

Forage Series

Alfalfa for Dairy Cattle

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Alfalfa is an excellent forage for high producing cows. Cows efficiently use the high levels of protein, calcium and high quality fiber in alfalfa for producing milk. The palatability of alfalfa is high. Typically, cows will eat more alfalfa than grass because the fiber content is usually lower in alfalfa (Table 1).

Alfalfa hay or silage can be fed free choice throughout the year. Lower feed bills and higher milk production are the primary reasons alfalfa is used on dairy farms.

The major problem with forages fed to dairy cattle with high levels of milk production is the inability of cows to consume enough energy.

This low energy intake is due to low TDN content of the forage. Intake by dairy cattle is maximized when the total ration has a digestibility of 65 to 75 percent. In practical terms, this is equal to a ration of 40 to 60 percent grain and 40 to 60 percent early cut hay or silage. Most forages are highly digestible and permit high levels of intake during the early stages of growth when temperatures are cool and when soil moisture is adequate. Thus, cereal grains and ryegrass are of high quality while in the vegetative growth stage during the fall, winter and early spring. Permanent grasses are usually high quality forages during the spring and early summer. Hot weather reduces feeding value regardless of management, fertilization or type of forage. The period of maximum growth of high quality grass forage is primarily confined to six to eight weeks in the spring and early summer. **However, digestibility of alfalfa declines slower than warm season perennial grasses as these two forage types mature.**

Table 1. Composition (DM Basis) of Alfalfa and Bermudagrass Hay

	Mid-Bloom Alfalfa	Bermuda
	%	
CP	17.0	9.8
TDN	58	49
ADF	35	38
NDF	46	77
Calcium	1.41	0.53
Phosphorus	0.24	0.21
Relative Feed Value	124.6	71.6

Alfalfa is universally considered one of the highest quality forages. Most dairy producers would use it if they had an adequate supply readily available at economical prices. Alfalfa can be profitably grown in many areas of Arkansas. Dairy producers are now successfully growing alfalfa in areas of the state and under management systems once thought impossible.

As dairy producers who have primarily used grass forages realize the economic value of quality alfalfa in their feeding programs, they will utilize more of it on their farms.

The greatest single cause of low quality forage is harvesting hay or silage when it is too mature. On many dairy farms, as much as half the grain that must be fed is due to the failure

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Ration Ingredient	Maturity and Composition of Alfalfa (DM Basis)			
	Mature 92 RFV 13.0% CP 55% TDN 44% ADF 55% NDF	Full Bloom 104 RFV 14.5% CP 57% TDN 41% ADF 51% NDF	Mid Bloom 125 RFV 16.0% CP 60% TDN 35% ADF 46% NDF	Early Bloom 138 RFV 18.0% CP 62% TDN 34% ADF 42% NDF
Alfalfa (lbs)	18.8	20.1	22.5	29.2
Corn (lbs)	23.9	23.1	21.2	17.6
Soybean Meal 48% (lbs)	4.1	3.4	2.5	0
Vitamin-Mineral Mix (lbs)	0.5	0.4	0.4	0.4
Ration Cost/Cwt	\$5.91	\$5.83	\$5.70	\$4.57
Feed Cost/Cow/Day	\$2.70	\$2.65	\$2.59	\$2.51
Savings/100 Cows/Year	0	\$2,920	\$5,100	\$6,935
Comparative Value of Alfalfa/Ton	\$95	\$100	\$106	\$114

to harvest forage at an early growth stage when it is higher in energy and protein and has lower fiber content. Small grains harvested after early bloom, corn harvested above 35 percent dry matter, sorghum harvested when the leaves are brown, bermudagrass harvested at more than 28-day intervals and clovers and alfalfa harvested past mid-bloom stage require large increases in grain feeding for good milk production. Early bloom alfalfa has more total digestible nutrients (TDN) and crude protein (CP) than mature alfalfa (Table 2).

Mature alfalfa is considered below average in quality. It contains more fiber as it matures and may average 13 to 15 percent protein on a dry matter basis. Mid-bloom alfalfa is considered average quality, containing 16 to 17 percent protein. Early bloom and immature (late bud stage) alfalfa forages are classified as high quality. They can be 18 percent protein or higher on a dry matter basis. **However, the most important quality component of alfalfa compared to grass is the lower fiber because it allows greater feed intake which allows greater milk production.** Generally, alfalfa for dairy cattle should be between 140 and 150 in Relative Feed Value (RFV). Alfalfa below 140 RFV may be too high in fiber to be an economical purchase, while alfalfa above 180 RFV may be too low in fiber, which can result in acidosis in the rumen.

Table 2 shows four rations, each using a different quality of alfalfa as the only forage source. Corn is priced at \$110/ton, 48 percent soybean meal at \$180/ton and the alfalfa hay at \$100/ton. Feedstuffs listed in the first column of the table are used to balance a ration on a least cost basis to meet the needs of Holstein cows producing 55 pounds of milk daily. The ration with the highest quality alfalfa hay (that cut in the early bloom stage of growth) does not require the addition of soybean meal to raise the protein content. The savings of 19 cents/cow/day in feed costs add up to \$6,935/year in a 100-cow herd when compared to using mature hay.

Although equal pricing of excellent and low quality alfalfa may not seem logical, it is done in this comparison because there is little price differential for quality hay on the open market. Unfortunately, relatively little hay is sold on the basis of a forage analysis. Production costs are similar for varying hay quality. The earlier cut alfalfa is likely to yield less per cutting, but an extra cutting may be possible. Early harvest should reduce harvesting loss because leafy forage cures faster than stemmy forage, thus hastening the baling operation. Testing your hay is important because the compositions of bales that look similar may vary greatly. In Tables 1-3, mid-bloom alfalfa from three different feed tables resulted in different analyses.

Alfalfa Hay		Percent Protein (as fed) Required in Concentrate Mix at Different Levels of Production ----- Pounds of Milk -----				
Lbs Fed	% Protein	40	50	60	70	80
25	13	12%	14%	15%	15%	15%
25	16	8%	11%	12%	13%	14%
25	19	8%	8%	9%	10%	12%

The comparative values of alfalfa on the bottom line of Table 2 are prices you could afford to pay for either mature, early bloom or immature alfalfa, if you wanted to formulate a ration equal in cost to a ration that used full bloom alfalfa priced at \$100 per ton. For example, a dairyman could pay \$114 for early bloom alfalfa. With all hay prices the same, the ration would cost \$4.57 per hundred pounds of milk produced with early-bloom alfalfa compared to \$5.83, the cost of milk produced with full-bloom alfalfa.

Tables 3 and 4 provide further insight into the economic value of alfalfa. Table 3 shows that medium to high quality alfalfa (that with protein content of 16 percent or higher) provides enough protein for 40 pounds of milk per day with no protein supplement needed above that supplied by corn, milo or cereal grains, which average 8 percent or higher in protein content. A concentrate mix of 12 to 14 percent protein provides adequate protein when fed with high quality alfalfa (that with a protein content of 16+ percent) for production of 80 or more pounds of milk per day.

The low fiber content of immature alfalfa [acid detergent fiber (ADF) and neutral detergent fiber (NDF)] allows dairy cattle to eat more hay, thus reducing costs of concentrate.

Table 4 allows the producer to quickly determine the comparative value of alfalfa that tests 18 percent crude protein when the price of corn and soybean meal are known.

Since most of the protein content of alfalfa is contained in the leaves, keep leaf loss to a minimum. Harvesting alfalfa as haylage or silage is an excellent method of doing this, since it reduces leaf loss in both the harvesting and feeding procedures. Alfalfa hay should be fed in bunks, troughs or in hay racks with feed troughs beneath to catch shattered leaves. *Never* feed alfalfa on the ground because mold may grow.

Alfalfa is not recommended as the only forage for dry cows because of its high calcium content. High quality grass forages with a protein content of 11 to 13 percent are recommended for dry cows and springing heifers. Alfalfa can be fed in limited quantities to dry cows.

The primary considerations in the successful feeding of alfalfa or other forages to dairy cattle are (1) assessment of nutrients required, (2) selection of feedstuff to supply needed nutrients in an acceptable and economical manner and (3) selection of an appropriate management and feeding system. Dairy producers strive to formulate rations that allow the cow to produce great quantities of milk at the most reasonable cost. They balance nutrients in forages and concentrates against the animal's requirements and use feed ingredients and processing methods that produce rations animals will consume in quantity. With high forage feeding, the problem is primarily one of adequate energy intake. Maintenance of normal metabolism and health are problems with high concentrate feeding. The solution is to feed forages and concentrates in proportions which maximize milk production and minimize feed cost and health problems. High quality alfalfa comes closer to meeting all the above considerations in successful feeding of dairy cows than any other one feed.

Dairy producers now have another option for utilizing alfalfa in their forage program. Newly released alfalfa varieties with low set crowns are less likely to be damaged by grazing animals than are the more conventional hay-type varieties with high set crowns. Two examples of the newer tap-rooted, grazing-type alfalfas are Alfagraze and Amerigraze. They may be hayed, ensiled or pastured. When pastured, rotational grazing is recommended over continuous grazing.

The use of one of the rotational grazing systems will allow dairy producers to utilize alfalfa more

Table 4. The Relative Value of Alfalfa Hay (18.2% Crude Protein, 57% TDN [As Fed Basis]) Per Ton

Price of Shelled Corn		Price of Soybean Meal Per Cwt					
Per Cwt	Per Bu	\$8.00	\$9.00	\$10.00	\$11.00	\$12.00	\$13.00
\$3	\$1.68	\$75	\$81	\$89	\$95	\$103	\$110
\$4	\$2.24	\$81	\$88	\$95	\$102	\$109	\$116
\$5	\$2.80	\$88	\$95	\$101	\$109	\$116	\$123
\$6	\$3.36	\$95	\$101	\$108	\$115	\$122	\$129
\$7	\$3.92	\$101	\$107	\$115	\$122	\$129	\$136
\$8	\$4.48	\$108	\$114	\$121	\$128	\$135	\$142
\$9	\$5.04	\$114	\$120	\$128	\$135	\$142	\$149

effectively. Refer to Extension forage fact sheets FSA 2129, *Comparing Grazing Management Systems*, and FSA 2130, *Controlled Grazing Management Systems*, for more information on specific rotational grazing management systems. Also available at your local county Extension office are FSA 15, *Establishing Alfalfa*, FSA 2000, *Alfalfa Site Selection*, FSA 2002, *Planting Alfalfa*, and FSA 2003, *Fertilizing and Liming Alfalfa*.

Under rotational grazing, the rest periods will increase yields as plants can recover from trampling damage and graze more quickly. The result is more leaf area is produced. Cattle left on pastures too long tend to graze regrowth because it is younger and more palatable. This grazing cuts yield potential, allows greater weed and grass invasion, reduces quality and can shorten stand life. Grazing schedules that allow three weeks of rest in the spring when growth rate is high and up to four weeks of rest during mid-summer when growth is slow will generally produce best overall results.

Rotational Grazing Management Tips

- ▲ Graze first-year stands after cutting the first crop in the early bloom stage.
- ▲ Establish the grazing pattern early in the spring when growth is at least 5 to 6 inches tall. Graze to 3 to 4 inches of stubble before moving to the next paddock. With uneven grazing, clipping to a uniform 3-inch height within one day of removing cattle from the paddock maximizes consistency of the forage at the next grazing interval. Alfalfa should be grazed to a 3- to 4-inch height as uniformly as possible. Leaving tall stubble between grazing events encourages insect pests and does not improve regrowth.
- ▲ Typically for lactating cattle, it is ideal to offer just enough alfalfa in a given paddock for one day's grazing and then rotate to a new paddock. This may be as little as two 1-hour grazing periods per day.

Rotational grazing usually involves adjusting paddock sizes throughout the growing season as growing conditions change. Generally, to utilize alfalfa in a classical rotational grazing system, a

minimum of 6 to 8 paddocks will be needed. A given paddock will be grazed two to three days; then cattle are rotated to a new paddock. Ideally, 12 to 16 paddocks will provide even better grazing management options, especially for summer growth patterns. Typically, alfalfa will be ready for regrazing in 21 to 30 days after cattle are removed from a paddock, depending on the time of year.

Strip grazing may be the grazing system of choice as this allows producers to offer a new paddock each day and adjust the paddock size to seasonal growing conditions. With strip grazing, animals may be time-limit grazed on alfalfa for only 1 1/2 to 3 hours per day and then moved to a permanent grass pasture for the remainder of the day.

Regardless of the grazing system chosen, alfalfa needs to be protected from winter injury. Remove dairy cattle from the pasture four to five weeks before the average first killing frost date. This allows the stand to build up a reserve of energy in its roots before going into winter.

Bloat management is another point to keep in mind when grazing alfalfa. Problems with bloat vary from farm to farm. Bloat can cause the death of cows grazing alfalfa. Here are some precautionary practices that may help reduce bloat problems:

- ▲ Prefill animals by feeding hay or another forage before turning them onto the alfalfa pasture.
- ▲ Put animals on alfalfa pastures for short periods initially.
- ▲ Always keep dry hay available during grazing.
- ▲ Watch animals closely on cool, wet days.
- ▲ Once adapted to grazing alfalfa, let cattle continue to graze daily and don't alter their diet.
- ▲ Use grass, such as orchardgrass, as a companion crop. Stands that contain 25 to 50 percent grass are less likely to cause bloat.
- ▲ Consider the use of an anti-foaming agent if the problem warrants such precautions.

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