Mid-West Cattlemen News

Interpreting Forage Analysis Results

By now, hay should be made and stored away and it's time to think about optimizing cost in your winter feeding program. In fact, aside from depreciation cost of the cow, winter feed cost is the largest expense on a cow-calf operation. Focusing on optimizing cost in a winter feeding program might be the best way to maximize profit in your operation.

The best place to start when developing a winter feeding program is to sample your forage to determine the best way to utilize it. A robust NIR analysis of grass hay costs around $15 per sample and can provide all the information necessary to formulate a feeding program. But when the results come back from the lab, how should they be interpreted? We will discuss the important components of a forage analysis and what they mean for wintering a cow.

Moisture

Moisture is the only number that matters in the As-Fed column. Moisture is simply the measure of water content of the forage. For most dry-baled hay, the moisture content will be 12 to 18 percent. If moisture in dry hay is greater than 20 percent, there was likely some heating and nutrient loss in the hay unless an inoculant like our Hay Saver was used. For wet-baled haylage, we would look for a moisture content of 45 to 65 percent for proper fermentation. Anything less than 45 percent is difficult to exclude oxygen from and we will likely see spoilage and heating. For haylage baled at greater than 65 percent moisture, seepage and unfavorable fermentation can be expected. The other number to look at for moisture is Percent Dry Matter (DM), which is simply the percent of the product left once all the moisture is cooked off. For the remainder of nutrients, it is best to analyze them on a DM basis to remove variability of water content.

Crude Protein (CP)

Crude Protein (CP) is the measure of protein in the forage. Protein is important in supplying nitrogen and essential amino acids to the rumen microbes. CP is typically given too much weight when discussing a forage analysis in our area. In a cool season grass like fescue, protein content of hay is most often adequate to meet the needs of a gestating cow, which are 8 to 9 percent. CP in a warm season grass, like sudan grass, should be given more attention as it is much lower and has potential to limit intake without protein supplementation.

Protein Availability

Measures of protein availability presented on the lab analysis can be tricky to understand. Most labs will publish measures of protein availability as Rumen Degradable Protein (RDP) or Degradable Intake Protein (DIP). Both RDP and DIP are the same measure that indicate the portion of the protein that is available to the rumen microbes. RDP of a grass hay is typically around 70 percent of total CP. Protein that is not degradable in the rumen will be presented as Rumen Undegradable Protein (RUP) or Undegradable Intake Protein (UIP). Both RUP and UIP are a measure of the protein that will bypass the rumen and be available for the animal to absorb. Forages are typically not a good source of RUP and most of the protein is available in the rumen. Another protein availability number that is often provided on a forage analysis is Acid Detergent Insoluble Crude Protein (ADICP). ADICP is a measure of the protein that is not available to the animal. This can be a good number to review to determine if forage has heated during storage. Non heat-damaged forage will contain less than 12 percent of CP as ADICP. If the forage has heated and made the protein unavailable, the ADICP will be much higher and require additional protein to be fed.

Fiber & Carbohydrates

Fiber parameters of forage analyses are the most important and overlooked numbers on the lab report. Fiber most often is presented as Neutral Detergent

Fiber (NDF) and Acid Detergent Fiber (ADF). NDF is a measure of total structural carbohydrates in the plant which are present as hemicellulose, cellulose and lignin. Lower NDF hay is typically less mature and more digestible. ADF is a measure of the less digestible portion of structural carbohydrates which are cellulose and lignin. Almost no lignin will be digested by the animal and only a portion of the cellulose will be digested. The higher the ADF the less digestible the forage will be. I have summarized normal ranges for a variety of forages in Table 1.

Table 1. Nutrient Range for Common Harvested Forages

	CP			NDF			TDN		
	Low	Avg	High	Low	Avg	High	Low	Avg	High
Sorghum Sudan	6%	11%	15%	56%	64%	71%	49%	55%	60%
Fescue	7%	11%	15%	55%	63%	70%	53%	58%	62%
Alfalfa	14%	18%	22%	41%	48%	56%	54%	58%	63%
Wheat	6%	11%	15%	51%	59%	67%	53%	58%	63%
Straw	3%	5%	8%	65%	73%	81%	43%	48%	54%

Non Fiber Carbohydrates (NFC) would be a measure of starches, sugars and pectin. NFC is basically a measure of easily digested carbohydrates. In stored forage, the higher the NFC the more digestible energy the forage contains.

Calculated Numbers

Nutrients measured by the lab are often used to calculate energy values of the forage based on generalized calculation. These measures are typically presented as Total Digestible Nutrients (TDN), Metabolizable Energy (ME), or Net Energy (NE). TDN is most often used for on-farm formulation in winter cow diets and is a basic number to use when comparing forage nutrient content. NE system is used to calculated the amount of energy available in the forage for maintenance, growth and lactation. Most energy equations use analyzed ADF and NDF content to estimate an energy value of the forage. Relative Feed Value (RFV) is also used often as a measure of forage quality. RFV works well when comparing quality of similar forages like comparing one alfalfa to another. I would caution using RFV to compare the quality of unlike forages as it typically undervalues the quality of grass and overvalues the quality of legume hays.

Mineral Content

Most forage analyses will present macro mineral concentrations of the forage, which will typically include calcium, phosphorus, magnesium, potassium, sodium and sulfur. In general, a good free-choice mineral program will balance mineral needs that the forage won't provide. Most often, trace mineral concentrations are not included in a general forage analysis but can be analyzed upon request.

Ash

Ash is a measure of total mineral content in the forage. This is typically not an important number nutritionally, but if ash content of the forage exceeds 12 percent, harvesting equipment needs to be adjusted to reduce soil contamination of the forage.

Economics

Applying nutrient analyses to a winter feeding program is essential. If you figure a middle to late-gestation cow requires 8 percent CP and 55 percent TDN, it is very possible that forage will not meet her nutrient requirements. It is impossible to develop a winter feeding program without first testing the forage. By knowing what the forage provides and what the cows require, we can customize a winter feed program that optimizes cost without sacrificing performance of the cow. In a spring calving herd, winter is often the time we have to influence body condition prior to calving and breeding. Let our team at Cargill develop a winter feed program that takes care of the cows and leaves some money in your pocket!

"Fiber parameters of forage analyses are the most important."

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Contact your Cargill representative for winter feeding programs.