

# CFA Report Terms



This list and definitions is meant to define in a basic way each of the items on a typical CFA Laboratories feed analysis Report.

**Dry Matter** – The inverse of Moisture. This represents the fraction of the sample that is not water and is measured by loss on drying by various methods depending on the feed type and analysis requested.

**ADF** – Acid Detergent Fiber. This fiber fraction is generally defined as the portion of the sample consisting of cellulose and lignin. ADF is an important part of the RFV calculation and early ration balancing programs used ADF to directly calculate energy values. Generally samples with lower amounts of ADF are considered higher quality.

**aNDF (w/Na<sub>2</sub>SO<sub>3</sub>)** – Neutral Detergent Fiber measured with amylase and sodium sulphite is generally defined as the portion of a sample consisting of hemicellulose, cellulose and lignin. aNDF is a key nutritional component that is important to RFV, RFQ and nearly all of the modern energy calculations. The additions of amylase and sodium sulphite are adaptations to correct for starch and protein contamination in the original NDF method. Generally samples with lower amounts of NDF are considered higher quality.

**aNDFom (w/Na<sub>2</sub>SO<sub>3</sub>)** – Since silica is not soluble in Neutral Detergent, soil contamination in feed samples can result in artificially high aNDF values. aNDFom is measured the same as aNDF (w/Na<sub>2</sub>SO<sub>3</sub>) with the exception that it has been corrected for as contamination. “om” is the designation for the organic matter basis.

**Lignin (Sulfuric Acid)** – Lignin is considered to be indigestible, therefore high lignin values are associated with poor quality feed. Lignin is used to define fiber digestibility in many energy calculations but is rapidly being replaced by direct measurements of fiber digestibility like NDFD and uNDF.

**Lignin % NDF** – A calculated value that expresses lignin as a percentage of the NDF. This was one of the early ways of evaluating fiber digestibility.

**AD-ICP** – Acid Detergent Insoluble Crude Protein is the amount of protein



Bound in the ADF fraction. This fraction is considered to be indigestible.  
High AD-ICP values are typically found in heat damaged samples.

**ND-ICP** – Neutral Detergent Insoluble Crude Protein is the amount of protein bound in the NDF fraction. This fraction is partially digestible. ND-ICP is important in some ration balancing models to define protein digestion parameters.

**Protein Sol.** – Protein Solubility is the amount of protein that is soluble in a buffer borate solution. Generally, samples with high protein solubility are thought to be more rapidly degraded in the rumen.

**Starch** – A direct measurement of the starch content in a feedstuff, this measure has a high inverse correlation to NDF with a feed type. For example, corn silage high in starch will also be low in NDF.

**IVSD7** – In vitro starch digestibility at 7 hours is a measurement used to indicate the relative digestibility of starch in a sample. This measurement can be used to detect changes in starch digestion over time.

**Fat (EE)** – Ether Extract fat is a crude measurement of fat in a sample. This is less expensive and less accurate measure than total fatty acids.

**Total Fatty Acids (TFA)** – A sum of all the fatty acids in a sample. This is a very accurate measure of the amount of fat in a sample and has replaced Ether Extract in most energy calculations.

**Ash** – A measurement of all the inorganic material in a sample including minerals and soil contamination. A certain amount of ash is normal in all samples but elevated levels indicate soil contamination. Ash has zero energy value and has a negative impact on quality.

**Sugar (ESC)** – Ethanol Soluble Carbohydrates is one way to measure sugar in feed samples. Most forages have elevated levels of sugar when they are freshly harvested and much of this sugar is consumed during fermentation of ensiled feeds.

**Sugar (WSC)** – Water Soluble Carbohydrates is another way to measure sugar in feed samples. Many ration programs prefer WSC to ESC, because it includes some fructans that are missed in ESC samples.

**Lactic Acid** – Produced during the fermentation process of ensiled feeds,



high levels of lactic acids are associated with high quality fermentations.

**Acetic Acid** – Produced during ensiling, elevated levels of acetic acid is an indication of poor fermentation in naturally fermented feeds. The exception to this is feeds inoculated with *L.Buchneri*, in which case elevated levels of acetic acid can still be considered high fermentations.

**Butyric Acid** – Only produced during poor fermentations, Butyric acid is typically found in wet or rained on hay.

**Ammonia – CP** – Some ammonia is found in most ensiled feeds. In ensiled high moisture corn ammonia is a good marker of starch digestibility.

## **Fiber Digestibility**

All Fiber digestibility analyses at CFA Laboratories are measured using methods derived from the Goering and Van Soest technique under the supervision of Dr. David Mertens.

**NDFD 12, 24, 30 OR 48** – NDF Digestibility is calculated from the relationship between aNDFom and uNDFom. Various ration balancing programs utilize any one of these time points or combinations of them. The time point that is appropriate will depend upon the program being utilized.

**uNDFom 12, 24, 30, 48, 72, 96, 120 or 240** – Since silica is not soluble in Neutral Detergent, soil contamination in feed samples can result in artificially high uNDF values. uNDFom is measured the same as uNDF, with the exception that it has been ash corrected. “om” is the designation for organic matter basis. The appropriate analysis time point is dependent on the feed type being analysed and the ration program it is used in.

## **Calculations**

**Lactic: Acetic ratio** – The ratio of lactic to acetic acid is one indication of the quality of a fermentation. Generally ratios above 2:1 represent quality fermentations. Lower ratios may be acceptable for feeds inoculated with *L.Buchneri*.

**Adjusted Crude Protein** – This calculation adjusts the crude protein value if the AD – ICP value is above normal for a feed type.

**NFC** – Non Fener Carbohydrates is a calculated value that represents the amount of sugar, starch, soluble fiber, and volatile fatty acids in a sample.

**ADF – TDN 1x, Neg, Nem, Nel** – These are all ADF based measurements



of energy. Used in early ration balancing programs these have generally been replaced by energy calculations that take into account variations in protein, fiber, fat and ash.

**OARDC – TDN 1x, Neg, Nem, Nel** – These energy calculations developed by the Ohio Agricultural Research and Development Centre use a summative approach that accounts for variation in protein, fiber, fat and ash.

**MLK06 – TDN 1x, Neg, Nem, Nel** – These energy calculations were developed by the University of Wisconsin and are a modification of the OARDC calculations that include adjustments for NDFD and moisture content of corn silage.

**MLK13 – TDN 1x, Neg, Nem, Nel** – These energy calculations were developed by the University of Wisconsin and are a modification of the OARDC calculations that include adjustments for NDFD of hay, haylage and small grain silage.

**Milk per ton MLK06, MLK13** – This index of feed energy is derived from the TDN 1x values of Milk 2006.

**RFV** – Relative Feed Value is an index for comparing various hay and haylage samples derived from the ADF and NDF values in a feed sample.

**RFQ** – Relative Forage Quality is an index similar to RFV that also includes adjustment for NDF digestibility.

**Kd rate (Van Amburgh)** – The rate of digestion of NDF in a sample as calculated using a single NDFD time point and lignin.

**Kd rate (MIR)** – the rate of digestion of NDF in a sample as calculated using multiple NDFD time points and uNDF240.