Western Beef Resource Committee

Fourth Edition

Cattle Producer's Handbook

Nutrition Section 330

Nutritional Management of the Mature Beef Cow

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Productivity and profitability of cow-calf operations depends, in part, on how well their nutritional management plans meet the nutritional needs of the cowherd. In addition, research has suggested that nutrition during late gestation influences the performance and profitability of the subsequent offspring. This article provides an overview of beef cow nutrition as well as some considerations for developing a cowherd nutritional management plan.

Specific information concerning cow nutritional requirements can be found in 300, "Nutrient Requirements of Beef Cattle." For mature cows, nutrient requirements are listed for three physiological stages:

1. Dry pregnant mature cows in the middle third of gestation;
2. Dry pregnant mature cows in the last third of gestation; and
3. Cows nursing calves during the first 3 to 4 months postpartum.

Consequently, we will describe the nutritional management of mature beef cows as it relates to these stages. In addition, more information on nutrition can be found in 327, "Mineral Supplementation of Beef Cows in the Western United States," which provides mineral requirements and supplementation strategies, and 313, "Beef Cattle Nutrition: Feeding the Cow and the Rumen," which presents some of the most current information used in determining cow nutrient requirements.

The example animal that will be used throughout this article is a 1,200-pound, 5-year old Angus cow that becomes pregnant 90 days after calving. Table 1 has her annual requirements for metabolizable protein (see 313. "Beef Cattle Nutrition: Feeding the Cow and the Rumen" for more on metabolizable protein), calcium (Ca), and phosphorus (P), while Fig. 1 charts her annual requirements for energy (NRC 2000).

Dry Pregnant Mature Cows *(middle third of gestation)*

When a cow is dry and in the middle third of gestation, her nutrient requirements are at the lowest point of her production cycle (months 7 through 9 after

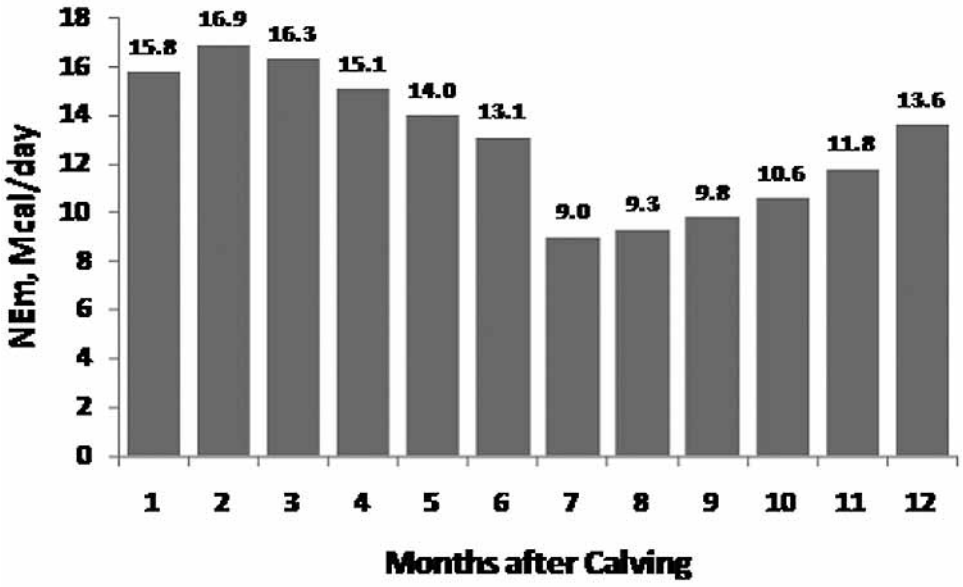

Fig. 1. Net energy for maintenance (NEm) of a 1,200-pound, 5-year old Angus cow becoming pregnant 90 days after calving (NRC 2000).

Table 1. Nutrient requirements of a 1,200-pound, 5-year old Angus cow becoming pregnant 90 days after calving (NRC 2000).

	Months after calving											
Nutrient required	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
MP, grams/day	824	903	856	771	688	619	441	453	473	508	566	656
Ca, grams/day	35	39	37	33	29	25	17	17	17	28	28	28
P, grams/day	24	26	25	22	20	18	13	13	13	18	18	18

MP = metabolizable protein; Ca = calcium; P = phosphorus; 1 pound = 454 grams

calving; Table 1; Fig. 1). If a cow calved on March 1 and became pregnant on June 1, the middle third of gestation would coincide with September through November. This period of time is the easiest to improve cow body condition score (BCS; see 720, "Condition Scoring of Beef Cattle") and increase weight of thin cows. Consequently, weaning at this time is a management practice that will help maintain or increase cow BCS.

Weight gains of both cows and calves are often low by late August; particularly during years of poor forage quality. Research in the Intermountain West has demonstrated that weaning calves at approximately 140 days of age increases cow BCS and weight, by one full score and approximately 100 pounds, respectively, at the beginning of the winter feeding period compared with cows whose calves are weaned at a more traditional time period (e.g. 205 days; Fig. 2; Merrill et al. 2008). Consequently, these traditional weaned cows have increased winter feed costs of about $30/cow compared with the early weaned cows due to the extra feed needed to get them to a comparable BCS by calving.

The overall economic effect of early weaning, however, is dependent on several factors including timing and amount of precipitation, calf performance, calf prices, and feed costs (feedstuffs, labor, and fuel). In addition, common practice for most spring-calving cows in the western U.S. is to wean in late October or early November. Consequently, it may be difficult for these producers to take advantage of this strategy to put weight and condition on their cows.

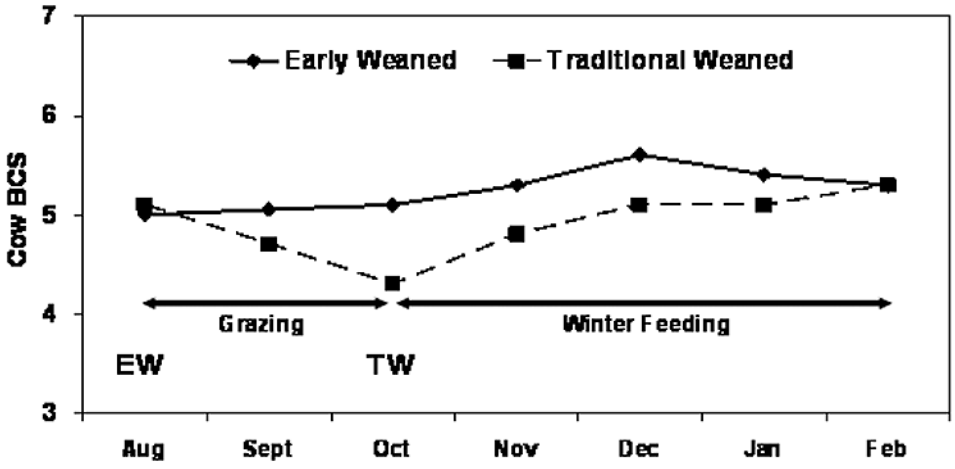

Fig. 2. Cow body condition score (BCS) as influenced by early weaning (EW; 130 days of age) vs. traditional weaning (TW; 207 days of age). Adapted from Merrill et al. (2008).

Dry Pregnant Mature Cows *(last third of gestation)*

The 90 days leading up to calving are a critical time in the cow production cycle (months 10 through 12 after calving; Table 1; Fig. 1). The only period with greater nutrient requirements is the first 3 to 4 months of lactation. The fetus grows rapidly during the last third of gestation and requires increased nutrition from the cow for normal development (Fig. 3). Approximately 80 percent of fetal growth occurs during the last third of gestation.

During this period, a cow should be gaining approximately 1 pound/day in the form of calf growth and associated uterine fluids and membranes. Extremely important is to have cows in good body condition (a BCS of approximately 5) at calving for these reasons:

- To maintain good reproductive performance (shortened time to first estrus, improved first service, and overall conception rate),
- To ensure colostrum production is adequate, and
- To improve probability the calf is born healthy.

Research has suggested that providing supplemental protein to mature cows during the last 90 days of gestation improves calf survivability and weaning weight, yields greater economic returns at weaning (Bohnert et al. 2010), and, with retained ownership (Stalker et al., 2006), and improves fertility in heifers (Table 2; Funston et al. 2008; Martin et al. 2007). This work suggests that protein supplementation of the cow during the last third of gestation has positive performance

Table 2. Late-gestation protein supplementation of mature beef cows and subsequent effects on heifer progeny performance[a].

Item	Martin et al. (2007)		Funston et al. (2008)	
	No supplement	Supplement	No supplement	Supplement
Weaning wt., lb	456	467	492	511
Age at puberty, days	334	339	365	352
Pregnancy, %	80	93	83	90

[a]Data within the table is from the heifer progeny of cows that either did not (no supplement) or did (supplement) receive supplemental protein during late gestation.

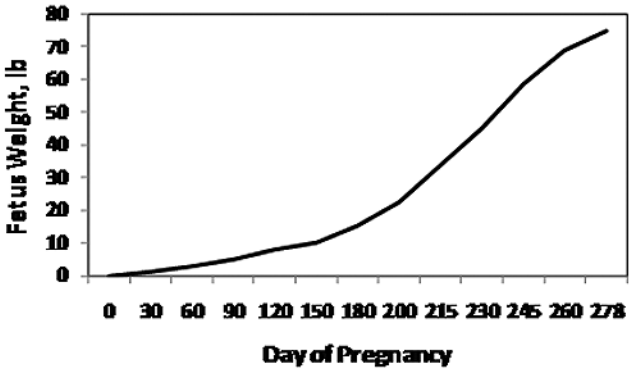

Fig. 3. Fetus growth during gestation. Approximately 80 percent of all fetal growth occurs during the last third of gestation. Adapted from Carpenter and Sprott (2008).

Table 3. Relationship of cow body condition score (BCS) at calving and during the breeding season to pregnancy rate (Kunkle and Sand 2003)[a].

Pregnancy rate (%) determined at:	BCS		
	4	5	6
Calving	60	78	91
Breeding season	58	85	95

[a]BCS is based on a 1 to 9 scale; 1 = extremely thin; 9 = obese

and economic effects, irrespective of the benefits to the cow, on the productivity of the subsequent offspring.

Cows Nursing Calves *(first 3 to 4 months post-partum)*

The period of time from calving to breeding is when a cow has the greatest nutrient requirements compared with any other time during the production year (Table 1; Fig. 1). On average, a BCS of 5 or greater at calving and/or beginning of breeding ensures that body reserves are adequate for postpartum reproduction. Data compiled from field studies conducted in Texas and Oklahoma, which contained information from more than 1,400 beef cows, indicated that cows with BCS of 4 at calving and during the breeding season had reduced pregnancy rates compared to cows with BCS of 5 or greater (Table 3; Kunkle and Sand 2003). Thus, beef cattle producers should try and make sure that mature cows calve in a BCS of 5. This ensures the cow has adequate energy reserves to go through early lactation and enters the breeding season with a BCS of at least 5 (Figs. 4 and 5), which is typically considered the "critical" BCS for adequate reproductive performance of beef cows.

Producers should be aware, however, that BCS $\geq$ 7 could result in increased calving difficulty not to mention increased cost. Data indicate that cows beginning the breeding season with excessive BCS have a reduced chance of becoming pregnant compared to cows with moderate BCS (Fig. 6; Cooke et al. 2009). This can be attributed to detrimental effects of excessive nutritional intake on fertility and also on the ability of

Fig. 4. A cow that calved in adequate body condition score (BCS 5).

Fig. 5. A cow that calved in poor body condition score (BCS 3).

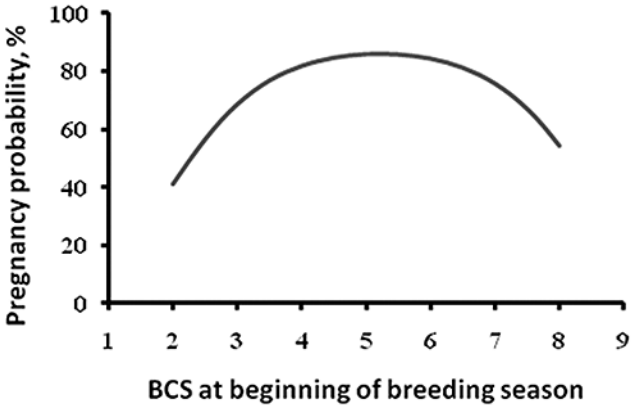

Fig. 6. Influence of body condition score (BCS), assessed at the beginning of the breeding season, on the probability of cows to become pregnant. Adapted from Cooke et al. (2009).

cows to maintain early pregnancy. Cows with BCS > 6 at calving should not be placed on a nutrient-restricted diet as it may cause cows to stop cycling, resulting in lower reproductive performance.

On the other hand, if the cowherd is calving with BCS ≤4, there may still be a chance to get cows pregnant within a 60-day breeding season. Cows with low BCS at calving can still experience adequate pregnancy rates if offered energy and protein beyond their requirements (approximately 120 percent) during the early postpartum period (Cooke et al. 2008). This is an emergency procedure, however, and likely will be detrimental to the economic efficiency and productivity of the cattle enterprise, particularly because it requires intensive and costly feeding programs. The bottom line is that supplemental feeding will require a much greater quantity of nutrients (quality feed) in order to improve BCS during lactation compared with the middle or last third of gestation.

Conclusion

The greatest influence on the profitability of cow-calf operations is the percentage of cows in the herd that become pregnant and calve every 12 months. Therefore, cows should calve in a BCS of 5 or greater to maintain a 365-day calving interval. This can be accomplished most effectively through proper nutrition and management during the middle and last third of gestation.

If cows have an inadequate body condition going into the breeding season, they will require additional supplementation in order to improve their BCS. Supplemental feeding at this time is expensive and will lower a cowherd's profitability. The alternative to supplementation is a lower percentage of calves to wean and sell the following year.

Cattle producers are advised to visually monitor cow BCS each year at weaning, calving, and the beginning of the breeding season. This will provide producers with the information necessary to make sound nutritional management decisions that can improve the overall performance of the cowherd.

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