Forage analysis: Don’t guess…Test!

Forage growing conditions across Kansas ranged from exceptionally wet in some regions to drought in others. The much-needed rainfall in the western regions of the state were a welcome change but also created an increase in weed pressure in hay fields and made timely harvesting of forages challenging. The rapid on-set of drought in the central and North-central region of the state stressed forages and crops mid-season. All these conditions could potentially affect forage quality and may greatly increase the risk of mold and nitrates in harvested forages, which can be harmful and toxic to livestock. This is the year to test your harvested forages! As the old saying goes “don’t guess…test”.

When submitting a forage sample for testing, the basic components of a forage analysis are dry matter (moisture), crude protein, an estimate of the energy content of the feedstuff (Total Digestible Nutrients (TDN), Net Energy for Maintenance (NEm), Net Energy for gain (NEg), and the macro minerals, Calcium and Phosphorous. These are the most basic analytical procedures that are required to evaluate forages and balance rations. However, there are some additional analyses that can offer insight into the quality of the forage or improve our ability to predict animal performance. I recommend that the report include acid detergent fiber (ADF) and neutral detergent fiber (NDF).

The amount of NDF in forage reflects the amount of cell wall contents (hemicellulose, cellulose, and lignin) within the sample. The NDF fraction is often associated with the respective bulkiness of forage and is correlated with dry matter intake of the forage or feedstuff. Therefore, the amount of NDF may be used to estimate the expected dry matter intake associated with the forage. The ADF number represents the amount of cellulose and lignin within the forage and is correlated with the respective digestibility of the forage. In general, a higher ADF value is associated with forage that has a greater proportion of cellulose and lignin and would likely be more mature. Additionally, the ADF fraction is used to calculate the energy estimates TDN, NEm, and NEg that appear on the report. As forages mature, ADF increases and energy content decreases.

If the hay was put up under less-than-ideal harvest conditions or contains a large proportion of weeds, mold is a concern. A generic mold count may be requested at most labs. This analysis does not identify specific types of mold but simply tells us the concentration of mold within a forage sample. In addition, if the forage is a known nitrate accumulator (forage sorghums, crop residues, cereal hay), contains weeds that accumulate nitrates (kochia, lambsquarters, sunflower, pigweed, Johnsongrass) or was stressed (i.e. drought, hail damage) prior to harvesting, a nitrate analysis is recommended. Nitrates and mold can be managed by blending forages to dilute out
the mold or nitrates. However, the concentrations must be known to accurately dilute the mold and nitrates to safe concentrations.

Most analytical laboratories have several different analysis packages available. These packages typically include the basic analytical procedures outlined above (DM, CP, TDN) and then add on specific analyses such as NDF, or the Macrominerals (Ca, P, Mg, K, Na, Cl, S). Mold counts or nitrate analyses are usually offered as separate analytical procedures and must be requested separately for additional fees. In addition, some labs may not offer all services in-house and may send samples to other laboratories for analysis, which can require additional time.

Thanks to Justin Waggoner for sharing information related to forage analysis and for further information regarding forage sampling or if you need assistance submitting samples, contact me at any Post Rock Extension District Offices in Beloit, Lincoln, Mankato, Osborne, or Smith Center.

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