



Considerations When Purchasing Hay for a Dairy Milking Herd

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Forages are the foundation for building diets for the dairy herd. The quality of these forages greatly impacts profitability and performance, especially of the milking herd. Because of limited land base, labor, or personal preference, farmers may decide to purchase part or all of their herd's forage needs. In other parts of the United States, corn silage and other chopped forages are sold and oftentimes delivered to the farm as needed. In Kentucky, hay is the storage form of forage most often available to purchase. This publication deals with considerations when purchasing hay, especially alfalfa or alfalfa/grass hay, for the milking herd.

Should I Raise or Purchase Hay?

One question often asked is, "Should I raise my own alfalfa hay, or should I purchase what I need?" When making this decision, you need to review not only the economics of raising your own alfalfa but also whether you have the land and labor resources to devote to raising alfalfa hay, balage, or silage. Specifically, you need to evaluate:

A. The best use of your available land and labor resources.

1. Do you have the land and labor resources to harvest the quality of alfalfa or alfalfa/grass hay needed by the milking herd?
2. Are these resources better used elsewhere in your farming operation?
3. Are you better off purchasing alfalfa hay and raising more silage on your farm?
4. Are your labor resources better directed toward managing cows or other operations on your farm?

B. The costs associated with raising quality hay.

1. What does it cost you to raise an acre of alfalfa or alfalfa/grass forage?
2. What quality of hay have you harvested over the past three years?

3. How many tons of milk cow hay have you produced per acre in the past three years?
4. On a tonnage basis, what has it cost you to raise alfalfa or alfalfa/grass forage for your milking cows?
5. Would it have been cheaper to purchase or raise the amount of hay needed?

Economic budgets (on an annual basis) indicate it costs about \$330 to raise an acre of alfalfa, assuming that the establishment costs are spread out over four years. If an alfalfa stand produces 4.5 to 5 tons per acre, it would cost \$66 to \$73 per ton of forage. In Kentucky, however, rain often delays harvest and/or decreases the quality of at least one cutting. Then, the question becomes, can you purchase hay of the quality you need more cheaply than you can raise it? Table 1 illustrates how decreasing yields of quality hay impact the costs of producing hay for the milking herd.

Know the Quality of Hay You Are Buying

To determine the quality of hay or balage you are buying, you must have the forage sampled and the quality analyzed by a forage testing laboratory. To accurately determine the quality of hay for sale, a representative sample must be taken using a hay probe. Grab samples will not provide uniform samples for analysis. For square bales of hay, 15 to 20 separate bales from each lot of hay should be cored using a hay probe. (A lot of hay is defined as hay from the same field that has been cut, handled, baled, and stored under similar conditions.) In a bucket, mix the samples thoroughly, and send a quart of material to a certified forage testing laboratory for testing and analysis. The National Forage Testing Association (NFTA) certifies the accuracy of forage testing laboratories. Forage testing laboratories currently certified for either wet-chemistry or NIR analysis can be found on the NFTA Web site (www.foragetesting.org).

Table 1. Impact of losing one cutting on the costs associated with raising a ton of alfalfa, alfalfa/grass, or clover/grass hay.

Situation	Losses in yield	Amount of milk-quality hay	Cost per ton
Alfalfa or Alfalfa/Grass Hay:			
<i>Annual cost = \$330/acre* with a yield of 4.5 tons/acre</i>			
All cuttings made into high-quality hay suitable for milking herd	0%	4.5 tons	\$73/ton
First cutting lost	35% reduction	2.9 tons	\$114/ton
Later cutting lost to rain damage or lack of rainfall	20% reduction	3.6 tons	\$92/ton
Clover/Grass Hay:			
<i>Annual cost = \$240/acre* with a yield of 3 tons per acre</i>			
All cuttings made into high-quality hay suitable for milking herd	0%	3 tons	\$80/ton
First cutting lost	35% reduction	1.9 tons	\$126/ton
Later cutting lost to rain damage or lack of rainfall	20% reduction	2.4 tons	\$100/ton

* Costs adapted from *Sustainable Dairy Systems Forage Economic Budgets*

Reading a Forage Analysis

Energy is the hardest nutrient to provide to cattle; therefore, the most important numbers on a forage analysis are acid detergent fiber (ADF) and/or neutral detergent fiber (NDF) content. These numbers ultimately relate to the amount of energy available to support milk production, growth, and reproduction. The ADF content reflects the digestibility and amount of energy cattle can obtain from the forage. The NDF content reflects the potential intake of a forage. **As the fiber content increases (both ADF and NDF), the digestibility, energy content, and potential forage intake decreases.** These changes ultimately affect performance and profitability. Protein content is a distant second in importance to fiber content when determining which hay to purchase or feed to a group of cattle.

Relative feed value (RFV) or acid detergent fiber (ADF) is the most important measure of forage quality because it relates to the digestibility, potential forage intake, and energy of a forage. These factors determine profitability and palatability of the forage.

Within a type of hay, the higher the RFV, the greater the quality of the forage. Because alfalfa generally contains less fiber, alfalfa hay generally has a higher relative feed value than a grass hay at the same stage of maturity. Table 2 lists the different quality standards for alfalfa or grass hay and their corresponding nutrient composition.

Table 2. Alfalfa, alfalfa/grass mixture, or grass quality standards.

Category	Relative Feed Value	ADF (%)	NDF (%)	Crude Protein
Prime	> 151	< 30	< 40	> 19
1	125-150	31-35	40-46	17-19
2	103-124	36-40	47-53	14-16
3	87-102	41-42	54-60	11-13

Source: *AGR-131, Alfalfa Hay Quality Makes the Difference*

Purchase Hay on Weight and Watch Moisture Content

Hay should be purchased based on weight and not size. As illustrated in Table 3, when bales are priced on size, the weight of the package greatly influences the price paid per ton.

Table 3. Weight of bales greatly influences price per ton when purchased at cost per bale.

Square bales priced at \$3 per bale	Round bales priced at \$80 per bale
60 lb bales = cost of \$100/ton	1,500 lb round bales = \$107/ton
40 lb bales = cost of \$150/ton	1,200 lb round bales = \$133/ton

In addition, hay should contain no more than 14 percent moisture or less than 86 percent dry matter. Wetter hays are more prone to molding, and you pay additional money for the water in the hay.

Dairy Quality Hay

High-producing dairy cows need alfalfa hay, which, *after harvest*, contains a relative feed value greater than 150. Hay or silage that tests lower than this will increase feed costs and decrease profitability for the dairy herd. Forage that tests lower can be fed to those cattle that require lower amounts of nutrients relative to the high-producing dairy cow. Table 4 lists the recommended uses for various qualities of alfalfa.

Table 4. Recommended uses for various qualities of alfalfa.

Relative Feed Value	Use for dairy cattle
Over 180	Excellent forage but needs to be fed with other forages
150 to 180	High-producing dairy cows and calves under 3 months of age
120 to 150	Low-producing dairy cows and young heifers over 4 months of age
100 to 120	Dry cows (check potassium level in diet of close-up dry cows) and older heifers when fed with corn silage

What about feeding western alfalfa hay, which has an RFV over 200? Alfalfa hay with a relative feed value of 200 contains considerably less fiber than hay with a slightly lower relative feed value. Alfalfa hay with an RFV greater than 200 acts like concentrates in a milking cow diet, and these diets need to be balanced as such. In order to use these supreme quality hays, consult your nutritionist to make sure you have adequate amounts of effective fiber in the diet. These hays can be used effectively in diets for the milking herd, but they must be properly balanced to reflect their nutrient composition.

Quality of Hay = Performance and Profitability

With advancing stage of plant maturity, fiber digestibility and protein content of the alfalfa plant decreases while the amount of fiber increases. Consequently, less energy is available to the cow when it consumes more mature alfalfa. Energy is the nutrient that most often limits performance in dairy or beef cattle—not protein.

Feeding high-quality forages results in greater feed intake and, as a result, dairy cows produce more milk, and they oftentimes can produce this milk more economically. Classical studies done at the University of Wisconsin with mid-lactation dairy cows fed alfalfa hay as the sole forage found that for each 1 percent increase in NDF above 40 percent, the amount of alfalfa hay consumed by these cows decreased by 0.5 pound, and milk production decreased

by 1 pound per day. Feeding additional grain with lower quality forages did not increase production to the amount seen when early-cut, higher quality forages were fed with lower amounts of grain.

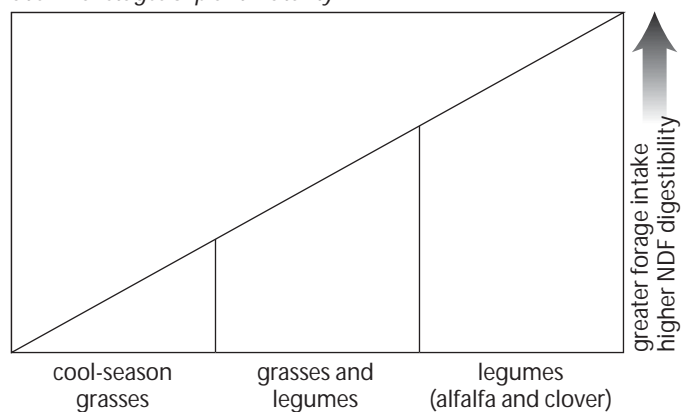
This decrease in milk production can be seen even when as little as 5 pounds of alfalfa hay is fed. If we compare the difference in energy supplied by 5 pounds of hay with an RFV of 150 versus 115, the lower quality alfalfa hay (RFV = 115) supports 1.5 fewer pounds of milk. At current milk prices, a dairy farmer would generate \$0.20 less daily income per cow with the lower quality alfalfa hay if the ration was not rebalanced. For a 100-cow herd, this reduction in milk production could decrease milk income by \$600 per month. Put another way, profitability for this farmer would be equal if he or she spent an additional \$80/ton for the higher quality alfalfa hay. With the lower quality alfalfa hay, intake is oftentimes decreased. If we take into account a 3-pound decrease in intake of the poorer quality hay, milk production could decrease by as much as 7 pounds of milk, especially in early lactation cows. The bottom line is that dairy farmers need to buy quality hay that has been tested for its nutrient content.

Alfalfa versus Grass Hay for the Milking Herd

Alfalfa is a forage crop that is not only high yielding but, more importantly, it is an excellent source of energy, protein, fiber, and minerals for dairy cattle. Intake potential is increased for alfalfa hay over grass hay at the same stage of maturity. Also, alfalfa contains more energy than grass hay. Alfalfa is beneficial because it is an excellent source of both dietary energy and protein, and it has more digestible fiber and higher mineral content.

- **Excellent energy source.** High-quality alfalfa is an excellent source of energy. Energy is the hardest nutrient to provide in adequate amounts to support

Intake of Forages by Cattle
at similar stages of plant maturity



milk production and efficient reproduction. Thus, by feeding forages naturally higher in energy, it is easier to meet the energy needs of high-producing dairy cows. In addition, alfalfa contains a highly digestible source of sugars, starches, and pectins (25 to 30 percent nonstructural carbohydrates), which the rumen bacteria can use as an energy source. Also, alfalfa contains a highly digestible source of protein and neutral detergent fiber (NDF), which increases the amount of energy available to the cow when compared to grass forages.

- **Digestible protein source.** The protein found in alfalfa hay is highly digestible, and it contains a higher proportion of ruminally undegradable or bypass protein (RUP) (25 to 35 percent RUP) than grass hays.
- **Lower and more rapidly digestible NDF.** In general, NDF is slowly digested in the cow's rumen; and as the amount of NDF from a forage increases, forage intake is decreased. Since the NDF content of alfalfa is lower and more digestible than NDF from grass forages, this

NDF is more rapidly cleared from the rumen, which stimulates intake. Any time feed intake is improved, performance is increased, especially with early lactation cows. A dairy farmer's greatest profit is generated during the early lactation period. In addition, alfalfa forage provides more buffering capacity in the rumen. This, in turn, helps buffer the pH changes in the rumen and helps decrease the incidence of health problems, such as ruminal acidosis.

- **Higher mineral content.** Alfalfa contains a greater concentration of calcium, phosphorus, potassium, magnesium, sulfur, iron, zinc, and selenium than grasses. The concentration of minerals is greater and more available in alfalfa forage harvested at earlier stages of maturity. From a practical and economical standpoint, minerals are relatively cheaply added to dairy cow diets as inorganic mineral sources so that the amount supplied through alfalfa does not greatly enhance performance or profitability.