soybean meal
4	1,163 average weight .75 lbs/day daily gain 1.52 Mcal req./day	Mcal/day provided = 1.52 2.03 lbs. crude protein/day	(1) 25.32 lbs. sudan hay	Mcal/day provided= 1.52 2.08 lbs. crude protein/day	(1) 22.3 lbs. prairie hay (2) 2.7 lbs. sorghum grain (3) 1.0 lbs. soybean meal
5	1,200 average weight 0 lbs/day daily gain	Mcal/day provided = .019 1.62 lbs. crude protein/day	(1) 20.3 lbs. sudan hay	Mcal/day provided= .02 1.82 lbs. crude protein/day	(1) 21.6 lbs. prairie hay (2) 1.13 lbs sorghum grain
6	1,238 average weight 0 lbs/day daily gain	Mcal/day provided = .018 1.73 lbs. crude protein/day	(1) 20.3 lbs. sudan hay (2) .20 lbs. soybean meal	Mcal/day provided= .02 1.85 lbs. crude protein/day	(1) 22.0 lbs. prairie hay (2) 1.15 lbs. soybean meal

[a]Body Condition Score 100 days prior to calving

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