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FORAGE AND FEED ANALYSIS INTERPRETATION

Forage and feed testing involves determining nutrient levels in forages and feeds and is one of the most effective feed and forage management tools to develop strategic supplemental feeding approaches for livestock or equine diet.

The Colorado State University Soil, Water, and Plant Testing Laboratory (SWPTL) provides producers with a detailed forage analysis that includes important nutritional components such as dry matter (moisture), total digestible nutrients, crude protein, fiber, nitrate-nitrogen, relative forage quality, and mineral concentration.
This guide provides definitions of these terms to help you start interpreting a forage analysis report. A more detailed interpretation and assistance with balancing rations can be obtained by contacting your Animal Science Extension agent in your local CSU Extension Office.
Dry Matter (DM) - the percentage of feed that is not water. Most nutrient requirements are on a DM basis.

Crude Protein (CP) - includes true protein and nonprotein nitrogen. It is a calculated value of % N x 6.25.
Neutral Detergent Fiber (NDF) is the hemicellulose, cellulose, and lignin content of a feed. The higher the value, the more structural carbohydrate and typically the less digestible.
Acid Detergent Fiber (ADF) include cellulose and lignin. The higher the value, the lower the digestibility and the lower energy available to the animal.

Total Digestible Nutrients (TDN) is an estimate of the energy content of the feed. It is calculated by a formula that uses ADF, NDF, CP, and ash. Typically, the greater the value the more energy-dense the feed stuff is considered. If NDF is not assayed, TDN is estimated using ADF values.

$$\%TDN = 87.84 - (\%ADF \times 0.7)$$

Net Energy – accounts for energy losses from digestion of different feeds, for which the TDN does not account. The Net Energy system allows for partitioning of nutrients based on stage of production. It allows for energy to go towards maintenance **(NEm)**, or production, lactation **(NEl)** or gain **(NEg)**
Ash represents the total mineral content present in the feed. However, ash values do not tell any about the kind of minerals present in the feed. Ash typically ranges from 3 to 12% on a dry matter basis. Grain and concentration diets usually range between 1 to 4% ash. Excessive amounts of ash indicate soil contamination.

Relative Feed Value (RFV) - a measure of the overall nutrient value of the forage.

$$RFV = (\%\text{ Digestible Dry Matter} \times \%\text{ Dry Matter Intake})/100$$

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Digestible Dry Matter (DDM) is the percentage of a forage sample that is digestible. It is an estimate based on the results from animal feeding trials and forage ADF

DDM= 88.9 - (ADF % X 0.779)

Dry Matter Intake (DMI) is the amount of forage and feed consume in a day. It is an estimate or prediction based on results from animal feed trials, producer measurements/experience or measurement of NDF concentration of a forage.

% DMI = 120 / % NDF

Relative Forage Quality (RFQ) is similar to RFV but used TDN in place of DDM in calculations. Because RFQ calculation include digestible fiber, this index is expected to be more representative of animal performance on the forage tested. Higher RFV and RFQ values indicate higher forage quality.

RFQ = TDN x DM /100

Minerals

The most common minerals analyzed for forage analysis include the macro minerals calcium, phosphorus, potassium, magnesium, and sulfur. Trace minerals, such as zinc, copper, iron, and manganese, among others, are typically not analyzed in a standard forage test and must be requested specifically for an additional cost. Trace mineral values are expressed in parts per million (ppm) and macro minerals are expressed as a percentage.

Knowing forage quality based on nutrient contribution to animal diets is critical to planning an accurate and efficient nutritional program. Feeding low quality forage limits forage intake and results in poor animal performance.