

Matching Hay Quality with Animal Nutrient Requirements

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Because feeding costs can account for over 50% of the cost of livestock production, knowing your hay quality and animal requirements can have a significant impact on profitability. As you harvest hay in the spring, you may wonder about the quality of your product. This article addresses the topic of nutrient content of grass/legume hay and the nutrient requirements of livestock that may be consuming it. Some suggestions on how the livestock manger can utilize the hay effectively and efficiently are offered.

Hay Quality

First, what is the nutritive quality of hay for livestock, and how does timing of putting up hay affect this? Nutrient quality of hay is measured in terms of energy and protein. Another important determinant of quality is the digestibility of the hay, or how easily the hay is broken down and absorbed. The higher these attributes are, the higher the quality of hay.

Young, fast-growing plants (vegetative state) contain a higher percentage of energy and protein than old, slow-growing plants that have gone to seed (mature or reproductive state). Additionally, the digestibility of the former plants is much higher than that of the later. This means that the animal can obtain a greater percentage of nutrients from the vegetative feed.



Low quality grass hay and protein tubs could provide a proper ration for some classes of livestock.

Generally, as the plant matures and gets a higher ratio of stem to leaf material, fiber content increases and percentage of protein and energy decrease. Associated with this are decreased digestibility and feed intake; therefore, a decrease in quality and quantity the animal receives. This is why early cut hay is more nutritious than late cut hay. Good quality hay comes from fields that are cut when plants are still young and nutritious. Of course you need to have sufficient quantity of forage to cut, so a compromise is made between increasing quantity and decreasing quality. Most hay should be cut between the time of the late boot stage (inflorescence emergence from the leaf sheath) and full seed head expression, well before flowers begin to release pollen.

Feed energy is expressed in terms of total digestible nutrients (TDN) and feed protein is expressed as crude protein (CP). These can be estimated from the natural components that make up the hay (fiber, fat, carbohydrates, and protein or nitrogen).

Digestibility of the feed is estimated based on the relationship among feed components. This is made possible from information gathered in extensive studies on chemical components of feeds and the actual digestibility of the feed through animals. Although in-depth analyses using actual animals were used to define these relationships, routine laboratory analysis for only a few feed components can be used to estimate the quality of feeds.

The best way to evaluate your hay is to take and submit hay samples for laboratory analysis. The cost is about \$25 to \$35. For information on how to test your hay and a list of labs that analyze feed samples, contact your local Extension Office. You can also request protein and energy values on the hay you purchase. For an estimate of your hay value, take a look at the Oregon Forage Library at

<http://oregonstate.edu/dept/animal-sciences/OregonFeedComp/index.htm>

For example, one very good quality grass-legume hay contained 13.8% CP and 62% TDN. Another hay of lower quality contains 8.4% CP and 58% TDN. The large variation in quality among hays in Oregon makes it important for you to have an accurate estimate of your hay quality.

If you are unable to get a chemical analysis performed on your hay, keep record of the cutting date or maturity and the amount of contamination by undesirable plants, which could decrease quality. You can use this information to help you feed out the hay later (see below).

Animal Requirements

Once you have an estimate of hay quality, you can match that with the animal's requirements. There are a few points to remember. Younger, fast growing animals have greater requirements for their size than mature animals. Highly productive animals also require more nutrients than animals merely maintaining weight.

Nutrient requirements of livestock have been investigated and results published by the National Research Council, and books and charts are available for beef and dairy cattle, sheep, goats, swine, horses, and more. Within these publications are lists of requirements by class (steers or heifers, pregnant, lactating, etc.), weight, and rate of gain desired. On-line editions can be found at <http://www.nationalacademies.org/agriculture/>. Enter "nutrient requirements of beef" (or other animal) in the search box.

Some example nutrient requirements are as follows. A 500 lb, medium framed steer calf gaining 1 lb per day requires 58.8% TDN and 9.5% CP in its diet. That same steer would need 85% TDN and 14.4% CP to gain 3 lb per day. Additionally, animal requirements may change with time. For example, a 154 lb, mid-gestation ewe has relatively moderate nutrient requirements (9% CP and 55% TDN) compared to a lactating ewe, which has significantly increased protein and energy requirements (15% CP and 65% TDN). See the publications for specific requirements for your animals.

Matching Feed with Animal Requirements

Once you have identified the animal type and its requirements, make sure it is receiving adequate nutrients for animal health and productivity goals.

You may need to provide supplemental feed to make up the difference in nutrient content between forage and animal requirements. Consider cost of supplement and benefits of increasing animal performance. Be careful not to overfeed supplement to the point of replacing base forages (hay or pasture).

Stack hay in bays according to quality and as you use the hay for summering or wintering your animals, keep in mind the different requirements for the animals as discussed above.