



Take Control of Your Nutrition

For every farming operation, improved efficiencies are essential for cutting costs, increasing profitability, and saving time. A major opportunity that can address all of these concerns starts with developing a proper ration for the animals. For dairy producing cattle in particular, testing forages is essential to keep the cattle producing at the highest possible level. With frequent testing, the cattle can be kept from being overfed/underfed and thus underproducing. The following is a guide for interpreting the data provided on our lab reports.

Acetic Acid

Acetic Acid is a volatile fatty acid (VFA) that becomes more prominent in extremely wet silages, silages with prolonged fermentation, or loosely packed silages.

Acid Detergent Fiber (ADF)

The ADF of a forage is the portion comprised of lignin and cellulose and is related to the digestibility of a forage. As lignin content increases, the digestibility of cellulose decreases. Typically, lower ADF values are optimal meaning that more cellulose is available to be digested.

Acid Detergent Fiber Lignin (ADL)

ADL is the lignin portion of ADF

Acid Detergent Insoluble Protein (ADP or ADICP)

ADP is the portion of Crude Protein (CP) that is bound to the Acid Detergent Fiber (ADF) or insoluble fiber fraction. This value represents heat damaged protein because excessive heating has occurred making it unavailable to both microbes and the animal.

ADFN

ADFN stands for Acid Detergent Fiber bound Nitrogen. During ensiling, if the conditions are too aerobic, nitrogen (N) can become bound to the ADF because of the Maillard reaction (heat damage). A level above 10% indicates some level of damage has occurred.

As Fed and Dry Matter Basis:

As fed refers to the actual amount of a feed or nutrient fed and includes the moisture present in the feed, whereas dry matter basis refers to the quantity of feed after removal of the water. All nutrients in forages are contained in its dry matter and animals consume feeds to meet their dry matter requirements. High moisture content in feeds means the animal has to consume more feed to receive the same amount of dry matter as it would from a drier feed. For instance, when an animal consumes 5 kg hay at 90% DM, it consumes 4.5 kg DM. But if the animal consumes haylage at 40%, it would have to consume 12.5 kg to get the same amount of DM ($5 \text{ kg}/0.4 = 12.5 \text{ kg}$).

Ash

Ash is the inorganic residue of mineral elements that would be left after burning the sample at a very high temperature

Crude Fat

This is the total fat content comprised of oils, fats, and other compounds soluble in ether. Fats are considered high energy and can be added to rations to increase energy concentration when intake is limited.

Crude Fiber (CF)

Most nutritionists no longer use crude fiber for the purpose of ration balancing because it doesn't consistently relate to the digestibility and intake of feeds. ADF and NDF have replaced CF. Crude Fiber contains all of the cellulose in a feed or forage but only part of the hemicellulose and lignin, depending on the type of feed or forage and its maturity.

Crude Protein or Protein (CP)

Is the total nitrogen content of the feed (true protein and non-protein nitrogen) multiplied by 6.25. This is based on the assumption that true protein contains 16% nitrogen. Grains generally have a CP content of 8 to 14 percent, with corn often being at the 7 to 9 percent range and wheat and oats in the 10 to 14 percent range. The CP is used by rumen bacteria for digesting forage and concentrates in the diet. In addition to the rumen microbes (source of protein for the cow), high-performing animals, especially milking dairy cows, need larger amounts of protein to be absorbed from the intestines (by pass protein or UIP).

Degradation Fractions

A Fraction

Rapidly degradable portion of the protein fraction. The A fraction consist of the N (nitrogen), amino acids, and protein that is available in the gut to support microbial synthesis. This fraction will be lower when the forage fermentation process is slow since the microbes fermenting it will use part of this protein fraction.

B Fraction

Unavailable protein fraction. It is associated with structural support of the plant. A lower B fraction is desired. Excessive heating in storage can cause a higher B fraction. Lignification will also cause higher B fraction values in mature forages.

D Fraction

Represents carbohydrates that are quickly degraded in the gut. Simple sugars included in this fraction are used by microbial fermenters while ensiled.

E Fraction

Represents carbohydrates that are intermediately degraded at a rate represented by K8. This fraction is only present in corn and small grain silages and is mainly influenced by the amount of grain in the forage.

EW Fraction

Represents the percent of the E fraction that is washed out of nylon bags during analysis as a function of particle size and solubility. The EW fraction is more readily fermented than the E fraction and is heavily influenced by the amount of processing the forage has endured.

G Fraction

Represents unavailable fiber or indigestible portion of the forage. The lower the G fraction, the more energy there is available to the animal. Maturity, sun light, rainfall, and temperature greatly impact this fraction.

K2

Rate of degradation of the escape protein fraction (<3= good quality, >6= poor)

K8

Rate of the degradation of the E fraction

K9

Rate of the degradation of the F fraction (>2.4= good quality, <1.8 poor)

Insoluble Fiber (IF)

Insoluble Fiber is a more accurate description of fiber in forages because it has been corrected for organic matter.

IVTDMD30

IVTDMD30 is short for in vitro true dry matter digestibility at 30 hours. This is expressed as a percentage and is determined by incubating a ground feed sample with rumen fluid in a beaker or test tube for 30 hours followed either by addition of acid and pepsin and further incubation for 24 hours or by boiling in neutral detergent fiber solution.

Lactic Acid

Lactic Acid is a volatile fatty acid (VFA) produced during the fermenting process. It should be the primary acid in good silage.

Lignin

Lignin is the indigestible portion of cell walls. It is a main factor in influencing digestibility and has no energy value for animals. Low levels are desirable to keep digestibility, intake, and performance optimal.

Minerals and their functions

Calcium (Ca) – Bone formation, muscle contraction/nerve impulses

Chloride (Cl) – Osmotic cell pressure regulation

Copper (Cu) – Hemoglobin synthesis and coenzyme functionality

Iron (Fe) – Hemoglobin and oxygen transport in blood. Used in enzymes

Magnesium (Mg) – enzyme activator, neuromuscular signals, bones

Manganese (Mn) – bones, growth, fertility, and enzymes

Phosphorus (P) – bones, key in metabolic functions and milk

Potassium (K) – Osmotic pressure regulation, nerve impulse conduction, and enzymes

Sodium (Na) – Muscle Contraction, osmotic pressure regulation, glucose uptake

Sulfur (S) – Microbial protein synthesis

Zinc (Zn) – Enzyme activation, wound healing, skin health

Moisture

Is the percent of water present in a sample (inverse of dry matter)

NDFD30

NDFD is short for Neutral detergent fiber digestibility at 30 hours and is the in vitro digestible fraction of NDF expressed as a percentage of the NDF content of a feed sample.

NDFOM

This value represents a more comprehensive fiber value than ADF alone. It includes hemicellulose, cellulose, and lignin in the sample. This value is organic matter corrected because the ASH value is taken into consideration as contamination.

Net Energy Lactation

Is used in the formulation of rations for dairy cattle. NEL estimates the energy available from the feed for the cattle's regular requirements plus milk production

Neutral Detergent Fiber (NDF)

NDF is a measure of insoluble fiber. It includes all of the cell wall carbohydrates including cellulose, hemicellulose, and lignin. NDF levels are used to predict forage intake. High NDF levels decrease intake and can limit the forage value.

Neutral Detergent Insoluble Protein (NDP or NDICP)

is the portion of CP that is bound to the Neutral Detergent Fiber (NDF) fraction. These proteins are not all indigestible, similar to ADP, but are considered to degrade more slowly in the gut.

Non Fiber Carbohydrates (NFC)

Are the readily available carbohydrates in the form of organic acids, sugars, starches, and soluble fiber. These can be rapidly and easily digested by the animal and are considered a readily available energy source. NFC (non-fiber carbohydrates) is a calculated value based on other measurable parameters

Non Structural Carbohydrates (NSC)

Is very similar to NFC but NSC is a measured value rather than calculated.

Potential Digestibility (PD)

PD measures the availability of carbohydrates. PD is inversely related to IF. As PD increases, IF decreases and vice versa. Less than 70% can be considered low quality while above 80% is excellent quality.

Simple Sugars (ESC)

Simple Sugars are ethanol soluble carbohydrates (mainly monosaccharides and disaccharides)

Soluble Carbohydrates (WSC)

These are the carbohydrates that are water soluble. These include simple sugars, oligosaccharides, polysaccharides, and fructans.

Soluble Protein

Is the soluble fraction of protein that is available to be absorbed by the animal.

Starch

Starch is a polysaccharide which is a polymeric chain of glucose molecules. Depending on the source, the starch maybe very compact/linked together and be slowly fermented in the gut or it may be weakly bonded together and be digested rapidly. Most of the non structural carbohydrate fraction is made up of starch.