

Predicting Hay and Silage Quality

Jerry H. Cherney
Department of Crop & Soil Sciences
Debbie J.R. Cherney
Department of Animal Science

Harvest decision-making depends on the quality of forage needed for a given class of livestock. What quality parameters should have the most influence on harvest decisions for lactating dairy cow feed? Besides harvest decisions, quality parameters also are necessary to assign value to forage quality for varietal ranking or forage marketing purposes. Forage evaluation for marketing is more important in the Midwest where a considerable amount of forage is bought and sold.

There has been increased emphasis on digestible fiber for evaluating forage quality, leading to the use of digestible fiber in 2001 NRC equations. Fiber increases and digestibility decreases with increased forage maturity. Fiber digestibility declines rapidly in the spring (Figure 1). The decline in fiber digestibility through May was linear and ranged from 1.1 to 1.6 percentage units per day across three locations in NYS. The increase in forage NDF during this period also is linear. Fertilization with P and K can impact forage yield, particularly with alfalfa, but P and K have almost no effect on fiber digestibility. High N fertilization tends to lower digestibility slightly and also lower fiber digestibility. The steep decline in NDF digestibility with maturity graphically points out the need for timely spring grass harvest.

Relative Feed Value (RFV), calculated from ADF and NDF, has been promoted since the late 70's for valuing forages, and is included in the results of most commercial laboratory forage sample analyses. Although RFV is of some use for comparing pure alfalfa samples, RFV is useless for comparing grass and legume forage. Acid detergent fiber is not a good way to estimate energy, as it only explains about half the variation in forage digestibility, resulting in forages with similar RFV values that support different levels of milk production. The relationship between ADF and energy is not sensitive to variation in feed intake and such energy predictions do not work well for high producing cows. To overcome this constraint the University of Wisconsin has proposed a Digestible Relative Feed Value (dRFV) index for 2002.

The dRFV Index uses digestible fiber and no longer includes acid detergent fiber (ADF) values. Digestible fiber is used to estimate energy content and potential forage intake. The new index will prove useful for valuing forage for marketing purposes. It may prove useful for ranking varieties for forage quality, although harvest at precisely the same maturity stage will be required and is very difficult in practice. It will not be useful as a harvest decision-making tool. Indices that assign value to forage, based on multiple forage quality parameters, are not useful for predicting harvest dates. Harvest of a particular grass or legume perennial forage should be based on optimum fiber content (NDF), as it is more difficult to balance the fiber content of a ration, compared to energy or protein.

The scale for dRFV values was kept the same as the old RFV scale, such that high quality alfalfa hay will still have about the same score. The primary difference will be with grasses. High quality grass generally has higher NDF than alfalfa, but still may have relatively high fiber digestibility. The new system will likely rank high quality grass considerably higher than the old RFV system. It is anticipated that dRFV will be appropriate for corn silage quality as well, since rankings will be very close, if not identical, to current milk per ton values generated from the Wisconsin MILK2000 spreadsheet program for corn silage. The spreadsheet program uses essentially the same inputs to calculate milk per ton as are used in calculating dRFV.

Harvest management of both alfalfa and grass should be based on getting the optimum NDF content of the forage. Other parameters, such as protein, fiber digestibility, or a combination of parameters such as dRFV are not useful harvest date targets. On the positive side, value will be assigned to quality of different forage species more fairly using dRFV compared to the old system. The new dRFV system is certainly a step forward for recognizing the potential of grass in high producing dairy cow rations.

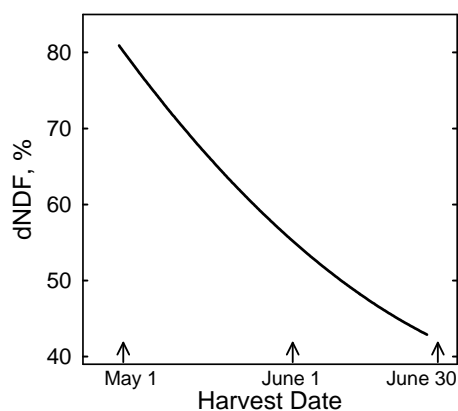


Figure 1 Decline in digestible NDF during the spring in perennial grasses. Average of five grass species (data from: J. Dairy Sci. 76:790. 1993).