



Cattle Producer's Handbook

Nutrition Section

319

Alfalfa for Beef Cows

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Protein and energy supplements do not need to come out of a sack. Often a more economical supplement is wrapped in twine or wire and is known as the "Queen of forages" or alfalfa hay.

Hay not meeting the dairy industry specifications may be purchased cheaper than processed supplements when comparing price on a per-pound-of-actual-nutrient basis (Table 1). A combination of home-grown hay, purchased alfalfa hay, and/or a mineral supplement may be used to balance the nutritional needs of the cowherd during critical periods of the year.

What Is Alfalfa?

Alfalfa is a legume, a nitrogen fixing plant that extracts nitrogen from the atmosphere and incorporates it into plant proteins. Other legumes include clovers, vetches, peas, beans, and birdsfoot trefoil. Alfalfa is grown throughout the U.S. and is capable of producing over 1,800 pounds of protein per acre per year.

Alfalfa as a Protein Source

Beef producers often use the term "high quality forage" to describe a high protein, low fiber feedstuff. Table

Table 1. Average quality and price of feeds commonly available to northern Nevada beef producers.¹

Feed	CP %	TDN %	Crude fiber %	Phos. %	Ca %	Mg %	K %	Price per ton	\$/lb protein
Alfalfa, dairy quality	18	60	23	0.22	1.41	0.33	2.52	\$110	\$0.31
Alfalfa, beef quality	15	55	28	0.25	1.40	0.14	2.45	\$85	\$0.28
Average grass hay*	8.4	53	31.4	0.19	0.54	0.12	1.66	\$60	\$0.36
Late cut non-fertilized grass hay*	6.7	50.1	32.6	0.17	0.50	0.11	1.35	\$55	\$0.41
Fertilized grass hays superior quality*	10.1	55.1	30.9	0.21	0.45	0.14	2.33	\$75	\$0.37
Range cube**	18	80	—	—	—	—	—	\$138	\$0.38
Wheat-mid pellet	16	79	9.2	1.13	0.11	0.52	1.33	\$168	\$0.53
Range block**	13	72	—	—	—	—	—	\$155	\$0.60
Molasses tubs**	16	76	4.0	1.0	2.0	0.50	7.0	\$380	\$1.19
Liquid molasses**	11	76	4.0	1.0	2.0	0.50	7.0	\$240	\$1.09

*302 samples collected 1946-87 from northeastern Nevada ranches.

**Contains additional NPN sources of protein not included in table. High energy diets are required to utilize those sources of protein.

¹Reference to a company or trade names does not imply approval or endorsement.

1 shows the protein, energy, fiber, and mineral content of various feeds available to beef producers. Early cut alfalfa (late bud, early bloom stage) may vary from 16 to 20 percent crude protein. Even late cut alfalfa will contain 12 to 15 percent crude protein. Fiber content of alfalfa hays range from 20 to 28 percent.

In contrast, the medium quality grass hay averages 8.4 percent crude protein and 31.4 percent fiber. Ruminal particulate passage rate is directly related to fiber content (high fiber = low passage rate). Higher feed consumption is correlated with low fiber and high protein diets. Passage rate of alfalfa is approximately 36 hours vs. up to 70 hours for the lower quality forages. The quality of alfalfa protein is excellent with more than 70 percent of its total protein being digestible.

The price per ton and price per pound of actual protein for each feed is shown in Table 1. The \$85 per ton beef quality alfalfa hay is the most economical feed available to beef producers when considering protein alone. The 28 cents per pound of actual protein is eight cents cheaper than the average grass hay listed and cheaper than the packaged supplements listed.

Alfalfa as an Energy Source

Alfalfa has one of the highest feeding values of forages. It is sometimes underestimated as an energy source. A ton of alfalfa hay contains as much total digestible nutrients (TDN) as 25 bushels of corn (and as much protein as two-thirds ton of soybean meal). Beef cows are often likely to be fed rations more deficient in energy than in protein, particularly during the last trimester of pregnancy and postpartum. A beef cow needs energy to regain body weight after calving, produce milk for her calf, and rebreed in 40 to 90 days after calving.

Some grass hays may be as high in digestible dry matter as alfalfa; however, those hays will be digested slower than alfalfa. As previously mentioned, some alfalfa hay will pass through the rumen of a beef cow in about one-half the time required by grass hay (36 vs. 70 hours). Therefore, animals fed alfalfa hay tend to gain faster, produce more milk, and maintain themselves in better condition than those fed other forages. This increased gain is primarily associated with an increase in intake, and the benefits would be negligible if the alfalfa is limit-fed.

Alfalfa as a Source of Minerals and Vitamins

Alfalfa can provide most minerals and vitamins at less cost than if supplied from processed sources.

Minerals

If one pound of alfalfa hay is fed per 100 pounds of body weight, the beef animal will meet its daily requirements for calcium, magnesium, potassium, sulfur, iron, cobalt, manganese, and zinc. Phosphorus levels of alfalfa are more moderate, but still high enough that if fed at the above rates will supply about two-thirds of the daily requirements needed. The high level of calcium in alfalfa is especially important for lactating cows, young developing replacement heifers, and bulls. Mineral content of alfalfa is related to fertilization and local soils. Hay quality tests are required to determine the actual amount of minerals in a given lot of hay.

Vitamins

Leafy, green alfalfa hay is unusually high in carotene, the precursor of Vitamin A. Vitamin A is the most common beef cow vitamin deficiency. Good quality alfalfa hay can furnish all the Vitamin A needs of beef animals. Vitamin A will leach out of hays stored over extended periods of time. Freshly harvested alfalfa is richer in Vitamin A.

Alfalfa maybe a good source of Vitamin E and selenium, depending on the soil's nutrient status the hay was grown on. "White muscle disease," which sometimes causes serious losses of calves, is caused by a deficiency of Vitamin E and selenium.

Sun-cured alfalfa hay is also a source of vitamins D and K as well as riboflavin and niacin. It is also a good source of magnesium, which is important in areas prone to grass tetany.

Alfalfa as a Fall Supplement

Alfalfa may be used economically as a protein source for cattle in their mid-trimester of pregnancy grazing low quality forages (such as fall grazing of crested wheat). Table 2 shows the nutrient content of dormant crested wheatgrass and nutrient requirements of the beef cow in her mid and last trimesters of pregnancy.

Protein supplementation is essential to maintain the body condition of the cow before entering the winter months and her last trimester of pregnancy. Processed

Table 2. Nutrient requirements of a 1,000-pound mature nonlactating cow and nutrient value of dormant crested wheat.

Nutrient	Nutrient requirements mid-trimester	Nutrient requirements last trimester	Nutrient value dormant crested wheatgrass	Combined rations ¹
Crude protein, %	1.3 lb or 7.0%	1.6 lb or 7.9%	(5.0%)	8.0%
TDN, %	8.8 lb or 48.8%	10.5 lb or 53.6%	(45.0%)	(49.0%)

¹Combined nutrient value of dormant crested wheatgrass and 5 pounds alfalfa hay.

Figures in parenthesis do not meet the nutrient requirements of a 1,000-pound nonlactating pregnant cow in the last trimester.

Table 3. Nutrient requirements of a 1,000-pound mature cow and nutrient value of common feeds.

Nutrient	Mid-trimester	Last trimester	Postpartum	Average grass hay	Alfalfa	50% grass 50% alfalfa
Crude	1.3 lb or 7.0%	1.6 lb or 7.9%	2.0 lb or 9.6%	(8.4%)	15%	11.7%
Protein, %						
TDN, %	8.8 lb or 48.8%	10.5 lb or 53.6%	11.5 lb or 56.6%	(53.0%)	(55.0%)	(54.0%)

Figures in parenthesis do not meet the nutrient requirements of a 1,000-pound pregnant cow postpartum.

Table 4. Nutrient requirements of an 850-pound pregnant 2-year-old heifer in last trimester of pregnancy and postpartum and nutrient value of common feeds.

Nutrient	Last trimester	Postpartum	Average grass hay	Alfalfa	50% grass 50% alfalfa
Crude	1.6 lb or 8.6%	1.9 lb or 10.6%	(8.4%)	15%	11.72%
Protein %					
TDN, %	10.5 lb or 59.3%	11.6 lb or 63.2%	(53.0%)	(55%)	(54%)

Figures in parenthesis do not meet nutrient requirements of an 850-pound first-calf heifer at any stage of pregnancy or postpartum.

higher priced supplements such as those listed in Table 1 are often used because of their convenience (range block or cube). By feeding 5 pounds of alfalfa every day or 10 pounds every other day, producers can meet the nutrient requirements of the beef animal more cheaply. Not only does alfalfa furnish the needed protein, but it also stimulates the rumen to increase the consumption and digestibility of the lower quality forages.

Winter Feeding Cows Alfalfa and Grass Hays

Many ranches produce a significant quantity of low quality grass hay. Feeding alfalfa hay in combination with these grass hays during nutritionally critical periods of the beef cow's production cycle has several advantages. Table 3 shows that the average Nevada grass hay falls short of fulfilling the protein and energy needs of a 1,000-pound cow postpartum (right after calving). By feeding a 50 percent grass hay, 50 percent alfalfa ration, the protein requirements are met. If we added 2 pounds of corn or wheat mids, the energy requirements during early lactation would be met.

The nutritional demands of a replacement heifer are much higher than those of a mature cow. Not meeting those nutritional demands may result in delayed conception for the heifer's second calf, a weaker calf, lower colostrum quality, and a lower weaning percent. Table 4 shows that a 50 percent grass hay/50 percent alfalfa diet plus 3 pounds of an energy concentrate is required to meet the nutritional demands of a heifer in her last trimester of pregnancy and postpartum early lactation.

Bloat Problems Associated with Feeding Alfalfa

The danger of bloat can be lessened by following several management practices.

- Do not feed dairy quality alfalfa hays to beef cattle.
- Do not allow leaves to build up in the feed bunk.
- Allow plenty of feed space for all animals to have access at once.
- Feed alfalfa in conjunction with a higher fiber feed such as grass hay. Never introduce hungry animals to leafy alfalfa.
- Remove and sell animals that are chronic bloaters.
- During wet weather take extra precautions on the aforementioned points.
- Bloat control may also be aided by feeding an antifoaming agent (e.g., polaxalene). Bloat Guard is an example and is available in medicated blocks, in commercial pelleted feeds as a top dress, or in a liquid that can be added to the water.

Alfalfa May Contain Phytoestrogens

Phytoestrogens are substances produced by the plant that act like the animal hormone estrogen. The plant probably developed these mechanisms to prevent overgrazing. Animals that eat too much plant estrogen do not reproduce well. This has been a problem with sheep on alfalfa and may happen in cattle. These phytoestrogens cause a decrease in the ability to produce natural estrogen, and eventually there is not enough animal estrogen produced to allow for natural reproduction.

Phytoestrogens are the highest in poor-quality, first-cut alfalfa. Plant estrogens increase at mid and full bloom, and rain on newly cut hay may increase phytoestrogen content. To prevent possible problems put up first cuttings early and dry. If there is a possibility of phytoestrogens in alfalfa, do not feed it to cows or heifers for at least 2 weeks before breeding.

For animals that are grazing alfalfa, do not over graze. The phytoestrogens occur primarily in the middle and

bottom leaves of alfalfa, and moderate grazing will prevent the animals from eating the leaves. They tend to graze alfalfa from the top leaves down.

Feedability of Alfalfa

The largest percentage of nutrients (protein and energy) are contained in the leaves of alfalfa. The stems are similar in nutrient content of grass hay. Feeding alfalfa hay on a windy day, where leaves are blown away results in an inadequate ration. By feeding the 50 percent grass hay/50 percent alfalfa ration in a windbreak area, leaf loss is reduced, thus balancing the ration.

Summary

Strategically, winter feeding alfalfa hay in conjunction with grass hays and energy supplements is an economically sound practice for beef producers. Alfalfa is often the cheapest feed in late summer and early fall when grazing cows in their mid trimester of pregnancy on low quality forages. Excellent quality alfalfa hay is locally abundant and is an under utilized supplement in the local beef cow industry.

Literature Review

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