

Importance of a Hay Analysis

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Many advances in equine research over the last few decades have greatly enhanced the understanding of specific nutritional requirements for horses, as well as the digestibility and usage of various equine feed ingredients. With this information, horse owners, enthusiasts, and nutritionists are better able to formulate specific products and diets to meet individual horse needs. In formulating diets, painstaking efforts are often taken to get detailed nutrient profiles of different concentrates and supplements being fed.

However, the largest component of the feeding program is frequently overlooked. Hay typically represents over 50% of the total diet for mature horses, yet the true nutritional value of the hay is often unknown. Selecting a hay based on its green color, soft, leafy texture, and lack of dust or mold is a great start, but to fully optimize feeding efficiency and take advantage of current research on specific nutrient requirements, a laboratory analysis of the hay is necessary. A basic analysis of protein, energy (or Acid Detergent Fiber [ADF] for calculating energy), calcium, phosphorus, potassium (for HYPP concerns), and moisture will allow for a more accurate determination of hay quality and a more balanced equine feeding program. The importance of each of these nutrient assays is listed below:

- **Protein.** Horses require a given amount of protein in their diet daily. The protein content of hay can range from 20% or more with some high-quality alfalfa, to less than 8% with some mature grasses. The protein content of the hay should play a major role in deciding the type and amount of concentrate or supplement to use. Protein content of the total diet is especially critical for proper growth of foals, optimal milk production in lactating mares, and maintenance of muscle tissue in performance horses.
- **Calcium and Phosphorus.** These two macro-minerals are required in the diet by all horses in specific amounts. Inadequate levels of these minerals in the ration will impair performance. However, the ratio between these minerals is as important as the total amounts in the ration. An imbalance of calcium and phosphorus in the ration can lead to deficiency problems. The levels of these minerals can vary among different types of hay. Legume hays, like alfalfa and clover, have exceptionally high calcium levels relative to phosphorus. Horses fed large amounts of legume hay require concentrates or supplements that will contribute a good amount of phosphorus to properly adjust the ratio of these minerals in the ration. Grass hays usually have more acceptable relative levels of calcium and phosphorus and are compatible with concentrates and supplements that make only minor adjustments to these minerals.
- **Potassium.** As a major electrolyte, potassium is involved in cation-anion balance, acid-base balance, and osmotic balance. Potassium is widely distributed in natural feed ingredients, with forages containing a higher level than cereal grains. Legume forages are higher in potassium than grasses. Since hay is high in

potassium and usually constitutes a significant portion of the equine diet, the potassium requirements should be easily met. Evaluating the potassium level in hay becomes especially important for horses with Hyperkalemic Periodic Paralysis (HYPP), an inherited disease of the muscle caused by a genetic defect. Horses affected with HYPP need to have their diet managed to avoid high levels of potassium and maintain a more constant potassium intake.

- **Energy.** The digestible energy (DE) in hay can vary greatly. The nutrient value of hay is largely dependent on its stage of growth. Young hay grown in the early part of the growing season has a lower fiber (ADF) level, making it more digestible and higher in energy. As the plant matures, the lignin content increases which reduces the digestibility of the plant. Hay will provide the horse with less energy when harvested at a greater degree of maturity. The digestible energy level of the concentrate and the amount fed should balance the energy level provided by the hay. If the total energy level of the hay and concentrate fed is too low, horses will lose body condition. High-energy concentrates fed with hay containing a high digestible energy value will lead to over-conditioned horses.
- **Moisture.** The moisture content of hay is an indicator of the effectiveness of the harvesting process as well as future quality. Hay with moisture greater than 13% may create storage problems and become susceptible to spontaneous combustion. In addition, wet hay is prone to growing molds. Moldy hay is not palatable, may contribute to respiratory problems, and may contain mycotoxins.

Sampling

A nutrient analysis also helps in determining the true economic value of hay. In other words, is it worth the price? Obtaining a representative sample of the hay, however, is the most critical step in the analysis process. The laboratory analysis can only be as good as the hay sample provided. It is important to recognize that not only does each batch of hay purchased differ in nutrient content, but that the bales within a batch of hay may also differ in nutrient content. Gathering multiple sub-samples from a batch of hay becomes crucial for accurate analysis.

The use of a forage sampler or bale probe is ideal for obtaining core samples from different bales. These sub-samples should then be mixed to provide a composite sample. Typically, obtaining 10-20 core samples will form a good composite sample. If a forage sampler is not available, a large sample (gallon-size bag) should be obtained from each bale prior to mixing to get a composite sample for analysis.

Summary

Research helps us understand specific equine nutritional requirements, as well as the value of various equine diet components. With this information, we are better able to formulate diets to meet the needs of any horse. Because hay typically represents over 50% of the horse diet, a basic nutrient analysis of a representative sample goes a long way in providing valuable information for formulating rations as well as determining the true economic value of the hay.