THE VALUE OF GRASS WITH ALFALFA

Dan Undersander [1/]

Generally dairymen have perceived grasses to be too high in fiber for high producing dairy cows since grasses tend to have higher NDF than alfalfa. But, with knowledge of digestible fiber, we have learned that the fiber of grass more digestible than that of alfalfa. This has opened some new opportunities for dairymen and many have begun to incorporate some grass into their rations.

Why the interest in grass mixed with alfalfa? The agronomic reasons for adding grass to alfalfa are:

1) Increased seeding year yields – some grasses, such as Italian ryegrass, will establish faster than the alfalfa and produce more total forage yield in seeding year than alfalfa alone.
2) Wider harvest window on second and later cuttings – many grasses head little or not at all after first cutting, therefore regrowth is primarily leaves which change little in quality over 7 to 10 days around harvest time.
3) Faster drying - 30 to 40% grass with alfalfa dries faster than either pure alfalfa or pure grass.
4) Some less winter kill or injury to the alfalfa stand – some grasses will survive standing water and/or ice in low spots of field better than alfalfa. Beware that some varieties of orchardgrass and tall fescue are not as winterhardy as others and will die before alfalfa.
5) Ability to apply manure to stands with less traffic damage and stand loss – grasses suffer less traffic damage than alfalfa.

Dairy nutritionists are becoming interested in including some grass because:

1) Grass/alfalfa mixtures have higher total fiber than alfalfa alone.
2) The fiber of grasses is more digestible than alfalfa.
3) Potential to reduce NFC of dairy rations – Increased use of corn silage in dairy rations, which is excellent forage for high producing cows, has nutritional limitations because it is low in protein and high in fermentable carbohydrate (starch). Lameness in dairy cattle has increased dramatically in the Midwest in recent years to 20 to 25% of all dairy cattle. One of major contributors to this problem has been formulation of high starch, low fiber diets (Cook, 2003).

Alfalfa is a good nutritional complement to corn silage because of its high protein content. However, high quality alfalfa is low in fiber and high in non-fiber carbohydrates like corn silage. When high quality alfalfa and corn silage are the only source of forage in diets of high producing cows, it can be difficult to provide adequate levels of digestible fiber without providing excessive levels of highly fermentable non fiber carbohydrate (NFC).

High quality grass silages may be a good fit with diets formulated with high quality corn silage and alfalfa diets. Intensively-managed grass (or grass mixed with alfalfa) is high yielding forage that contains moderate level of fiber (NDF) and a low concentration of NFC (Table 1). The nutrient profile of high quality grass complements the excesses and deficiencies of rations formulated with excellent quality corn silage and alfalfa.

[1/] Professor and Forage Agronomist, Dept. of Agronomy, UW-Madison, 1575 Linden Dr., Madison, WI.

There are three approaches to using grass in dairy diets. Past research has focused on the first two which have minimized the nutritional value of grasses in dairy diets.

One approach is to replace alfalfa with an equal amount of grass. This increases the total fiber content of the ration. If dietary levels of NDF are high enough to limit feed intake by rumen fill, the cows fed the grass-based diets typically consume less dry matter and produce less milk than those fed an equivalent amount of alfalfa.

A second approach is to balance for an equal level of fiber. Results from experiments designed this way usually find that milk yield and intake of grass-based diets are similar to alfalfa control diets. When grasses are used to replace an equivalent amount of NDF as contained in alfalfa, forage to concentrate ratios of the diets change. These experiments clearly show that grasses can be used in diets for high producing cows, but with increased concentrate levels.

A third, and newer, approach is to use grass as a source of digestible fiber. Grass at early maturity contains more NDF than corn silage or alfalfa but the fiber is more digestible than alfalfa NDF. In addition, early maturity grasses contain lower levels of NFC relative to alfalfa or corn silage, and equal or less crude protein than alfalfa forage as shown in Table 1.

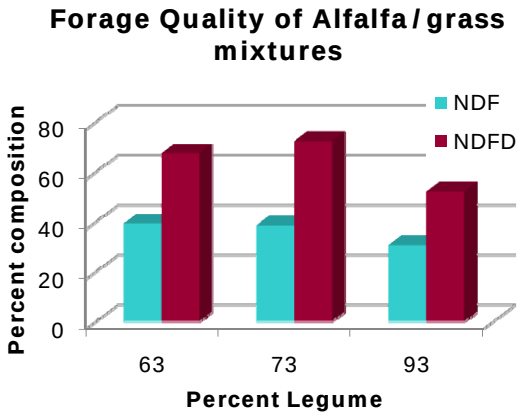
Table 1. typical composition of high quality forages.

Forage	CP	NDF	NDFD	NFC
	% of dry matter			
Corn silage	9	41	68	27.5
Alfalfa	20	40	48	27.5
Annual ryegrass	20	57	65	12.5
Tall fescue	17	60	60	14.5
Orchardgrass	16	60	60	11.5

Diets formulated with high quality corn silage are often marginal in fiber and high in NFC content and it becomes necessary to incorporate feeds that have highly digestible yet contain relatively low amounts of NFC and high amounts of digestible fiber. As alfalfa is brought into high corn silage diets, often the proportion of digested energy from fiber does not change and the proportion of rapidly fermented energy only shifts slightly from NFC to digestible protein.

Nutritionists sometimes add as much as 2 to 4 lb of straw to corn silage based diets to increase the proportion of dietary fiber. Adding straw increases the total fiber content of the diet but decreases the digestible energy intake because it is poorly digested and contributes significantly to rumen fill. Grasses may be a better choice to incorporate into high NFC/low fiber diets because unlike straw, the fiber in grasses is more digestible than fiber in corn silage, alfalfa or wheat straw. A recent feeding trial showed an average of 4 lbs milk/day when grass was used to add fiber rather than straw.

Replacing part of the corn silage and alfalfa with high quality grass fiber could shift the proportion of fermented energy from NFC to NDF while not reducing the overall digestibility of the diet. Note (in graph) the decline in NDF as mixtures shifted to more alfalfa while digestible fiber (NDFD) declined. This shift in fermentable components would be expected to provide a more steady supply of fermentable substrate to rumen microbes, which could in turn help stabilize the production of rumen acids and minimize the occurrence of ruminal acidosis.



Initial trials we have run have indicated that that we could maintain high levels of milk production when replacing a portion of the corn silage and alfalfa with grass silage, even though dietary NDF increased slightly.

The key to managing alfalfa-grass mixtures for high quality dairy forage is to maintain forage stands that contain about 30 to 40% grass. When the composition of the stand is in this range, nitrogen fixation from legumes can meet the needs of the grass species, and fiber content of the mixture is still acceptable.

Desired alfalfa/grass mixes can be maintained by picking appropriate grass species and varieties. Timothy and smooth bromegrass tend to produce too much forage in the spring but little the rest of the year so we recommend mixing either orchardgrass, tall fescue, or meadow fescue with alfalfa. This will get more grass in second and later cuttings.

Appropriate selection of grass varieties is crucial to success in alfalfa/grass mixtures. Grass varieties should be selected for yield, maturity (want late to have grass head close to when alfalfa is ready to harvest), adequate winterhardiness, rust resistance, and good seasonal distribution of yield.

Information on maturity and seasonal growth distribution are available on my website at www.uwex.edu/ces/forage , then select 'grasses' and then 'historical information on grass yield trials.'