Important Factors for Hay Quality When Buying Hay

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Florida livestock producers grow their own forages. While pasture is the primary source, each year the winter months require differing amounts of hay supplementation. Some producers are large enough to have the labor force to put up their own hay. Others are dependent on finding hay that is both economical and nutritious.

The horse industry differs here in that much of the forage is purchased on the open market. In many cases this is a year-round necessity of "hay buying".

Traditional Method

Whether it is cattle or horses, farmers and ranchers have historically purchased based on sensory skills. The appearance and smell of the hay are helpful. A skilled buyer will see leafiness, color, dustiness, presence of legumes, absence of weeds, and presence of mold. Purchasing hay in this way is a learned and important skill.

Nutritional Analysis

More important than sensory perception of hay is its nutritional suitability to meet an animal's daily nutrient requirements. Nutrient needs vary from horse to cow, age of an animal, size, condition, stage of lactation, etc.

To begin to address the needs of an animal or herd of animals, knowing the scientific analysis is crucial. While ranchers would not purchase feed without a guarantee tag, they too often would make a major investment in hay without knowing this vital information.

Important Factors

-Species
Legumes like alfalfa and perennial peanut are higher in protein, energy, and minerals and lower in fiber than grasses like timothy, bermuda, and bahia.

-Maturity
Yield typically increases with maturity while quality decreases. Changes in leaf / steam ratio is the primary reason.

-Climate
Weather can play a role in the best hay crop or destroy its quality if rained on while drying. In Florida, drought and flooding are important factors.

-Pasture Management and Harvesting Practices
Fertilizer, irrigation, and weed control are major factors that depend on the rancher or hay producer. After species, stage of maturity at harvest is the most human controlled factor.

Forage lab Terms

When using forage analysis, understanding terms is essential.

Table 1. Nutrient composition of typical legume and grass hays (DM basis).

Species	CP%	ADF%	NDF%	RFV	TDN%	DE, Mcal/lb	Ca%	P%
Legume	20.9	30.0	38.4	163	59	1.181.20	0.28	
Grass	10.4	39.8	63.8	86	44	0.880.57	0.25	
Bermudagrass	9.5	36.7	69.0	82	45	0.900.49	0.19	

Dairy One Summary Statisitics. 2000

- Dry matter basis – nutrient results for a sample reported with the water removed. Removing the water eliminates the dilution effect of the water and enables direct nutrient comparison of different forages. For example, suppose that you wanted to compare the protein content of hay testing 90% dry matter to a pasture testing 20% dry matter. On an as sampled basis, the hay tests 14% crude protein (CP) and the pasture 4% CP. The hay appears to be higher in CP. However, removing the dilution effect of the water reveals that the hay is 15.5% CP (14/.90) and the pasture is 20% (4/.20) on a dry matter basis. Thus, removing the dilution effect of the water revealed that per pound of dry matter, the pasture is higher in protein. Thus, when comparing figures to one another, it is important to use the results expressed on a dry matter basis. It is also important to realize that most daily nutrient requirements for balancing rations are expressed on a dry matter basis. To fully utilize the information contained in a forage analysis, it is essential to become accustomed to using results on a dry matter basis.

- Crude Protein (CP) – the total protein in the sample including true protein and non-protein nitrogen. Proteins are organic compounds composed of amino acids. They are a major part of vital organs, tissue, muscle, hair, skin, milk, and enzymes. Protein is required on a daily basis for maintenance, growth, reproduction, and lactation.

- Acid Detergent Fiber (ADF) – a measure of cellulose and lignin. Cellulose varies in digestibility and is negatively influenced by lignin content. As lignin increases, digestibility of the cellulose decreases. ADF is negatively correlated with overall digestibility.

- Neutral Detergent Fiber (NDF) – a measure of hemicellulose, cellulose and lignin representing the fibrous bulk of the forage. These three components are classified as cell wall or structural carbohydrates. They provide support for the growing plant. NDF is negatively correlated with intake.

- Digestible Energy (DE) – equals gross feed energy minus fecal energy. For horses, it is predicted from CP and ADF for forages and ADF for grains.

- Total Digestible Nutrients (TDN) – an energy measure denoting the sum of the digestible protein, digestible nitrogen free extract (NFE), digestible crude fiber and 2.25x the digestible fat. TDN is estimated from the digestible energy (DE).

- Relative Feed Value (RFV) – an index for ranking forages based on digestibility and intake potential of cattle. RFV is calculated from ADF and NDF. A RFV of 100 is considered the average score and represents an alfalfa hay containing 41% ADF and 53% NDF on a dry matter basis. The higher the RFV, the better the quality.

Due to the inherent variability of measuring ADF and NDF, absolute RFV values should be used to classify forage. For example, if a RFV of 150 is the target value, any forage testing 145 to 155 should be considered to have an equivalent value. A good rule of thumb is to accept anything within at least +/- 5 points of the target value. A lot of hay is priced on 20 point spreads. This allows for sampling and analytical variations. This represents the best use of RFV as a marketing tool.

How do I use this information to evaluate hay?

Consider the following example: Two hays are available with the following analyses:

	CP%	ADE%	NDF%	DE Mcal/lb	Ca%	P%	RFV
Hay X	17	35	47	1.04	1.19	0.30	122
Hay Y	11	39	61	0.90	0.60	0.25	89

Which is the best hay? Clearly, Hay X is higher in quality. It is higher in protein, DE, minerals, and RFV and lower in fiber than Hay Y. However, *best* is a relative term. Best for what? Consider the daily nutrient requirements for 3 different horses:

	CP%	DE, Mcal/lb	Ca%	P%
Light Work	8.8	1.05	0.27	0.19
Lactating Mare (0-3 mo. Lact.)	12.0	1.10	0.47	0.30
Weanling, 4 mo.	13.1	1.25	0.62	0.34

Now which hay is the best? For the light working horse, Hay Y more closely mirrors its nutrient requirements. The lower DE content can easily be supplemented with the grain portion of the ration.

The DE, protein and mineral requirements of the mare and weanling are greater than the light working horse. Additional nutrients are required to support lactation in the mare and growth in the weanling. In this case, hay X would be a good candidate, though ideally, a combination of Hay X and Y would work best.

Conclusion

Nutritional analysis of hay is one factor in considering hay buying. It is, however, the best way to calculate meeting nutrient requirements of livestock. Remember, your animal's needs may not be the highest quality and most expensive hay. At the same time, you do not want to pay high quality hay prices for hay the lab shows as poor quality.