Forage testing is important for balancing rations

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Summer appears to be in full swing here on the coast. This is the time when many livestock producers spend their time cutting silage and hay and preserving it for use later this fall and winter. For years I have seen livestock producers with all types of livestock feeding forages without any analysis and/or animal performance goals. If you fall in this group, I challenge you to consider the merits of testing your forages.

Balanced nutrition is important for efficient livestock production. Daily nutrient requirements vary depending on the phase of production. Knowing the nutrient composition of feeds and matching feeds to animal requirements at a given stage of production will ensure that nutritional needs are met. Forage analysis is a tool that provides information needed for proper livestock nutrition.

Forage testing is used to determine nutrient composition and potential animal performance of both silages and hays. Essentially, the goal is to take a representative sample of your preserved forages and send it to a certified laboratory and have it analyzed for nutritional attributes. This is really essential information for producers to make good decisions.

There are two ways that forages are analyzed for nutrient content. Wet chemistry uses established laboratory tests to quantify protein, fiber, fat, and minerals. More recently, near infrared reflectance spectroscopy (NIR) has been perfected to quickly, economically, and accurately measure nutrient content without destroying the sample. The NIR instrument must be calibrated to wet chemistry which is the standard. Individual laboratories will advise about feeds that can be analyzed with NIR, based on the calibrations available to them.

When sampling hay, it is best to use a core sampler. Take 10 to 20 core samples from each hay lot then composite and mix and take a sub-sample for analysis. Small rectangular bales should be sampled by coring from the end. Large hay bales should be sampled from the front or back (not the sides) in order to get a cross section of the rolled hay. Silages are best sampled after they go through the fermentation process. Actual sampling procedures vary slightly depending on the type of system you are using and how much variation you expect in your stored feeds. I have a core sampler available to the public that I loan out at no cost. Just call or come by the Oregon State University Extension office in Tillamook and we can make that available.

Factors Influencing Forage Quality

Since many factors affect forage quality, no single factor can be used to make this prediction. Maturity stage at harvest, forage species and variety, leafiness, harvest and storage conditions are important factors that determine quality.
**Maturity.** As forage plants mature, the concentration of structural carbohydrates and lignin increases. Structural carbohydrates, the plant's fiber component, include cellulose and hemicellulose. While cellulose and hemicellulose can be partially digested by ruminant livestock and horses, another part of the fiber component, lignin, is not digestible. Research has shown that an increase of one percentage unit of lignin will result in three to four percentage units decrease in digestible dry matter. As the amount of fiber increases and digestibility decreases, forage consumption is also reduced; therefore, the amount of digestible energy consumed decreases as the forage matures.

**Species and Variety.** Forage quality differences between species and among varieties within a species are generally related to differences in both non-structural or structural carbohydrate quantity and digestibility. The figure below illustrates the differences in some species and varieties seen in a local research trial I recently conducted looking at structural carbohydrate digestibility. These variations have an effect on animal performance. Grasses in the blue are fescues, the orange are orchard grasses and the green are ryegrasses.

![Graph showing NDF digestibility of various species and varieties.]

**Leafiness.** Leaves contain more nonstructural carbohydrates and protein than stems. The nonstructural carbohydrates, which include plant sugars and starches, are highly digestible. When forage plants mature, the leaf to stem ratio decreases. Thus, forages with a greater amount of leaves are more likely to be of higher quality.

**Harvest and Storage Conditions.** Forage crops decrease in nonstructural carbohydrate concentration and digestible dry matter percentage during the curing process because of plant respiration. Decreases in digestible dry matter can also occur from the leaching of soluble nutrients during rainfall and the physical loss of leaves at harvest. Management techniques that minimize curing time (use of a mower-conditioner and/or preservative) can minimize digestible dry matter loss. Just as plant respiration reduces forage quality...
during curing, similar activity can cause quality changes during storage. If hay with excessive moisture is package and stored, mold may develop.

It is important to understand the quality of your forages to best meet your animals’ needs and your production goals. It is easier to make good decisions with good information. If you need help sampling or interpreting results or would like more information please call or come by at OSU Extension, 2204 4th St., Tillamook. 842-3433. Information online can be found at www.foragetesting.org.