Feeding Grass to Dairy Cows

Improved management for high quality, advances in equipment, and innovations related to bale silage and other storage options have made grass silage a more attractive option for dairy farmers. While grass species and variety selection, as well as fertilization issues are important, harvest management will determine the success or failure of grass silage as high producing dairy cow forage. High quality grasses can fit well in rations of high producing dairy cows.

Composition of Grass vs. Legumes

Composition of grasses tends to be more variable than legumes, primarily due to the strong impact of N fertilization on grass composition. Grasses have higher fiber concentration than legumes at an optimum stage of growth for harvest. Grass forage is optimum at 50-55% NDF, while alfalfa is optimum at around 40% NDF. Less mature grass with lower NDF than optimum lacks sufficient yield for an economical harvest.

Protein content of grasses is directly related to available N in the soil, but grasses will generally be lower in CP than legumes. Alfalfa at an optimum harvest date will be approximately 20% CP, while grass fertilized adequately will typically be 16-18% CP. Legumes will accumulate more minerals and ash than grasses, in particular legumes will have much more calcium. Mineral concentrations generally decline in all forage with increased maturity, and are strongly influenced by soil fertility and environment.

Advantages of Grass

Grass is high in cellulose, encouraging cellulosic bacteria, and more acetate production. Among other results, acetate generates more milk fat. Grain in the diet encourages amylolytic bacteria, and more propionate production. Propionate ends up as glucose, one result is generation of more milk volume.

It is often difficult to balance a ration with low NDF alfalfa as the sole fiber source. Grass provides fiber in a smaller package than alfalfa; this leaves more room for grain in the ration. High quality grass is needed to generate sufficient intake for high milk production. Grass forage tends to result in higher rumen pH due to more acetate, helping to avoid rumen acidosis.

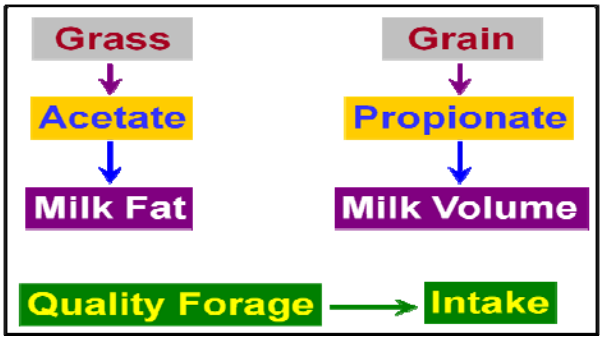

Figure 1. Grass plus grain in a dairy ration.

Feeding Trials

We have conducted a number of grass feeding trials with medium to high producing dairy cows. Rather than use forage to concentrate ratios, which favors the high quality forage, rations were balanced for maximum NDF in the diet that would not limit intake. This allowed cows to attain their intake potential with optimal ruminal fills. It also maximized the use of homegrown feeds, which have a favorable impact on farm nutrient balance.

Forage Quality of Grass

Table 1. Forage NDF and animal response to two sources of grass forage.

	Forage	Dry matter	Milk yield
Forage source	NDF, %	intake, lbs/day	lbs/day
Early cut orchardgrass	55	42	77
Late cut orchardgrass	63	35	69

Study 1. Although there were no differences in diet CP, NDF or digestible NDF, dry matter intake and subsequent milk production were

higher with early cut grass (Table 1; Fig. 2). Balancing rations for NDF establishes upper limits of forage:concentrate ratios, but this approach does not account for more subtle differences in fiber associated with digestion and passage kinetics. Forages had the same particle size.

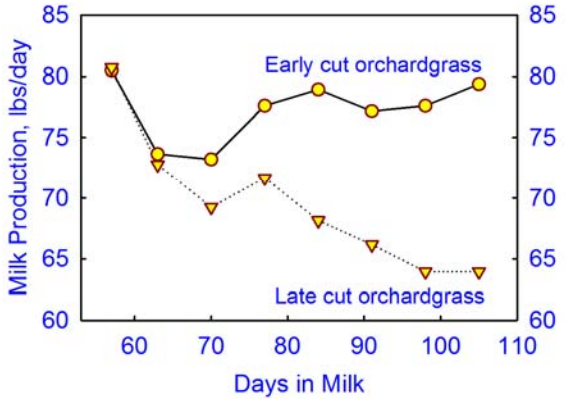

Figure 2. Milk production of dairy cows (57 days in milk) fed balanced rations of higher quality vs. lower quality orchardgrass.

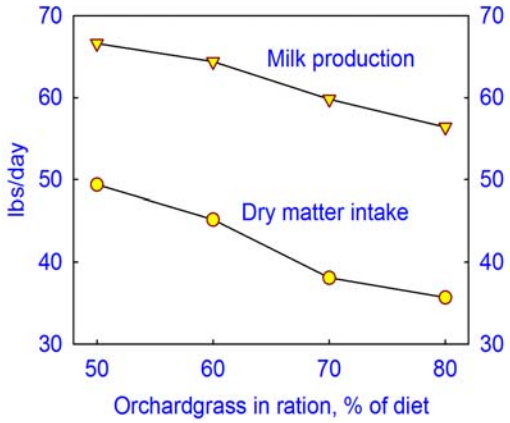

Figure 3. Milk and DMI of dairy cows (183 days in milk) fed different levels of early-cut orchardgrass in the diet.

Study 2. Orchardgrass (55% NDF) was used to balance rations containing 50 to 80% forage. Increasing forage in the ration decreased DM intake linearly (Fig. 3). Indigestible NDF varied by 50% among diets, while indigestible NDF intake varied only slightly, suggesting that rumen fill was limited by indigestible NDF.

Milk production generally relates very well to DM intake, and declined with increasing forage in the ration (Fig. 3). NDF intake remained constant as forage content increased, suggesting that when forage source is constant, NDF intake is a reliable predictor of DM intake and milk production for grasses.

Summary

High producing dairy cows on grass-based diets can have milk production equal to alfalfa-based diets. Ration balancing is not as well understood for grass compared to alfalfa, but it is clear that high quality grass is an essential component.

Additional Resources

- 2011 Cornell Guide for Integrated Field Crops Management. Electronically accessible at: http://ipmguidelines.org/Fieldcrops/.
- Cherney, D.J.R., J.H. Cherney and L.E. Chase. 2004. Lactation performance of Holstein cows fed fescue, orchardgrass or alfalfa silage. J. Dairy Sci. 87:2268-2276.
- Cherney, D.J.R., J.H. Cherney and L.E. Chase. 2003. Influence of non-fibrous carbohydrates on lactation performance of cows fed fescue silage. J. Dairy Sci.86:3983-3991.
- Cherney, D.J.R., J.H. Cherney and L.E. Chase. 2002. Performance of lactating Holstein cows as influenced by grass species and maturity, and level of inclusion. Prof. Anim. Sci. 18:316-323.
- Jonker, J.S., D.J.R. Cherney, D.G. Fox, L.E. Chase, and J.H. Cherney. 2002. Orchardgrass versus alfalfa for lactating dairy cattle: production, digestibility, and N balance. J. Appl. Anim. Res. 21:81-92.

Disclaimer

For more information

Cornell University Cooperative Extension

Grass Management Manual
http://forages.org

Jerry Cherney, Debbie J.R. Cherney

2011