RFV or RFQ, is 150 the Right Number Anymore?

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Dairy quality hay is in short supply this year in the Midwest. Recent hay auctions have illustrated this with premium quality alfalfa selling for more than $150/ton and some as high as $220 for fourth cutting in small square bales.

Table 1. *Haylage type.*

	Legume		Mixed		Grass	
	Range	Average	Range	Average	Range	Average
CP	16.3-23.9	20.1	15.5-24.5	20.1	7.4-19.0	13.2
NDF	33.6-47.7	40.7	23.5-49.8	41.6	41.1-66.5	53.8
NDFD	44.2-59.7	52.0	42.5-60.4	51.4	35.0-64.5	49.7
Lignin	5.9-9.9	7.9	5.8-10.0	7.9	2.6-9.0	5.8
RFV	111-184	148	108-181	144	72-145	109
RFQ	124-211	167	112-211	161	74-162	118

Dairyland Labs. 2006 data.

What is dairy quality hay? Increasingly, dairy producers and alfalfa growers are realizing the value of hay or haylage exceeding the traditional target of 150 relative feed value. Composite data for 2006 haylages (Table 1) show that the average of legume and mixed haylages are very close to the target RFV of 150. However, a wide range in all measurements of quality and many very high in crude protein (CP), neutral detergent fiber digestibility (NDFD), relative feed value (RFV) and relative feed quality (RFQ) can be seen. This would indicate many producers often desire a haylage that is higher than 150 RFV. This may be due to wanting higher crude protein but may also reflect the ability to achieve greater intakes and greater milk production from such forage.

What numbers are important in looking at forage analysis? A typical forage test report may have over 30 numbers to consider. The categories on Table 1 are items many consider important for a quick assessment when feeding dairy animals.

Crude protein is the total protein in a forage sample which is important to an animal for numerous reasons: maintenance, production, growth and possibly growth of a developing calf. High CP is valuable, especially with high supplement prices, but too much emphasis is placed on CP alone. Crude protein is divided into soluble, rumen degradable, rumen undegradable, and insoluble fractions.

Neutral Detergent Fiber (NDF) is an estimate of the cell wall contents and is composed of hemicellulose, cellulose and lignin. It is the NDF that gives a plant rigidity and support and provides fiber to a dairy animal. Hemicellulose and cellulose are digestible by rumen microbes and provide energy to the ruminant but lignin is indigestible and can inhibit cellulose digestion. Other numbers associated with NDF are effective NDF (eNDF) which is associated with cud chewing and healthy rumens, the amount of dry matter that is digestible NDF (dNDF); and finally, the percent of NDF that is digestible (NDFD). Neutral detergent fiber has long been negatively associated with intake potential of forage.

Lignin is an indigestible phenolic compound that is waterproof glue in plant fiber. It inhibits cellulose digestion in NDF and thus can lower NDF digestibility and overall energy available from forage.

Neutral detergent fiber digestibility is the percent of NDF that is potentially digestible. This number is greatly influenced by lignin content and is usually determined by either 30 or 48 hour in vitro incubation or by NIR based on in vitro equations. The goal is to have NDFD > 50%. Due to lower lignin content of grasses, NDFD is typically higher in grasses than it is in alfalfa.

Relative forage quality is an index for ranking forages based on dry matter intake (DMI) and total digestible nutrients (TDN). RFQ=(DMI, % of BW) X (TDN, % of DM). While the formulae for DMI and TDN of grasses and legumes are different, NDFD is part of both equations.

Relative feed value is based on acid detergent fiber (ADF) and NDF, but due to variability in measuring ADF and not using digestibility in the equation, accuracy of forage value has been more difficult to ascertain. Also, under the RFV system, grasses are typically undervalued due to the fact that lignin and NDFD are not included in its calculation.

With the introduction of RFQ, there is greater ability to predict digestibility of forages. Should target numbers change? It depends on the target animal to be fed. If feeding lactating dairy cows, RFQ should be targeted >165. This should provide forage with an NDFD of >50% and CP levels >22%. This quality of forage would result in greater intakes and be able to support higher milk production due to greater digestibility of NDF. Under the traditional RFV system, one would still want to target >150 for alfalfa forage for lactating dairy animals.