A Methodical Approach to Beef Cow Nutrition

David Lalman, Extension Beef Cattle Specialist
OSU Animal Science

My phone has kept me busy this summer visiting with producers about options to minimize feed costs this coming winter. The process of evaluating feeding or supplementation programs is not complicated and can be accomplished in 4 steps:

1. Determine the nutrient requirements for the appropriate stage of production.
2. Anticipate the amount of nutrients cows will receive from winter range and/or hay.
3. Determine supplemental needs.
4. Evaluate supplement alternatives.

Nutrient Requirements

Nutrient requirements for beef cows include those for water, energy, protein, minerals and vitamins. Cow age, size, breed, body condition, milk production potential, expected calf birth weight, hair coat length in relation to current temperature and various other environmental effects all influence a cow's requirements. Computer software programs, such as OSU Cowculator, and tabular data are available in various extension and industry publications to assist producers in determine animal requirements in different situations.

Nutrient Contribution from Forage

General guidelines for estimating forage intake are included in Table 3, and are expressed as a percentage of cow body weight. In general, intake is lower with lower quality forages and increases considerably with the onset of lactation.

The next step is to estimate nutrient content of standing forage or hay. As mentioned earlier, these values are also variable, depending on forage type, maturity and weathering. The most accurate method to determine supplemental needs for cows that will receive primarily a hay diet, is to have the hay analyzed for nutrient concentration. Table 3 includes average nutrient values for a few common forages found in the Southern Plains.

Table 1. Average nutrient content of selected forages (dry matter basis)[1].

Hay Type	Crude Protein, %	NEm, Mcal/ lb	Ca, %	P, %	Estimated Intake, % of body weight Gest.	Lact.
Winter range	5.0	.41	.26	.15	1.8	2.0
Prairie hay	6.4	.45	.35	.14	1.8	2.2
Bermudagrass hay	7.8	.42	.47	.20	1.8	2.0
Sorg/sudan hay	8.0	.52	.55	.30	2.0	2.3

[1]Nutrient Requirements of Beef Cattle, NRC, 1984 and 1996.

Supplemental Needs

Once nutrient requirements have been established and a reasonable estimate of the nutrient contribution of the forage has been made, determining supplemental needs is simply a comparison of the two. For this discussion, we will assume cows will graze winter range (receive little or no hay supplementation). Average cow weight will be 1100 lb. and average calving date is March 15. Consequently, these cows would be grazing low quality winter range throughout the last one third of gestation. By using the information in Table 1 supplemental needs for a cow grazing winter range were calculated (Table 2). Without supplementation, this group of cows would be considerably deficient in both protein and energy, and would be expected to lose considerable body condition before calving.

Table 2. Nutrient supply compared to requirements for 1100 lb. beef cow grazing native range during last one third of pregnancy.

	Crude Protein, lb.	NEm, Mcal
Required	1.74	10.39
Supplied by forage	.99	8.12
Supplemental need	.75	2.27

Evaluating Supplement Alternatives

Fortunately, ruminant animals can use a wide variety of feeds to meet their protein and energy needs. Evaluating and capitalizing on supplement “bargain” opportunities requires some knowledge of beef cow nutrition, a mechanism to track markets and the ability to contract or even store feeds in advance of the feeding period. In addition, cost of ingredients for the supplementation program is only part of the story. Some feeds are bulky and difficult to handle. In many cases, storage for truckload lots must be available in order to reduce transportation costs. Available labor and feeding system must also be considered, and may limit the options for many producers.

Table 3 illustrates cost per ton and cost per unit of protein and energy for several feeds. Costs for these feeds were estimated based on average prices in Central Oklahoma. Certainly, costs for each producer will vary from the values in the table depending on current feed commodity market conditions, source, transportation costs and many other factors. Be sure to investigate your own costs for any alternative that you are considering.

Table 3. Typical nutrient composition and cost per unit of nutrient for various feeds.

Feed	$/Ton[1]	% CP	$/lb Protein	Mcal NEm/lb	$/Mcal
Corn grain	$200.00	8	$1.25	0.99	$0.10
14% feed product	$213.00	14	$0.76	0.68	$0.16
20% feed product	$249.00	20	$0.62	0.69	$0.18
25% feed product	$270.00	25	$0.54	0.74	$0.18
38% feed product	$343.00	38	$0.45	0.73	$0.23
Good bermudagrass hay	$75.00	11	$0.34	0.49	$0.08
Good prairie hay	$75.00	6	$0.63	0.52	$0.07
Full bloom alfalfa hay	$90.00	15	$0.30	0.52	$0.09
Mid-bloom alfalfa hay	$125.00	19	$0.33	0.56	$0.11
Wheat middlings	$200.00	16	$0.63	0.74	$0.14
Soybean hulls	$205.00	11	$0.93	0.76	$0.13
Corn gluten feed	$210.00	21	$0.50	0.79	$0.13

[1]`Costs of all feed sources vary. This exercise is intended as an example only. Readers are encouraged to use the demonstrated calculations with their own available feed resources and associated costs.

In general, higher protein feeds are usually cheaper sources of protein and high-energy feeds that are low in protein are cheaper sources of energy (Table 3). This relationship still holds true in today's higher feed cost environment. The data in table 3 also points out that good quality hay is extremely valuable in times when feed grain and oilseed meal prices are high. The least expensive energy sources in Table 3 are the grass hays. For several years, corn grain has been less expensive per unit of energy than good quality grass hay. This is no longer the case…again, based on the prices and nutrient values used here.

Cost per unit of protein or energy cannot be used exclusively in evaluating these alternatives for this scenario, because our "model" cow herd requires supplemental protein and energy. If the cows were in excellent condition (Condition score of 6 or greater), 2 pounds of the 38% feed product could be fed to meet the protein requirement. The net effect would be to maximize forage intake and digestion, with the understanding that the cows would lose some weight and condition, due to a slight deficiency in energy intake. Obviously, this program minimizes cost, but may not be the best choice

for cattle that have marginal body condition at the beginning of the feeding period, as one would expect lower pregnancy rates the following year. Table 4 demonstrates various supplementation programs and costs that would meet the protein supplementation need.

Table 4. Feeding rate and cost to provide adequate supplemental protein for 1,100 lb beef cows grazing winter range during late pregnancy.

Item	Amount Fed, lb/Day	Protein, lb/Day	NEm, Mcal/Day	$/Day	$/90 Days
Supplemental need[1]		**0.75**	**2.27**		
Corn grain	9.4	0.75	9.3	$0.94	$84.60
14% cube	5.4	0.76	3.7	$0.58	$51.76
20% cube	3.75	0.75	2.6	$0.47	$42.02
25% cube	3	0.75	2.2	$0.41	$36.45
38% cube	2	0.76	1.5	$0.34	$30.87
Full-bloom alflafa hay	5	0.75	2.6	$0.23	$20.25
Mid-bloom alfalfa hay	4	0.76	2.2	$0.25	$22.50
Wheat middlings	4.7	0.75	3.5	$0.47	$42.30
Soybean hulls	6.8	0.75	5.2	$0.70	$62.73
Corn gluten feed	3.6	0.76	2.8	$0.38	$34.02

Notice that the lower protein supplement sources, such as corn and soybean hulls, are not practical protein sources. In fact, energy must be overfed to satisfy the protein need. With this much “supplement” intake, one would expect the forage intake to be much lower than the projection shown in Table 1 above. Because of the low quality forage diet; these cows require considerable supplemental protein and energy. Consequently, feeds or blends of feeds that are moderate in protein (around 25% CP) and high in energy fit this scenario the best. Obviously, for cows receiving grass hay similar to the bermudagrass hay shown in table 3, low protein, high-energy feeds would be more economical.

In summary, reducing feed costs, while maintaining performance is a must for Oklahoma cow/calf producers. By using a systematic approach to evaluating beef cow nutritional requirements, forage nutrient contribution and various supplement sources; an optimal winter nutrition program can be designed. The lowest cost alternative will not always be the best program, due to the relative value of convenience, labor availability and feeding system. The most effective way to evaluate alternatives is to first determine the cost of the total supplementation program, then compare differences in cost with these other factors.