

Understanding Forage Analysis Important To Livestock Producers

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Much of the hay sold in the Midwest is sold by the bale, based on color or forage type, with little concern over quality. Good-quality hay is often sold too cheap, and poor-quality hay, which is low in both protein and energy and usually high in fiber, is often sold for more than it is worth. Knowing hay quality is a critical factor in formulating economical supplementation programs.

Several methods of estimating (visual appraisal) or analytically determining (chemical analysis, and near infrared reflectance spectroscopy) the nutrient content of forages are available. Each method has strengths and weaknesses in selecting forages for cattle.

Visual appraisal of forages is based on feel, smell and sight. The forage is evaluated by odor (mold or weed presence), color, leafiness, maturity (presence of heads), and the presence of foreign material (insects, weeds and dust). Although a visual appraisal is quick and inexpensive, it is very subjective.

A chemical analysis is the most accurate method to assess nutrient make-up. The analysis will determine excesses and deficiencies in the forage and assist in appropriate supplementation. Nutrients commonly assessed include crude protein, fiber, fat and minerals. Crude protein measures all nitrogenous compounds present in the sample and does not distinguish true protein from non-protein nitrogen, which is not a problem for ruminants.

Forage testing labs typically run two types of fiber determinations. One uses an acid detergent solution to digest the dried-feed sample,

and the other uses a neutral detergent solution. The digested solution is filtered, and the residue on the filter is the fiber. These fibers are termed acid detergent fiber (ADF) and neutral detergent fiber (NDF). NDF is larger than ADF in plants and is considered to be the cell wall component. NDF is used to predict intake, while ADF is used to predict digestibility. Both can be used to estimate energy. The chemical analysis will determine nutrient excesses and deficiencies so rations can be balanced accordingly. Chemical analysis is expensive, and the tests can take from 24 hours to two weeks to complete; but, the cost of the test can be offset by not over-feeding expensive nutrients.

More recently, near infrared reflectance (NIR) spectroscopy has been perfected to quickly, economically and accurately measure nutrient content without destroying the sample. NIR technology uses light reflectance and works best on the major chemical constituents in forages (large compounds) such as those that compose protein and fiber. Minerals are smaller and, therefore, more difficult to measure with the NIR, and wet chemistry should be used if precise levels are needed. The NIR instrument must be calibrated to wet chemistry, which is the standard.

Forage testing provides a measure of the nutrient content of hay or pasture that animals are consuming. A forage analysis report contains information on such attributes as moisture, fiber, digestibility, protein and mineral content. Comparing the forage's nutrient content with the animal's nutrient requirements enables a producer to see if supplements are needed to improve animal performance or health. Δ

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