Interpreting an Equine Hay Analysis

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Most universities and equine nutritionists are encouraging horse owners to have hay analyzed, especially if quality is a concern, or the horse is having nutritional problems. However, most owners need help interpreting analysis results. Below are common components analyzed, and a basic interpretation of each, keeping in mind that additional components can be analyzed by request.

When the sample is returned, two columns of numbers will be reported: "As Sampled" and "Dry Matter." "As Sampled" is nutrients in their natural state, including water. "Dry Matter" is nutrients with moisture removed (water can have a diluting effect on the results). "Dry Matter" results allow for direct comparison of nutrients across different feeds and often simplifies the ration balancing process. Either can be used for ration balancing, but it is very important to be consistent and use one or the other.

Moisture - optimum horse hay moisture ranges 10-17%. Hay under 10% may be too dry, leading to brittle and dusty hay. Hay over 18% moisture has a high probability of molding (unless propionic acid is used), and hay over 25% moisture poses the threat of severe heat damage and serves as a potential fire hazard.

Dry Matter (DM) - how much of the sample is left after the water (moisture) is removed.

Crude Protein (CP) - a measure of the protein concentration of the hay. CP can range 8-14% in grass hays (depending on nitrogen fertilization), 14-17% in mixed hays, and 15-20+% in legume hays. Most horses require approximately 10% crude protein, except lactating mares and foals.

Acid Detergent Fiber (ADF) - composed of cellulose, lignin, and other poorly digested components. The lower the ADF value, the more digestible the nutrients in the hay. Values of 30-35% are good and values above 45% are of little nutritional value.

Neutral Detergent Fiber (NDF) - a measurement of the insoluble fiber (i.e., hemicellulose, cellulose, lignocellulose, and lignin). These components are structural carbohydrates and provide plant structure. In theory, the higher the NDF, the less a horse will consume. NDF levels between 40-50 are good, and those above 65 will likely not be consumed by most horses.

Relative Feed Value (RFV) - commonly used when selecting dairy quality hay. The utility of RFV in selection of horse hay is unknown, but can be used as a guideline to good hay. An RFV of 100 is considered the average score and represents alfalfa hay containing 41% ADF and 53% NDF on a dry matter basis. Generally, a higher RFV reflects higher quality, greater intake and digestibility. An equine nutritionist will not use RFV to balance a horse's ration.

Fat (sometimes referred to as Crude Fat) - a measurement of fat content. Fat is an energy dense nutrient and contains about 2.5 times the energy found in carbohydrates. Fat is added to rations to boost energy levels.

Non-fiber Carbohydrate (NFC) - a mathematical estimate of starches and sugars. Although not always perfect, the NFC value is often used as an indicator of the level of starches and sugar in a forage sample.

Equine Digestible Energy (DE) - measure of the digestible energy in the hay, and used to balance the energy portion of the equine diet. For a light working horse, DE should be about 20 Mcal/day, and most hays range 0.76-0.94 Mcal/lb of DE.

Equine Total Digestible Nutrients (Equine TDN) - 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 40-55%.

Calcium (Ca) and Phosphorus (P) - macro-minerals required in the diet by all horses. Levels of these minerals can vary among different hay (i.e., legume hays have high Ca levels relative to P). For the adult horse, the Ca:P ration should be between 3:1 to 1:1.

Potassium (K) - is an electrolyte. Legume forages are higher in potassium than grasses. Since hay is high in potassium and usually constitutes a significant portion of the equine diet, potassium requirements are usually met with hay alone.

There has been significant interest in the sugar and carbohydrate content of hays. These analyses help select a suitable feed for horses, especially those that show sensitivity to starch and sugar. Although not commonly done, some labs are able to test for the following:

Non-Structural Carbohydrates (NSC) - an analysis of the non- structural carbohydrates (starches and sugars) in the forage. Not to be confused with NFC, which is calculated, not actually analyzed. Since some horses are sensitive to dietary starch and sugar (i.e., horses with Cushings Disease or laminitis), the NSC level is helpful in selecting hay. Generally speaking, hay containing greater than 10% NSC should not be fed to sensitive horses.

Starch (a sub-component of NSC) - Generally, no more than 15% of total daily calories from starch should be fed to horses with EPSM (equine polysaccharide storage myopathy) and PSSM (polysaccharide storage myopathy).

Ethanol Soluble Carbohydrates (ESC) - solubilized and extracted in 80% ethanol. Includes primarily monosaccharides (glucose and fructose) and disaccharide.

Once the hay has been analyzed, work with an equine nutritionist to balance the horse's ration. Generally speaking, a horse's ration is balanced in the following order: energy (fiber), protein, minerals, and vitamins. To read the latest recommendations on equine nutrient requirements, consult the National Research Council's Nutrient Requirements of Horses publication.

Contact the lab of your choice to test hay for the above components. Prior to sending in the sample, obtain recommended sampling procedures, costs, and components to be analyzed. Be sure to request an equine analysis and remember that the analysis is only as good as the sample submitted.