Analyzing Hay and Feeds

Relying on tradition or advertising to formulate your horses ration can be misleading - the only way to be certain of what your hay or feed contains is to have it analyzed by a forage laboratory. Despite traditional thought, many grass hays are more than adequate in calcium and protein for most adult horses. Sugar and starch content can vary dramatically depending on growing and cutting conditions. Some pellets and feeds do not provide adequate levels of certain nutrients and some nutrients may be in excess of desired levels (this is especially true of iron).

While most healthy horses can tolerate wide variations and imbalances, knowing what's in your feed can help provide optimum health and performance.

Where to Get Your Hay or Feed Analyzed

Dairy One Forage Lab
730 Warren Road
Ithica, NY 14850
1-800-496-3344
http://www.dairyone.com/Forage/services/Forage/forage_Price_List.htm
Submittal form
http://www.dairyone.com/Forage/services/Forage/SampleSubmittal.htm

Tests to request:
F-321 Forage NIR ($16) and
M-329 Wet Chemistry Minerals ($10)
or (preferred)
Test # 10 – Basic ($28) plus
34 -Starch ($9)
254 - WSC ($5)
[154 – ESC ($7)]
Also request 161 - Nitrates ($8) for breeding mares.

These tests will give you Protein, DE (digestible energy/Mcal), NFC, NSC (sugar and starch), major mineral, trace minerals. The NIR test also shows fat, lignen and estimated lysine. Results are reported as "%" or "ppm" and require some math to put it into a useful format.

Equine Analytical Laboratories
730 Warren Road
Ithica, NY 14850
1-877-819-4110
http://www.equi-analytical.com/default.htm
Submittal form:
http://www.equi-analytical.com/Services/Sample_information_sheet.pdf

Test to request:
(601) Equi-Tech ($29, NIR)
or
(603) Trainer ($49, wet chemistry)

This is the "equine" division of Dairy One. The comparable tests cost a bit more, however the report format also shows results in grams or milligrams based on the "amount fed" you indicate on the submittal form.

There is a wealth of information on the website, including a “basic” version of the NRC tables. Purchase of a hay corer (hay probe) includes a free (601) Equi-Tech analysis.

Other Forage Labs

Litchfield Analytical Services
http://www.litchlab.com/
Test 4T ($26) plus sugar ($17) and starch ($20)
or
Equus Plus ($49)
Litchfield was the first to provide NSC (non-structural carbohydrates: sugar and starch) level testing and is still considered to be the “gold standard”.

Dairyland Laboratories
http://www.dairylandlabs.com
Test N7H ($16.50) plus M4 ($17)
Does not include starch, NSC

Should I request the NIR or Wet Chemistry Test?

The “wet chemistry” tests are considered by many to be more precise, especially for sugar and starch (NSC). I would recommend using wet chem. to test hay for insulin resistant (IR) mares in late pregnancy/lactation and horses with persistent or recurring laminitis.

I have found the less expensive NIR tests results to be fairly consistent with “wet chem” test results when I have had both tests run on the same sample of Bermuda hay.

How to Send Samples

The forage lab websites all have sections on taking a good hay sample. Using a hay corer will provide a more accurate representative sample for analysis. Samples should be taken from several bales (I usually sample 20+ bales in a load). The samples are mixed well in a clean bucket, then a few handfuls are placed in a “zip lock” bag – enough to fill a one-quart bag.

For pellets, obtain about a cup from several bags, mix them together, then place about a cup of the mixed samples into a “zip lock” bag.

The laboratories will provide mailers, but using a priority mailer (envelope or box for hay, a box for pellets) from the U.S. Post Office works well. Mark the plastic bag containing the sample with a description of the sample (such as “Brand X Pellets” or “Bermuda Hay”). Enclose a check for payment and the submittal form in an envelope with the complete Lab address on it. (Be sure you put your email address on the submittal form to get faster results via email.) Place the envelope and the sample in the mailer and send via Priority Mail. You should receive your results within one week by email.

What to Do With the Results

If you are comfortable with numbers, I can provide you with an Excel spreadsheet or a “paper and pencil” worksheet that you can use to calculate your supplement needs. I can also assist with in depth interpretation of the results. I use guidelines based on the 2007 NRC (National Research Council) Nutritional Requirements of horses, as well as additional guidelines developed by Eleanor Kellon, VMD, and Kentucky Equine Research (KER).

Because minerals are synergistic and many affect the absorption and utilization of other minerals and nutrients, it is important that they be balanced. For example, most horse owners are aware that calcium should be one and a half to two times the amount of phosphorus in a horses ration; but may not know that calcium and magnesium should also be balanced. And fewer are aware that high potassium in hay may affect a horse's normal "salt hunger" because of the sodium conserving mechanism of the body.

The general balancing ratios developed by Dr. Kellon are:

Major (Macro) Minerals:
Calcium 1-1/2 to 2 times phosphorus and magnesium
Potassium 3.3 to 10 times sodium (3.3:1 is the ideal target)

Trace (Micro) Minerals:
Iron 4 to 10 times copper (4:1 is the ideal target)
Copper generally not to exceed 4 times NRC value (based on kg of dry feed)
Zinc and manganese 3 times copper, with manganese lower than zinc

Healthy horses can tolerate fairly large deviations from these ratios but many circumstances call for staying close to ideal targets. Pregnancy, lactation and growth increase the requirements for protein – both amount and quality – and calories, and lessen the tolerance for imbalance, as do strenuous work and stressful conditions (climate, travel, and environment). Metabolic conditions, age and illness also lower the tolerance for imbalance.

Other factors may affect balancing a ration, including long standing excesses or deficiencies, high levels of toxic minerals (molybdenum, aluminum, etc.), area water mineral levels, iron overload (which requires specific blood work to diagnose). These conditions may require addition of minerals beyond the normal "safe" levels, diluting the ration with forage from a different growing area or outright rejection of a forage or feed.

High iron levels in hay and feed have only recently been addressed as a concern in equine nutrition for adult horses (though it has been studied fairly extensively in zoo animals).

Nutrition Consulting

If your hay or feed falls outside acceptable parameters or if your horse has performance or health issues, it can be helpful to consult with an equine nutritionist. Good resources are extension services and university veterinary schools. Veterinarians who specialize in reproduction or equine sports medicine are apt to be current in nutritional research. Eleanor Kellon, VMD, provides ration consults for race/performance horses and breeders and also provides assistance with metabolic problems. Email address provide on request.

Many feed and supplement company representatives are nutritionists; however some sales representatives may have limited nutritional education.

While I am not a certified nutritionist, I have extensively studied equine nutrition for the past several years and can help you develop an optimal feeding program. My emphasis is on education so the horse owner obtains the knowledge to make informed decisions about their horses' diet.

I tend to be skeptical of "magic bullet" feeds or supplements and of those whose advice is biased by the products they are trying to sell. While many feeds, supplements and herbs are useful and helpful, the horse owner needs to understand what they are and how and why they work.

All feed and supplement recommendations should be reviewed with your veterinarian.

RESOURCES

NRC
National Research Council Nutritional Requirements for Horses
Sixth Revised Edition (2007)

The NRC Nutrient Requirement Tables are available on the Equi-Analytical website at http://www.equi-analytical.com/default.htm under the "Putting results to work" tab.

The entire 1989 NRC Nutritional Requirements for Horses book is available online in PDF format at http://www.nap.edu/books/0309039894/html/. You can also purchase a hardcopy of the 2007 Sixth Revised Edition at this site.
The "Daily Nutrient Requirements" for DE, protein, lysine and major minerals are in Tables 5-1A through 5-1G beginning on page 42. These are based on weight/use of the horse.
Trace minerals are in Table 5-3 on page 48. These are based on their concentration in the amount of feed (% or ppm per kg of feed).

Kentucky Equine Research is a forerunner in equine nutrition and has a wealth of information in the articles in the Library section at
http://www.ker.com/index.html?region=na

Equine Supplements & Nutraceuticals by Eleanor M. Kellon, VMD, is available from Breakthrough Publications, www.booksonhorses.com (and other sources such as Amazon) and contains excellent discussion on general and specific needs as well as information and maps concerning toxicity.

Equine Cushings Group – Equine Cushings and Insulin Resistance discussion, research and support moderated by Dr. Eleanor Kellon with extensive nutritional information files.
http://groups.yahoo.com/group/EquineCushings/

Susan Evans Garlinghouse, DVM's website contains "must read" articles on nutrition for endurance horses.
http://shady-acres.com/susan/index.shtml

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