



What does your Forage or Feed Sample Analysis Mean

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Introduction

The selling, purchasing and use of hay, feed ingredients and agro industrial by products such as distillers' grain is generally based on their nutritive values. If you wish to know the nutrient content of a hay sample, you have to send a composite sample of hay to a feed analysis laboratory. A copy of the analysis results will be sent to you with the Dry Matter, Crude Protein, Total Digestible Nutrient (TDN) Neutral Detergent Fiber (NDF), and Acid Detergent Fiber (ADF) depending on which analysis you requested. Some of these terms may not be fully understood by some. The intent of this fact sheet is to explain what these results mean.

Dry Matter

There is a difference between the terms Dry Matter and Dry Matter Basis. The Dry Matter of a feed ingredient is one hundred percent minus the moisture percent (100% - Moisture %). The Dry Matter Basis is calculated as if the forage has no moisture. The conversion of feed and forage Dry Matter to a Dry Matter Basis allows for the accurate comparison of nutritive values among different feed ingredients. For example, let us assume that we have a hay consisting of 90% Dry Matter and haylage consisting of 40% Dry Matter. In addition, the hay consists of 14% crude protein and the haylage consist of 8% crude protein. The problem is the inability to compare the crude protein content of hay with the haylage because they have different Dry Matter percentages. For us to compare them, we have to calculate the crude protein contents of the hay and haylage on a Dry Matter Basis. To do this we divide each the crude protein percentages of hay and haylage by their respective Dry Matter percentage as shown below.

$$\text{Hay Crude Protein on a Dry Matter Basis} = 14/.90 = 15.5\%$$

$$\text{Haylage Crude Protein on a Dry Matter Basis} = 8/.40 = 20.0\%$$

From this calculation we can now compare the crude protein contents of both ingredients. The haylage has a higher percentage of crude protein than the hay.

Knowing the dry matter of hay is important for selling and buying hay. Generally hay is sold on an air dried basis with 90% Dry Matter. For hay with moisture less than 10% could mean brittleness and excessive leaf loss. Conversely, hay that consists of 14-18% moisture may indicate a possibility of developing mold.

Crude Protein

Crude protein is one of the most requested analysis when feed ingredients are submitted for testing. If the feed ingredient(s) will be used for feeding poultry and swine, then analysis should be done for the essential amino acids such as lysine, methionine and threonine etc. because rations for monogastrics (pigs and chickens) are formulated based of amino acid requirements.

Total Digestible Nutrient (TDN)

TDN is considered as an estimate of the energy content or value of forage. It is used mainly in the balancing of rations for beef cattle. A dry cow needs 52% TDN and a lactating cow needs 60% TDN. It represents the digestible materials in feeds and forages. TDN is important because it is used to estimate the Acid Detergent Fiber value. Feed and forage analysis report energy values as mega calories per pound as well. This is called the Net Energy System.

Neutral Detergent Fiber (NDF)

NDF measures the slowly digestible hemicellulose, cellulose and lignin in plants and feeds. It represents all the structural cell wall materials in plants, and it is responsible for the rigidity and physical support in plants. NDF has been traditionally used to predict forage intake by ruminants. The voluntary intake by ruminants is reduced as the NDF increases in plants and forages. Cattle voluntary intake tends to decline when the NDF percent in the total diet Dry Matter is increased above 35%. On the contrary, as the total diet NDF level declines below 27%, the tendency to stomach upset increases. Legumes in general, tend to have a low NDF value than those for grasses. Additionally as plants and forages mature, the NDF values increase.

Acid Detergent Fiber (ADF)

ADF is a sub fraction of NDF, and it consists mainly of cellulose and lignin. The ADF content of feed ingredients vary from 3% in corn to 50% in warm season grasses. In general, as ADF value increases, forage digestibility is reduced. It is used to predict the energy content of forages.