

Hay Forage Analysis

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What Is a Hay Forage Analysis?

Hay Forage Analysis provides the nutrient content of the hay that you are feeding to your animals.

Forage Nutrient Content Varies Between

- ◆ Seasons
- ◆ Geographic Locations
- ◆ Cuttings
- ◆ Storage Conditions.



By knowing the nutrient content of the hay, you can better manage the nutrition of your animals for better health and productivity

Why Should I Perform a Hay Forage Analysis?

Nutrient requirements of livestock vary with age, use, season, and production status. Forages generally make up the primary feed for most livestock.

- ◆ Knowing the **ENERGY** and **PROTEIN** content of forages is important to provide optimum nutrition for your animals.
- ◆ Forage analysis can determine **MINERAL LEVELS** in the forages.
- ◆ **Different areas of the country** have different availability of minerals in the soil and thus result in forages that may or may not meet the requirements of the animal for specific minerals.
- ◆ Knowing the nutrient content of your forages, allows you to better **tailor additional supplements** to meet the needs of your animals

How Do I Collect Hay for Forage Analysis

The most important aspect of collecting a hay sample for forage analysis is obtaining a representative sample of the entire lot of hay. This means randomly sampling several bales and obtaining a representative sample from each bale. While it is possible to simply grab some hay from several bales, this often results in a composite sample that is not representative of the hay because of over representing stems versus leaves. This is particularly true with alfalfa or alfalfa-mix hays. In addition, hand grab samples tend to collect forage from the exterior of the bale where the nutrient content of the forage may be affected by exposure to the environment.

Core Hay Samples

Core Samples are the preferred method of sampling hay for forage nutrient analysis. Quality hay core probes are made of a sturdy metal tube with a sharpened or serrated end to cut through the hay when obtaining the core. The length of the probe should be at least 14 inches and 18 to 24 inches is preferred. The probe diameter should be between 3/8 and 3/4 inches. This will provide about 1/2 pound of hay from 20 samples. The purpose is to collect a representative sample of stems and leaves.



Obtaining A Core Hay Sample For Analysis

- ◆ Sample each "lot" or cutting of hay separately.
- ◆ Obtain core samples from at least **20 bales** selected at **random** throughout the entire lot. If there are less than 20 bales, take multiple cores from all of the bales until you have 20 core samples.
- ◆ Collect core samples from the side of the bale that is most resistant to puncture.
 - ◆ **Square Bales:** Sample from the small ends.
 - ◆ **Round Bales:** Sample from the side.
- ◆ Drive the entire probe into each bale.
- ◆ Empty the core chamber into the collection canister (multi-bore probes) or into your collection bag (single-bore probes) between each bale.
- ◆ Collect the sample into a **1 Quart Ziploc Bag**.
- ◆ Squeeze out the air and seal the bag.
- ◆ **Label** the bag accordingly.
- ◆ Send the sample to the lab the same day as collection or as soon as possible.



StarQualitySamplers.com

Where Can I Get a Forage Sample Probe?

Hay core probes are available from multiple sources. Information on several quality hay core probes is available at the **National Forage Testing Association**.

<http://www.foragetesting.org>

- ◆ **Colorado Hay Probe:** Nasco - <http://www.enasco.com>
- ◆ **Penn State Forage Sampler:** Nasco - <http://www.enasco.com>
- ◆ **AMS Hay & Forage Probe:** <http://www.ams-samplers.com/>
- ◆ **Best Harvest Hay Sampler Probe:** <http://bestharveststore.com/11.html>
- ◆ **Star Forage Sampler:** <http://www.starqualitysamplers.com/forage.php>
- ◆ **Hart Forage Sampler:** Hart Machine Company, 1216 SW Hart St, Madras, OR 97741, 541-475-3107

Where Do I Send Hay for Forage Analysis

There are many laboratories across the country that perform forage nutrient analysis. The first way to ensure a quality analysis is to utilize a laboratory that is certified by The National Forage Testing Association (NFTA, <http://www.foragetesting.org/>). Certification means that this laboratory meets specific quality testing standards and demonstrates proficiency and accuracy for reporting percent dry matter, crude protein, acid detergent fiber, and neutral detergent fiber. A list of certified labs can be obtained from the NFTA web site.

Wet Chemistry or NIR Analysis?

There are two general methods typically used for forage nutrient analysis, **Near Infrared Reflectance Spectroscopy (NIR or NIRS)**, and **Wet Chemistry**. While NIR analysis is less expensive, this method is not considered as accurate as wet chemistry. NIR may be suitable for determining basic nutrient analysis including DM, CP, ADF, and NDF. It is often not suitable for accurate determination of mineral levels in feeds

What Do the Forage Analysis Results Mean?

- ◆ **Percent Dry Matter (DM):** The percent of the forage that is not water. For hay, this is typically around 87-95%. Feeds with a lower DM require higher as fed intake to deliver the same amount of nutrients.
- ◆ **Crude Protein (CP):** An estimate of the protein content based on total nitrogen of the feed and reported as a percentage. A normal range in hay is 6 to 20% on a DM basis.
- ◆ **Neutral Detergent Fiber (NDF):** Measure of the fiber in the feed consisting of hemicelluloses, cellulose, and lignin. These are the carbohydrates that make up the cell wall and structure of the plant material. NDF predicts voluntary intake. As NDF increases, there is more fiber to the forage which takes longer to digest and thus decreases voluntary intake. A normal range in hay is 30 to 60% on a DM basis.
- ◆ **Acid Detergent Fiber (ADF):** A measure of the cellulose and lignin and leaves out the more digestible hemicelluloses. ADF is a predictor of digestibility of the hay. As ADF increases, digestibility decreases. A normal range in hay is 25 to 45% on a DM basis.
- ◆ **Relative Feed Value (RFV):** A calculated ranking of the feed based on digestibility (ADF) and intake (NDF). The higher the RFV, the better the forage. RFV is primarily used for evaluating alfalfa hay for dairy cattle. It will routinely give a low value for grass hays and does not accurately reflect their feed value. This is because grass hays tend to have a higher NDF (limits total feed intake) than alfalfa but at the same time, they have a lower lignin concentration and thus their fiber is more digestible. What this does in the RFV calculation is under estimate feed intake and energy value of grass hay, thus under estimating the RFV relative to alfalfa hay.
- ◆ **Nonstructural Carbohydrates (NSC):** The easily digestible carbohydrates in the plant including starches and sugars. This is the primary carbohydrate energy source of the feed.
- ◆ **Crude Fat:** The amount of fat and other ether soluble components of the forage. Fat provides about 2.25 times as much energy per gram compared to carbohydrates and protein. However, high fat content (>5%) in the total diet can adversely affect forestomach function.
- ◆ **Total Digestible Nutrients (TDN):** TDN provides an overall estimate of the available energy density of the feed. It is the sum of the digestible protein, digestible NSC, digestible NDF, and 2.25 times the digestible fat.
- ◆ **Minerals:** Minerals are critical for the structure and function of tissues in the body. Too little (deficiency) or too much (toxicity) of these minerals can result in poor growth, poor production, or clinical disease. Mineral content of feed can vary greatly with geographic area. It is good to evaluate some of the important minerals in a feed sample to help select an appropriate supplementation to match with the hay that you are feeding