Winter Feeding: Sampling Stored Forages
Steven M. Jones, Associate Professor - Animal Science

Testing the nutrient value of forage is a valuable tool that can be utilized to balance livestock rations. Guessing the nutrient content of a major feed ingredient such as hay can be costly to livestock producers. To realize the value in hay or other stored forage, we need an analysis.

Most livestock producers will need to supplement this winter with some kind of stored forage. High prices for soybean meal, corn and other commodities further justify the cost of forage analysis. Forage test forms can be obtained from your county Extension office. These forms contain complete instructions on how to collect forage samples. Proper collection and identification of a sample is very important. A tool is needed to collect hay samples.

The cost for forage analysis is $18.00 per sample. Considering the cost of grain supplementation this year, the cost of analysis will easily pay for itself by preventing over supplementation. The real value is in correctly balancing diets so that productivity of the herd is maintained or improved, resulting in increased profitability.

Each hay type and cutting should be sampled and analyzed separately. Hay harvested on different dates within a cutting should also be sampled separately. Therefore, it is important that each cutting is stored separately and can be identified with its forage test.

When sampling forages, one cannot over stress the importance of proper sampling technique. Samples should be representative and selected at random. In summary, sample each lot of forage separately, and make sure that the forage can be identified with its analysis when feeding.

1. Core samples are preferred over grab samples. Even with hay that is not weathered, multiple core samples will contain a better distribution of plant material, which will result in a more accurate assessment of nutrient composition. Hay sampling probes are
available for use through county Extension offices in Arkansas. Samples should be taken from the end of square bales and from the side of round bales and stacks.

2. To correctly sample rectangular bales, drive the bit into the end of 15 to 20 bales from a particular lot of hay. Drill to the full depth of the sample tube on loose bales and half depth in tight bales. Mix the cores thoroughly and send the entire sample to the lab in a sealed plastic bag.

3. Large round bales should be sampled on the rounded side of the bale.

4. Twenty to thirty percent of the bales must be sampled to accurately estimate the nutrient composition of the hay. A demonstration project at the University of Arkansas showed differences of 5 percent TDN when as few as 5 percent of bales were sampled within a single hay lot. A minimum of six individually core-sampled round bales is necessary to have sufficient sample size for an analysis. Sample size should represent the larger of the two, either 6 bales or 20 percent of the number of bales in a lot.

Upon receiving the results from a forage analysis, the next step is to interpret the results. The results are separated into two columns – AS FED BASIS and DRY MATTER BASIS. When comparing a forage analysis to animal requirements, the values reported under dry matter basis should be used. The following information is reported when a forage sample is submitted for routine analysis through the University of Arkansas Cooperative Extension Service.

- Moisture – water content of a feed
- Dry Matter – 100 minus the water content. Used to convert AS FED to DRY MATTER. Example: 8.9 - 91.3 x 100 = 9.8
- Crude Protein – a measure of plant nitrogen multiplied times 6.25.
- Acid Detergent Fiber – a measure of plant cellulose and lignin. Acid detergent fiber is commonly used to estimate digestibility (TDN).
- Neutral Detergent Fiber – a measure of plant hemicellulose, cellulose and lignin. Neutral detergent fiber may also be used to estimate digestibility and is highly correlated with forage intake.
- Total Digestible Nutrients (TDN) – an estimate of the supply of energy. The number for total digestible nutrients is derived from equations developed from feeding trials. Equations commonly utilize acid detergent fiber to estimate TDN but may also include crude protein and/or neutral detergent fiber.
- Net Energy for Lactation – an estimate of the supply of energy commonly used for balancing dairy cow/lot rations.

The time and money spent forage testing has consistently been shown to be a valuable tool for avoiding costly feeding errors. However, a forage test is of little value if the producer is not willing to interpret the results and make supplemental feeding changes when necessary. Knowing the forage nutrient content can save money in the winter feed program. A forage analysis is the only way to accurately balance a ration or mineral program. Lastly, the forage analysis determines forage feeding value so you can compare cost of potential supplements.

Evaluating By-Product and Alternative Feeds and Forages for Sheep and Goats

Steven M. Jones, Associate Professor - Animal Science

The year 2010 has been a challenging one for sheep and goat producers in regard to feed costs and forage and hay availability. This will extend through the winter months of 2011. Many regions of the state experienced significant drought, while other regions were too dry to have normal hay quantities.

There have been many questions this year on by-product feeds and alternative forages – some producers trying to economize the feed bill and some simply trying to find adequate quantities of forage. There are also many misconceptions about by-product and alternative feedstuffs. It’s amazing what people believe based only on hearsay and not fact or science.

Cattle and horses have been extensively researched for nutritional acceptance of by-product feeds that are available. That is not the case for sheep and goats. So, in one way we are relying some-what on hearsay. Research IS becoming available for small ruminants in response to being fed these by-product feeds, but we still do not have the depth that has occurred with cattle. However, there are some proven scientific principles that are in place that must be adhered to until this area is thoroughly researched.

**Nutritional Profile.** Sheep and goats are ruminants; therefore, they are able to use a variety of feedstuffs to a certain extent.
When considering an alternative feedstuff, it is imperative to get an analysis of that feedstuff. One can use book values as a means to get some initial information, but an actual analysis of a feedstuff is very important. Most nutritional or chemical analysis of a feed on forage will list items individually.

**Energy.** Energy content of a feedstuff is reflected by the values contained in lab reports from the item’s total digestible nutrients (TDN). Feeds high in energy content usually have certain characteristics. They are lower in fiber content, have a high starch level, have a high fat content or some combination of the three. For instance, corn grain is low in fiber and high in starch. Dried distillers grains (a by-product of corn used in ethanol production) is as high in energy as corn, even though it has three times the fiber and very little starch. This is because it has high fat levels (9 to 12 percent).

High energy feeds are often used in sheep and goat rations. However, care must be taken when feeding high energy feeds. High starch-containing feeds can cause lactic acidosis. Thus, feeds high in digestible starch should be introduced to ruminants slowly and over a period of time in a “step up” fashion. It is usually recommended that fat levels of ruminant diets not exceed 6 to 8 percent of the diet dry matter. So, feeds high in energy from fat can often only be used as a portion of the energy feed of a ration.

**Fiber Content.** The fiber content of feedstuff is reflected on a feed analysis report by the variables entitled NDF, ADF and lignin. NDF stands for neutral detergent fiber and represents the fiber fraction containing hemicellulose, cellulose and lignin. ADF stands for acid detergent fiber and represents the cellulose and lignin content. These values are reported on a percentage basis.

The NDF value is important because it contains the entire fiber content and relates to how much of the feed an animal can physically consume. The ADF value is used as a predictor of how much of the feed is actually digested. The book values for a high-quality alfalfa hay have a NDF content of 45 percent and an ADF of 35 percent. Compare these values to an NDF of 87 percent and an ADF of 68 percent for low-quality filler forage such as cottonseed hulls.

**Protein.** Protein content of a feed analysis report is fairly straightforward. It is reported as a percentage. With by-product or alternative feeds or forages, it is also a good idea to check on the level of heat-damaged protein. This is often reflected as unavailable protein, ADF-N, bound protein or insoluble protein. The higher the number, the less digestible the amount of crude protein contained in the sample being analyzed and the more heat damage that has occurred.

**Minerals and Vitamins.** These are usually listed individually. All of them are important, but of particular importance are the amounts of calcium, phosphorous, copper and sulfur. Many by-product and alternative feeds are low in calcium and are often high in phosphorous. This doesn’t preclude the use of them in a ration but does mean extra calcium will need to be added. The ratio of calcium to phosphorous for male sheep and goats should be at least 2:1 to help prevent urinary calculi.

Copper is important to note, to avoid copper toxicity in sheep. Levels over 15 ppm should catch your attention.

Some areas of Arkansas have soils deficient in selenium. Selenium deficiencies will predispose animals to White Muscle disease in young animals or cause abortions in late term.

Sulfur is also high in many of the corn by-products from either ethanol or sugar production. Sulfur can interfere with thiamine (Vitamin B1) absorption, leading to the disease polioencephalitis. If high levels of these by-products are used, then thiamine should be included in the ration.

**Cost Comparison.** Just because a feed is a by-product doesn’t mean it is economical to feed. It is important when comparing prices of feedstuffs to make all variables as equal as possible. This includes the amount of dry matter, price per unit of nutrient and on an equal weight basis. Dry matter content is important when evaluating alternative feeds. When considering a feedstuff, decide what it will primarily be used for. Then compare it to a standard. For instance, compare a protein feed to the price of soybean meal on a cost per unit of protein. Compare energy feeds to corn, etc. Make sure to standardize price per common unit of measure – price per ton for hay, price per pound for corn, etc.

There is no perfect, complete feed for sheep and goats. Even commonly used feeds such as corn and mixed hay have to be fed in proper amounts and fortified with other nutrients. There are objective sources of information available to advise people about the use of by-product or alternative feeds. Contact your county Extension agent as a potential source of information.
Tips for Producers Dealing with the Drought

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Drought has made this a tough year for sheep and goat producers in many parts of Arkansas. On October 12, 2010, the U.S. drought indicates two-thirds of Arkansas being in moderate to severe drought. Although some parts of the state have had rainfall since that time, some areas still have not had measurable rainfall as of November 1. Reported hay production in Central and Southern Arkansas near the end of August was 50-75% of normal. In addition, the drier-than-normal autumn has slowed or suppressed stockpiling of warm-season grasses and slowed perennial cool-season grasses such as fescue, and annuals such as ryegrass have emerged only in correlation to the rainfall.

Drought-affected pastures rarely produce adequate amounts of forage. Hay is in short supply, and what is available tends to be of below-average quality. Drought-stressed plants tend to be nutrient deficient, especially in protein. Hay analysis reports for 2010 indicate adequate energy as a general rule as compared to averages. However, those same samples are well below average for protein. On an average year, our hays are adequate for protein for small ruminants, with the exception of lactating females and young growing kids/lambs. Therefore, supplementation is usually concentrated on providing energy requirements. The drought of 2010 has created challenges in both volume of hay and quality. Many producers are faced with winter supplementation for both protein and energy with limited hay inventories.

The drought of 2010 has created challenges in both volume of hay and quality. Many producers are faced with winter supplementation for both protein and energy with limited hay inventories.

Complicating the issue of short forage supply is a major increase in feed prices. During the drought of 2005, corn was priced at $2.86/bu. Since mid-summer, grain prices have strengthened with currently traded corn at about $5.50/bu. and soybeans at $12.42/bu. The price of commodities is correlated with the price of corn and soybean meal, to a lesser extent. As the price of corn increases, soybean hulls, corn gluten feed and rice bran prices will follow the corn price and it has!

The approach used to stretch a shortage of forage will vary depending on the severity of the situation on your farm. Listed below are a few things to consider.

1. Inventory available forage, both hay and potential grazing. Calculate amount and quality of hay needed for the herd. Next, determine the amount of time expected until pasture will be available. Now, you have real data needed to determine what and how much supplementation will be needed.

2. Weigh hay bales, both large round and squares. Bale weights will vary depending on forage species, baler type and moisture content. Recent data from the Arkansas 300-Days of Grazing Program indicates the following bale weight averages for 2010: a) 4x5 bales – 730 lb, b) 4x6 – 950 lb and c) small squares – 45 lb.

3. Reduce storage and feeding waste. Hay storage and feeding losses can reach a magnitude of 40%. Feeding hay in rings or hay feeders will keep feeding losses below 15%.

4. Body condition score your herd. Through the winter months you want to maintain or increase body condition score, especially for pregnant females that will reach parturition in late winter or early spring. Thin animals are more susceptible to disease and parasites, plus females that kid or lamb thin will have reduced milk production.

5. Inventory your herd and separate by nutrient requirements. Growing animals and lactating animals need the highest quality feeds because their requirements for protein and energy are greater. Females in early to mid-gestation and bucks are at maintenance requirements. Separating the herd by nutrient requirements allows you to allocate existing feed resources and strategically feed more expensive supplements to those animals requiring them, thus saving money.

6. Reduce herd size by culling least productive does/ewes. If feed resources are limited, now is the time to seriously look at reducing the herd. Criteria to consider include:
   a) Internal Parasites. Chronic parasite carriers should be culled. Maintain records so that parasite-tolerant goats can be retained and wormy and coccidiosis-prone goats can be identified for culling.
b) Poor mothering instincts, bad udders and teats and low milk output.
c) Old does and ewes.
d) Body conformation and structure.
e) Nonbreeders. Both males and females who do not breed on a recurring basis should be culled.

7. Don’t graze too long on short grass – it will take even longer to recover. Better to concentrate livestock in one area that is “sacrificed” and feed them there. Let the grass grow back before grazing. Grazing short grass just means you will have short grass for even a longer time.

Producers need to plan for the most effective management and conservation of their resources in drought-affected areas. Decisions you make now may affect production next year. Early planning and decisions regarding the management of livestock are most critical. Every operation may have different options based on stocking rates, production status of the animals, total available feed resources and the financial position and cash flow situation of the operation.

Calendar of Events

December 5, 2010 – AGPA meeting will be at 1 p.m. at the Heifer Ranch in Perryville.

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