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FACT SHEET

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Effective Horse Management - First in the Horse Nutrition Series

Hay Analysis: Its Importance and Interpretation

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Having your hay analyzed is a great idea. It is the only way to determine the actual nutrient content of your hay. It is important to know this so that you can be sure your horse is consuming an adequate diet. You may or may not need to feed grain depending on the quality of your hay. The better the quality of the hay you feed, the less grain you will need to feed. This can be a significant savings.

Two types of analyses can be performed. This is a visual and chemical analysis. If you have already purchased hay, then you have probably performed a visual analysis. Chemical analysis is when the hay is sampled and the nutrient content of the hay is determined by a laboratory.

In visual analysis, there are several factors that should be considered. These include:

- Maturity of hay– The more mature, or older, a hay is, the more fiber it contains, and the more stemmy or unpalatable it will become

Table 1. Example of stages of maturity of alfalfa hay (NRC 1989)

Stage of maturity	Fiber content	Characteristics
Early bloom	20.8%	includes many leaves, few stems
Midbloom	25.5%	includes fewer leaves, increasing stems
Full bloom	27.3%	Includes most stems

- Leafiness of the hay – The more leaves a hay has, the more nutrients it is likely to contain since nutrients are concentrated in the leaves (where photosynthesis occurs)
- Color of the hay – generally the greener, the better but see chart on next page.

Color	Problem	Quality
Green	None	Usually good, this is hay cut at the best time for feeding
Light golden yellow on outside of bale	Sun bleaching	Decreases palatability and carotene (used to make Vitamin A) but not a very serious problem
Yellow throughout bale	Over-mature when cut	Decrease in palatability, horse may not consume this hay
Dark brown or black hay	Exposed to rain, heavy dews, or fog	Decrease in nutrient content due to leaching by moisture, leaf shattering may be present, hay may be harsh and brittle
Brown hay	Mold growth, hay not dry when baled	Musty, moldy odor, flakes may show mold, loss of dry matter, digestible protein, energy, carotene and other vitamins, don't use this hay

- Odor and condition of the hay – look for hay that is not musty, dusty, or moldy; throw out any hay that is
- Presence of foreign materials in the hay – can be injurious (poisonous plants, wire) or non-injurious (weeds), but either decreases the overall quality of the hay

In order to have your hay analyzed chemically, you will need to get a hay sample. Use a core sampler and try to sample from at least twenty to twenty five different bales. Be sure to penetrate into the center of the bale with the core sampler. See your county extension office for information on how to use the core sampler (or to borrow one) if you do not have experience in hay sampling. Mix the samples together and then put them in a tight, clean, plastic bag or the bags that the forage testing lab provides. Mail it to the forage testing lab as soon as possible, and have it analyzed by the laboratory.

Interpreting your hay analysis results may not be the easiest part of this process. If you cannot determine what the results mean, you may want to consult an extension specialist in forage crops or agronomy at your county extension center, an animal scientist, or a county extension agent. Some of the main things to focus on when you see the analysis reports are:

- Dry Matter (DM)– This tells you how much of the sample is left after water is removed, it is the moisture or dry matter content of the sample. Hay will generally be about 89% dry matter or greater.
- Digestible energy (DE) – This is a measure of the digestible energy in the hay. For a light working horse, DE should be 20.5 Mcal/day. Hay may have .76 to .94 Mcal/lb or higher of DE.

- Total Digestible Nutrients (TDN) - This is a measure of the total digestible nutrients in the hay or its energy value (may be used in place of DE or offered in addition to DE), which may range from 40 to 55 percent.
- Crude Protein (CP)– This is a measure of the protein concentration of the hay and can range from 6-8% in native grass hays to about 15% or higher in high quality legume hays.
- Neutral Detergent Fiber (NDF) – This is a measure of the plant’s cell wall content, shown as a percent. The higher this is, the less the horse will eat of the hay.
- Acid Detergent Fiber (ADF) – This is a measure of the fiber concentration of the hay, shown as a percent. As ADF increases, digestibility and nutrient availability decreases.
- Non Structural Carbohydrates (NSC) – This is a measure of the non structural carbohydrates in the feed. If your horse has Cushing’s disease or is prone to colic or laminitis, you want to select hay with a lower NSC value. Timothy and alfalfa hay may have a 15% or 20% NSC value, respectively. If you want this analysis done, you should check to see if the lab offers it as it is not a common analysis at this time.
- Starch and Sugar- This is a measure of sugars and starches in the feed. You should feed no more than 15% of total daily calories from starch and sugar to horses with EPSM (equine polysaccharide storage myopathy) and PSSM (polysaccharide storage myopathy) EPSM is a muscle disease found in over 100 draft breeds that may cause severe weakness and muscle wasting in horses of all ages, poor performance, abnormal hind limb gaits, and shivers (in which the muscles keep twitching). PSSM is a muscle disease found in horses with Quarter Horse in their breeding such as American Quarter Horses, Paints, and Appaloosas with signs including reluctance to move, muscle stiffness, sweating, shifting lameness, and tremors in the flank area.

Here is what analysis of a good hay should look like:

Hay type	DM	DE	CP	NDF	ADF
Mid bloom alfalfa	91%	0.94 Mcal/lb	17%	42.9%	33.4%
Mid bloom smooth brome	87.6%	0.85 Mcal/lb	12.6%	50.5%	32.2%
Mid bloom timothy	88.9%	0.80 Mcal/lb	8.6%	56.6%	32.3%

Now you know some basics about analyzing hay. Be sure to consult your county extension agents or state specialists for help if you are not sure how to apply these results. By analyzing your hay, you will be able to feed your horse more effectively and efficiently.

References

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