Interpreting Key Values Of A Forage Test

Forage testing gives great insight into the quality and value of feedstuffs. Testing allows for a better understanding of the forage value, whether feeding it out or looking to sell. Understanding key feed test values can give a producer insight on how their current agronomy, harvesting and storage management plan is working.

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Dry Matter

Dry Matter is what remains after all the moisture is removed from a feed. The Dry Matter (DM) value on a forage test can say a lot about how it was harvested. The DM of harvested forage coming off the field will affect the fermentation process; further impacting nutritional quality. Forage that is too dry does not pack well leaving excess air during the fermentation process. The presence of air increases the risk of mold and yeast growth in storage, as well as increasing further loss of dry matter and nutrients. Too much moisture in a forage can result in seepage, decreased storage life and increased risk of spoilage and/or butyric acid production. If forage has been harvested at a less than ideal DM content due to weather or other delays, using a quality forage inoculant such as Inoc-U-Lock™, will help retain

Figure 1 IDEAL DM VALUES	
Hay	88-90%
Cornsilage Bunker	35-30%
Cornsilage Bag	40-30%
Cornsilage Upright Concrete Silo	37-32%
Cornsilage Oxygen Limiting Silo	45-40%
Haylage	60-40%
High Moisture Corn	76-67%

See Sources 1 and 2

forage quality and save a minimum of 4% DM loss. If the DM value is too high or too low, poor palatability, reduced DMI and poor livestock performance can result. Proper harvest management is key for DM quality.

pH

The pH value is a measurement of acidity or alkalinity of a substance. The pH of a forage test gives insight into how well the forage has fermented. There are a number of factors that can affect a forage pH value such as ash content, % DM and inoculant use. It can take three weeks or more for silages to reach a pH of < 4 with unassisted fermentation. Some forages may never reach the targeted pH. This can lead to mold, yeast and mycotoxins, loss of dry matter, decreased palatability and loss of feed quality. Using Inoc-U-Lock™ can be a great tool on any fermented feed stuffs. Inoc-U-Lock™ will accelerate the fermentation process in a controlled manner, dropping the pH to insure stability during storage.

Protein

There are several key protein values to consider:

1. Crude Protein: The total protein in a feed, which can indicate plant maturity at harvest.

2. Adjusted Crude Protein: A low Adjusted Crude Protein level can indicate if damage occurred during fermentation from improper heating resulting in a protein loss.

3. Soluble Protein: This protein is readily available to rumen microbes and a key component for good dairy cow nutrition.

Fiber

There are different values on the forage test report that show fiber levels:

1. NDF (Neutral Detergent Fiber): The residue left after boiling forage in a neutral detergent is called NDF. NDF represents the indigestible and slowly digestible components of the cell wall. This includes cellulose, hemicellulose, lignin, and ash. NDF can be further broken down into NDFa, NDFom and dNDF.

2. ADF (Acid Detergent Fiber): ADF measures cellulose, lignin and ash. This measurement is obtained by boiling forage in acid detergent. ADF is the least digestible form of forage.

Protein and fiber values can depend on plant variety, disease/insect management and the timing of harvesting and storage practices. Selecting a plant variety suitable for your area and climate will insure high quality forage.

Protein and fiber are also a reflection of any disease/insect pressure and crop management. Later cuttings will have higher fiber and lower protein readings and earlier cuttings will have lower fiber and higher protein readings. Cutting too late will not only decrease the forage quality but can impact plant recovery. For example, if alfalfa is allowed to flower before cutting, the plant will use up a majority of root reserves to enter its reproductive phase. Using up the root reserves will cause slower plant recovery and re-growth. Using Inoc-U-Lock™ can help insure proper storage and fermentation by retaining an additional 1% or more in protein.

Sugar (WSC)

The two methods used for measuring sugar content in a forage are ESC (Ethanol Soluble Carbs) and WSC (Water Soluble Carbs). WSC is the preferred measurement method because it evaluates all sugars relevant to ruminant digestion including monosaccharides, disaccharides, oligosaccharides, and fructans, whereas, ESC only shows a small fraction of the fructans[3].

Sugar values reflect harvest and storage management. If the sugar is low, the crop may have been rained on after cutting or the fermentation process may not have gone well. If fermentation was too slow or never reached the desired pH, a large amount of the forage sugar will be used up by microbes, resulting in a poorer feed quality.

Ash

The amount of total mineral that remains after all organic matter is burned off when the sample is tested is called ash. High ash content can decrease palatability. Ideally, ash content should be less than 10%. Levels higher than this can indicate an excess of dirt on the forage at harvest. Merging or raking techniques and cutting too low can increase the ash content.

Calcium

Calcium is a key macro mineral that can affect smooth muscle and skeletal muscle functions in cows as well as general body function and production. Calcium values in forages can be an indicator of overall nutrient density of the plant. For example, high calcium uptake in alfalfa can result in higher trace mineral levels, sugar levels, protein, and increase yield/acre.

Calcium in the soil can help with water penetration and plays a vital role in soil structure. Adequate soluble calcium in the soil can support healthy, nutrient dense forages that are excellent feed for livestock. In plants, calcium is essential for plant growth and formation of cell walls. Calcium levels in forages can vary geographically. Western alfalfa often has levels around 1.8 to 2.0%, whereas alfalfa from the Midwest often has calcium levels around 1.0 to 1.2%.

There are many factors and strategies that can be implemented to help provide nutrient dense forages for livestock. Using good agronomy, harvest and storage management practices are crucial to producing valuable feedstuffs. Providing quality feedstuffs to livestock can help improve animal health and overall producer profitability.

Quality forage starts with soil fertility. Soil sampling can help properly manage and maintain a healthy, nutrient rich soil that will yield quality forage. Forage quality can also be manipulated by selecting the best plant varieties for the producer's situation and goals.

When harvesting, producers should make sure crops are not cut too low. Cut for quality not quantity. Minimize dirt being stirred up in the forage when raking or merging. Keeping soil off forages will decrease ash levels and potentially harmful bacteria.

Storage management is important in creating an ideal environment for fermentation. Monitoring dry matter levels and proper packing will result in an improved feed stuff. Using a quality inoculant can help preserve forage quality by retaining up to 4-10% of DM and up to 1% protein.

Taking a deeper look at forage test results can give producers a better understanding of the forage quality and the management of the crop in general. Using these tips can help produce quality forages reducing the need to purchase additional supplements. To learn more about forage testing, call Crystal Creek® at 1-888-376-6777.

[1] Israelsen, Clark, et al. "Harvesting Corn Silage by Plant Moisture". Utah State University Extension. December, 2009.

[2] Gay, Susan W., et al. "Determining Forage Moisture Concentration". Virginia Tech Publications.

[3] *Understanding your results.* Dairyland Laboratories, Inc., Retrieved from: www.dairylandlabs.com/feed-and-forage/understanding-your-results/wsc-water-soluble-carbohydrates.