SPECIAL REPORT

TEST THOSE FORAGES

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As you think about your winter feeding program for your cow herd, forage quality should come quickly to mind. Now is the time to sample your forage supply and send those samples off for nutrient analysis. The date you get back will set the foundation for strategically feeding your cow herd this winter.

Your forage analysis results will help you match feed quality to the nutrient needs of your herd during the different production stage of the cow cycle. This will help you make the most effective use of your feed supply while maintaining the body condition of your cows.

Forage quality is defined as the sum total of the plant constituents that influence an animal's use of the feed. Along with its quality, the overall potential feeding value of a forage feed is influenced by the form in which it is fed (for example, particular size), the palatability of the forage, and by the quality of other feeds in the ration (associative feed effects).

Six major factors affecting forage quality (not yield), ranked by their impact on forage quality, include maturity, crop species, harvest and storage, environment, soil fertility, and variety. The relative importance of these factors, and some exceptions to the ranking, are described as follows:

Maturity is the most important factor affecting forage quality. Forage quality is never static-plants continually change in forage quality as they mature. As plant cell wall content increase, indigestible lignin accumulates. In fact, forage plant maturity changes so rapidly that it is possible to measure significant declines in forage quality every two or three days.

Differences in forage quality between grasses and legumes can be very large. The protein contents of legumes is typically much higher than that of grasses, and legume fiber tends to digest faster than grass fiber, allowing the ruminant to eat more of the legume.

Improve harvest techniques can seriously reduce forage quality, primarily through the loss of leaves. Storing a hay crop at an incorrect moisture content, or improper ensiling of a forage crop, can dramatically lower its quality.

Moisture, temperature, and the amount of sunlight influence forage quality. Rain damage is very destructive to forage quality. When bad weather delays harvesting, the forage crop becomes more mature and hence lower in quality. High temperatures may increase lignin accumulation and decrease quality, but drought stress may actually benefit quality be delaying maturity.

Soil fertility affects forage yield much more than it does quality. While it is possible to produce high quality forage on poor, unproductive soils, it is generally very difficult to produce high yields of high quality forage with an unproductive soil resource. Proper soil phosphorus (P) and potassium (K) levels help to keep desirable legumes in a mixed seeding and also reduce weed problems. It is necessary to balance soil fertility to avoid mineral imbalances in ruminants. Low soil fertility, as well as very high fertility, has resulted in reduced forage quality.

After decades of breeding forages for yield and persistence, attention has recently been focused on developing or identifying varieties with improved quality. Variety or cultivar can affect forage quality, but not as greatly as the other five factors.

What Determines Quality

All forage plants are composed of cells having fibrous cell walls for support and protection. Contained within the cells are several soluble compounds, most of which are highly digestible. Since cell wall material is the primary constituent of forages, one of the main objectives of forage analysis is to characterize the cell wall fiber.

Plant fiber has three major components: cellulose, hemicellulose, and lignin. Cellulose and hemicellulose are digestible to some extent by ruminants. Ruminants can convert these fiber components to energy because the rumen provides the correct environment for bacteria and other microorganisms that actually break down the fiber. Lignin is indigestible,and thus cannot be used by ruminants for energy.

Both grasses and legumes have two main plant parts, leaf and stem. As structural component of the plant, stems typically contain more fiber for support. Leaves on the other hand, provide a means for capture and utilization of energy from sunlight and tend to be lower in fiber content than stems. Given the large difference between the digestible fiber of stems and leaves, the proportion of leaf to stem in a given forage plant relates directly to its forage quality.

How Is Quality Determined?

Appraisal of a forage based on sight, smell, and touch can provide some general information, but chemical analysis are needed to assess the economic potential of the forage. The Van Soest Fiber Analysis System separates feeds into distinct fractions that relate to their nutritive value. Neutral detergent fiber (NDF) consists of the total fiber in the forage and relates negatively to forage intake by ruminants. Acid detergent fiber (ADG) is composed of highly indigestible fiber and relates negatively to forage digestibility. Total nitrogen concentration is the forage (usually expressed as crude protein) is also a useful measure, since adequate intake of nitrogen is essential for animal productivity.

Forage laboratories analyze samples for NDF, ADF, and total nitrogen. It is also possible to accurately estimate these components using near infrared reflectance spectroscopy (NIRS). Other estimates of forage equality, such as total digestible nutrients (TND), net energy of lactation (NEL), and relative feed value (RFV) are derived from mathematical manipulations of NDF and ADF values.

Forage quality can be extremely variable and, as in soil testing, proper sampling technique is essential Without a representative sample, the results from a laboratory analysis are useless. When an alfalfa-orchardgrass hay bale was sampled

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ic cows. In our example, if the milk:feed ratio decreased toward 1.25:1, as it does occasionally, then we may want to reduce grain feeding and target feeding to selected, early lactation cows. Our goal should still be to manage this pasture to obtain high intakes of high quality pasture, our lowest cost feedstuff.

Summary

The bottom line is that grain feeding for high producing cows on pasture results in higher total feed intake, which means higher, more profitable milk production and improved body condition. When we look at the New Zealand dairy industry, research shows that supplemental grain feeding is usually not economical with the milk and feed prices. An important benefit to grain (energy) supplementation is the improvement in body condition, and in turn reproductive performance, which is not considered in these example calculations.