Understanding your feed test

Dry matter/ moisture

Dry matter and moisture go hand in hand; these add to 100%.Moisture levels within feed sources such as hay, silage and pasture can vary greatly due to the variety and time of cutting. Feed sources such as grains, protein meals and legumes are much more consistent.

Proteins –Throughout time protein has been used as the first parameter to indicate feed quality. This is due to the protein level within the plant declining as the tissues within the plant mature increasing the fibre content resulting in an overall decline of nutrient value. Although this can be a basic indicator of the feed quality; more protein does not always mean quality, the type of protein is much more important.

- ***Crude Protein-*** *Traditionally crude protein has been the quoted value for protein**.*** *Although it gives us an idea of the protein content it does not give us an understanding of how it digests. Crude protein calculation -Nitrogen content (%) X 6.25 = Crude protein %*
- ***Soluble Protein—****Within the proportion of protein which is rumen degradable there are proteins which break down fast and some which break down slowly. Soluble protein is the proportion which breaks down fast, it is normally made up of true protein sources such as canola meal and non protein nitrogen sources.*
- ***Ammonia—****is a non protein nitrogen source it isw often a result of poorly fermented silages. High levels of ammonia is not desirable and can have negative effects on cow health and performance within silage sources we want no more than 1% of ammonia less is best. High ammonia levels is often a result of silage or wet feed source spoilage.*
- ***ADF Protein Acid Detergent Insoluble Crude Protein (ADICP) -*** *is an indicator of the protein which is unavailable to the animal even though it is included with the crude protein percentage. It is a good idea to remove the ADCIP from the crude protein to know how much protein is available for the animal.*
- ***NDF Protein Neutral Detergent Insoluble Crude Protein (NDICP)*** *this is the proportion of protein hel;d up within the fibre of the feed source. Some of this protein will be available to the animal some of it will not.*

Rumen Degradable Protein (RDP)- *Crude protein is made up of two protein sources , protein which will degrade within the rumen (RDP) and the protein which will escape the rumen or bypass the rumen known as Rumen Undegradable Protein (RUP). This number can be quoted by either % of DM or % of Crude protein . Crude protein—RDP = RUP*

Fibre— The amount of fibre increases within a plant as it gains maturity and ages. Throughout this process the simple sugars and carbohydrates convert from a highly digestible feed source into a less digestible feed souce. This is due to the change in structure as the plant matures the cell wall thickens overall providing less nutritive value to the animal. Less fibre within a sample results in a better nutrient content.

- ***Acid Detergent Fibre (ADF)*** *this it the proportion of fibre which is less digestible, such as lignin and cellulose.*
- ***aNDF Neutral Detergent Fibre*** *this is the measure of the total fibre within the feed source. It consists of both digestible and indigestible fibre components.*
- ***NDF—****is the component of Organic matter. It is extremely similar to aNDF and is used as a guide to how much ash, soil contamination within hay and silage.*
- ***Lignin—****is the indigestible proportion of both the NDF and the ADF. Lignin has no nutritional value for the animals when in large volumes it binds up within the rumen restricting the uptake of nutrients.*
- ***NDF Digestibility (NDF– D)*** *this is a prediction of the proportion of fibre particularly NDF which will be digested throughout the time period of 12/24/30/48/240 hours. The longer the feed remains within the rumen the greater the digestibility. Most nutritionist focus on the 24-30 hour mark for realistic digestibility outcome.*
- ***uNDF Indigestibility NDF—****indigestible fibre measured at 30/240 hour mark*

Carbohydrates—These are non fibre components of carbohydrates, normally quite simple carbs found within young plant tissue.

- ***Silage Acids—****is the proportion of carbohydrates which are not fibre, but have already been used within the fermented to acids through the ensile process; they cannot contribute to the fermentation within the rumen for energy or to grow microbial population. High silage acids can still be a positive as it indicates a good silage fermentation process; lower levels can be an indication of an incomplete ensile process or in some cases that the silage has gone rank. A silage acid reading of 5% reflects a good fermentation has occurred.*
- ***Ethanol Soluble Carbohydrate (sugar) ESC –****Simple sugars capturing monosaccharides. Disaccharides, oligosaccharides and some of the fructans.*
- ***Water Soluble Carbohydrates-*** *similar to the ESC this is a measure of sugars but captures more of the fructans within the feed compared to ESC.*

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- ***Starch–*** *is a carbohydrate which is found within cells of a plant especially within seed or as root tubers. It is made up of sugars which are linked together in a complex chain.*
- ***Soluble Fibre—****Soluble fibre which will ferment readily to VFA in the rumen and support microbial growth, but is poorly digested within the intestines.*
- ***Starch Dig*** *is measured over 7 hours with the feed at a 4mm grind. This measurement is not offered unless the starch content is high enough.*
- ***Fatty Acid total–*** *These are true fats, highly digestible and provide a good energy source for animals. They typically provide twice the energy to the animal as carbohydrates or proteins once they are absorbed.*
- ***Fatty Acid as % of total fat–*** *provides a guide to the proportion of the crude fat that is digestible fatty acids; more is better.*
- ***Crude Fat –****this is measured by ether extract, it contains an array of lipids most will be true fats which are highly digestible but some will contain waxes which are not digestible.*

Minerals—for accuracy of the mineral levels within a feed source *Wet Chem testing is the preferred testing method for accuracy of these elements.*

- ***Ash—****is the pure inorganic residue from burning the sample at an extremely high temperature for a long period of time to remove all of the organic material.*
- ***Macro Minerals—****include Calcium, phosphorous, magnesium, potassium, sulphur, sodium and chloride. These are the minerals required by the animals in large amounts.*
- ***Micro or Trace Minerals—****these are displayed as parts per million (ppm). The animals requirements are much smaller for these elements but they play a large role in the metabolic process.*

Qualitative—these are specific to silage or other feed sources which have undergone the fermentation process. These feeds are fermented in order to preserve them. Throughout the fermentation process the sugars within the plant are converted to organic acids in order to preserve the plant the numbers on the following acids give an indication as to how successful the fermentation process has been.

- ***Total Volatile Fatty Acids (VFA)-*** *is a measure of the total organic acids known as Volatile Fatty Acids (VFA) within silage. This is normally a similar number to the "silage acids "number displayed within carbohydrates section of the feed test. There should be a minimum of 5% VFA in silage to ensure a good fermentation process has occurred.*

- ***Lactic Acid –****is the preferred acid within silage. It produces a sweet tangy aroma which we associate with good quality silage. Good levels of lactic acid indicate a good ensile process has occurred with little spoilage. Lactic acid is the main driver behind Volatile Fatty Acid (VFA) production.*
- ***Acetic Acid*** *lower levels of acetic acid is preferred 1-2 % within the test as it reduces the palatability of the feed, it produces the vinegar smell. Small levels of acetic acid help to improve the aerobic stability of the silage, assisting with the shelf life of the silage once exposed to air.*
- ***Butyric Acid—*** *is the key driver behind the growth of spoilage organisms within silage especially when air is not removed during the ensiling process. Butyrate creates the vomit like smell silage can have; making the silage extremely unpalatable it is also a good indicator of other potential issues such as moulds and toxins. Extremely low levels of Butyrate are bearable no more than 0.2% of Dry matter.*

Energy and Index Calculations—a bigger number indicates a better feed.

- ***pH–*** *Australian Silage once fully fermented pasture silage or maize silage have a pH level of 4.0-5.0 less fermented pasture silage or legume silage range between 5-5.7. Higher dry matter products such as haylage range from 5.7+. Numbers above 7 are alkaline, numbers under 7 are acidic. Silage and fermented products should be acidic.*
- ***Total Digestible Nutrients TDN—****This is an energy predictor it is simple and inaccurate based off ADF values.*
- ***Metabolisable Energy—****ME= Gross Energy—Energy lost in Faeces– Energy lost in urine– energy lost in gasses majority of the world runs on Net energy Australia and New Zealand use metabolisable energy. This doesn't not account for the energy lost in the heat generated through fermentation. Metaboilisable energy will always bit a larger number than Net energy due to the heat increment differential.*
- ***Net Energy NE—****is the best indicator of the amount of energy actually available to the animal for maintenance, growth and milk production.*
- ***NDF Dig Rate (kd, %/Hr)*** *this is the predicted break down rate of NDF per hour. Less lignified or young the feed source is the plant tissue breaks down faster. The more mature lignified the slower the rate of breakdown occurs.*

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- ***Starch Dig Rate (Kd, % Hr) -*** *This describes the rate in which the starch component breakdown. Simple Starch sources breakdown much faster. A high rate of break-down will result in more energy released within the rumen and potentially block post ingestion; this can have a large impact on rumen stability. A slow rate of starch breakdown paired with a fast rumen throughput will result in more starch escaping the rumen and not being able to be utilised.*
- ***Non Fibre Carbohydrate NFC—*** *this is a calculation to identify the more readily available carbohydrates which are not fibrous within the sample. NFC= 100% -(CP% +(NDF% -NDICP%) Crude Fat % + Ash %)*
- ***Non- Structural Carbohydrates NSC***
- ***Relative Feed Value—****this is an index rating tool based off full bloom Lucerne crop with feed values of ADF = 41% and NDF 53 % RFV = 100. All other feed sources are ranked according to their relative merit. RVF = DDM (% of DM) X DMI (% BW) / 1.29**. This calculation only uses ADF as an indication of digestible dry matter (DDM); due to this limitation relative feed quality (RFQ) has superseded RFV*
- ***Relative Feed Quality—*** *RFQ is the updated calculation of RFV using TDN as a re-placement of DDM. It also takes into account protein, fibre digestibility and fat con-tent. RFQ= DMI (% of BW) X (TDN (% of DM) /1.23*

Speak with your Nutritionist today to organise a feed test or to review your feed test results

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