



Ridin' Herd

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Sample forages for quality

Nutrient quality of forages can vary a lot. Forages are the primary energy source for beef cows. As forages mature, digestibility decreases because of the increase in fiber.

When designing diets using harvested feeds, many rations are balanced using average values. These “book values” often result in over- or underfeeding certain nutrients. More-economical and better-balanced rations can be formulated using nutrient concentrations determined from feed analysis. In addition, nutrient “gaps” can be more accurately determined and supplementation strategies developed.

Sampling feeds

Forage-testing laboratories will not accept a “grab” sample of baled forages. Baled forages need to be sampled using a forage probe. Most producers do not have a forage probe, but most extension offices will have a probe for you to use.

A forage probe is essential for collecting a representative sample. For large round and square bales, the probe should penetrate at least 18 inches (in.) into the bale and have an internal diameter of at least $\frac{3}{8}$ -in. If the probe is 18 in. long or longer, sampling 15 large round bales should be adequate if the “lot” size is 30-40 bales.

Collect one sample from each bale by coring straight in from the center of the end of square bales and from the wrapped circumference of round bales. For loose or compressed hay stacks, use a hay probe that is at least 24 in. long to collect 15 or more samples from each “lot.”

To get a representative sample for each “lot” of hay, remember:

- Different cuttings of alfalfa need to be sampled separately.
- Grass hay cut early in the season should be sampled separate from hays cut in the middle or late in the season.
- Grass hays harvested at different locations need to be sampled separately.

Place the entire sample from each “lot” into a plastic bag and seal tightly. Label the sample bag with your name, address, lot ID and type of material. Most testing labs provide a description sheet to report this information and to request the desired tests.

Place samples in polyethylene freezer bags, squeeze the air out of the bag, seal tightly and store in a cool location. Use extra caution



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if subdividing a large hay sample, because subsampling dry hay can result in loss of fines and leaves. Freeze samples containing greater than 15% moisture until shipping.

Near-infrared reflectance (NIR) spectroscopy is a rapid, reliable, low-cost, computerized method to analyze feeds for nutrient content. It uses near-infrared light rather than chemicals to identify important compounds and measure their amount in a sample. Feeds can be analyzed in less than 15 minutes using NIR, compared to hours or days for chemical methods.

Make sure the sample is properly identified, because this is important to get accurate results. NIR does not do a good job of measuring minerals; however, it does a decent job measuring calcium (Ca) and phosphorus (P), likely because these minerals are tied closely to organic matter.

If you think you need a mineral analysis, consider using the chemical method.

Nutrients to consider

Dry matter. Percent dry matter (DM) is the percentage of feed that is not water.

In contrast, moisture is a measure of the amount of water in the feed on an “as is” or “as fed” basis, which is important because moisture dilutes the concentration of all nutrients. Percent DM content plus percent moisture content of a feed always equals 100%.

DM content of a feed is an important number because beef cow diets are formulated on a DM basis. The DM percentage is used to calculate the amount of feed needed to be fed “as is.” As an example, if the diet calls for grass hay to be fed at 25 pounds (lb.) per head per day, and the hay is 15% moisture and therefore 85% dry matter, you would need to feed each cow 29.4 lb. per head per day ($25 \text{ lb.} \div 0.85$) to account for the water in the hay.

Percent crude protein. Percent crude protein (CP) measures nitrogen (N) concentration in a feed. However, CP will measure both true protein and nonprotein nitrogen because the actual measurement is %N.

The new metabolizable protein (MP) system that was introduced in the 1996 *Nutrient Requirements for Beef Cattle* published by the National Research Council (NRC) incorporates degraded intake protein (DIP) and undegraded intake protein (UIP, or bypass protein). The DIP and UIP percentages must total 100% of the protein and are normally expressed as a fraction of the CP.

So, if the DIP of a forage is 70%, then UIP is 30%. If the CP of that same forage is 10%, then DIP is 70% of DM ($10\% \times 0.70 = 7\%$ DIP) and the UIP is 30% ($10\% \times 0.3 = 3\%$ UIP). Because NIR does not measure DIP and UIP, use book values from the 1996 NRC. If the CP and adjusted CP numbers are not the same, it indicates that there has been some heat damage in the forage. Use the adjusted CP value in developing diets for this feed.

Total digestible nutrients (TDN). TDN represents the total of the digestible components of crude fiber, protein, fat ($\times 2.25$) and nitrogen-free extract in the diet. This value is calculated from acid detergent fiber (ADF) in the NIR analysis. TDN is used to calculate beef cow rations where the diet is primarily forage.

Nitrates. Some feeds may contain nitrates that, when they reach a specific level, can



cause toxicities to the animal. Nitrates in forages usually accumulate as a result of suboptimal conditions during the growing season. Summer annuals are an example of forages that can accumulate nitrates. Consider always testing summer annuals for nitrates.

Relative feed value (RFV) combines digestibility (ADF) and intake [neutral detergent fiber (NDF)] into one number for a quick, easy, effective way to evaluate the quality of alfalfa and/or haylages. It is used primarily with legume or legume/grass forages. Relative feed value is most valuable for formulating diets for dairy cows and

not really useful in balancing diets for beef cattle. RFV provides an index to rank forages according to their digestible energy intake potential. RFV also has been used widely in hay marketing, but is not used in developing cow diets.

Final thoughts

The primary factor that impacts forage quality is maturity at the time of harvest. Every year there are a lot of differences in forage quality and forages need to be tested. Cows need diets that meet their needs, especially after calving.

Continue to explore opportunities to

reduce cow costs. Testing forages for quality will allow you to know the quality of the forages in the stack yard. In addition, if you know the nutrient needs of the cattle you are feeding, you may or may not need additional feeds or supplements to meet the requirements.



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