

FeedRight glossary

α-lactoalbumin	A whey protein that is synthesised in the mammary gland . It is essential for the synthesis of lactose (from glucose).
Abomasum	The forth or 'true stomach' of the ruminant. It contains gastric glands and secretes digestive enzymes.
Acetate (acetic acid)	One of the three main volatile fatty acids produced during carbohydrate fermentation. Acetate is produced by the rumen microbes that ferment structural carbohydrates and provides the building blocks for synthesis of short and medium chained fatty acids in the mammary gland.
Acid Detergent Fibre (ADF)	Acid Detergent Fibre (ADF) = cellulose + lignin A measurement of the less digestible or indigestible parts of the fibre that remain after treating the plant with acidic detergent. The higher the ADF, the lower the digestibility of the fibre fraction of the plant.
Acidosis	A metabolic disorder of the rumen. Acidosis is said to occur when the pH of the rumen falls to less than 5.5. Normal rumen pH is 5.8 to 7.0 depending on the diet.
Adipose tissue	Connective tissue comprised mainly of fat cells (adipocytes).
Amino acids	The building blocks for proteins; a cow requires 22 different amino acids for normal metabolic function.
Ammonia	A compound formed from nitrogen and hydrogen with the formula NH_3 . Ammonia is a key metabolite in rumen nitrogen metabolism.
β-hydroxybutyrate (BHBA)	A ketone body that can be used by most tissues as an energy source. BHBA is produced when the cow is in a state of severe negative energy balance; however, it can also arise from the conversion of butyrate in the rumen wall.
β-lactoglobulin	A whey protein synthesised in the mammary gland. It is involved in curd formation during cheese making.
β-oxidation	The process in the liver, where free fatty acids are oxidised to provide energy for the cow.
Biohydrogenation	The process in which hydrogen ions are added to the carbons of fatty acids that contain a double bond. The addition of hydrogen ions causes the double bond to become a single bond and the fatty acid becomes more saturated. Unsaturated free fatty acids that are completely biohydrogenated become saturated fatty acids.
Buffering agent	A substance, that when eaten, prevents an increase in acidity and maintains rumen pH levels.
Butyrate (butyric acid)	One of the three main volatile fatty acids produced during carbohydrate fermentation. Butyrate is produced by the rumen microbes that ferment sugar. Butyrate provides a small proportion of the building blocks for synthesis of short and medium chained fatty acids in the mammary gland and can be converted to BHBA in the rumen wall.

By-pass protein	Also known as undegradable dietary protein (UDP). By-pass protein passes through the rumen unaltered.
Carbohydrates	Compounds made up of sugar molecules (units) and are the major source of energy for grazing cows. There are two main types of carbohydrates: structural carbohydrates (cellulose and hemicellulose) and non-structural carbohydrates (soluble sugars and starches).
Casein	A family of phosphoproteins that account for approximately 90% of the protein in cow's milk.
Cellulose	A structural carbohydrate and component of the cell wall of green plants. Cellulose is a polysaccharide consisting of a linear chain of several hundred to many thousands glucose units.
Conjugated linoleic acid (<i>cis-9, trans-11</i>)	An unsaturated fatty acid secreted in cow's milk that contains positive biological properties for humans. It arises from incomplete biohydrogenation of dietary fatty acids such as linoleic or linolenic acids.
Conjugated linoleic acid (<i>trans-10, cis-12</i>)	An unsaturated fatty acid that can reduce the synthesis of milk fat in the mammary gland. It arises from incomplete biohydrogenation of dietary unsaturated fatty acids such as linoleic or linolenic acids.
Colostrum	The first milk secreted by the cow after calving that is rich in antibodies. A cow is usually in the 'colostrum mob' or termed a 'colostrum cow' for 4 days after calving.
Crude protein (CP)	An estimate of plant protein based on the nitrogen content of the feed. Crude protein (CP) = N x 6.25. It includes rumen degradable protein, undegradable dietary protein, and non-protein nitrogen.
Dehydrocholesterol	Sterol produced by animals that can be converted to vitamin D.
de novo synthesis	The synthesis of complex molecules within the body. For example: production of milk fatty acids from acetate in the mammary gland, as opposed to uptake of fatty acids from the diet.
Dietary cation anion difference (DCAD)	The difference between the amount of cations (positively charged minerals) and the amount of anions (negatively charged minerals) in the diet.
Dietary lipids	Generally in the form of triglycerides. Triglycerides consist of a glycerol backbone joined to 3 fatty acids. These fatty acids can be saturated (no double bonds between the carbons) or unsaturated (one or more double bonds between two carbons).
Digestibility	Not a direct measure of energy but can be used to indicate feed quality. If the feed is highly digestible, this usually means that there is more energy available to the cow for metabolic activities. Digestibility can be expressed as a % DM (e.g. what percentage of the feed eaten will be available for digestion by the animal).
Digestible energy (DE)	The energy from food which is available for digestion and is not excreted by the cow.
Dry matter (DM)	The proportion of feed remaining when all of the water has been removed. The dry matter (DM) contains all of the nutrients: energy, protein, fibre, vitamins, and minerals. The amount of DM in a feed is expressed as a percentage of the wet weight (e.g. 20% DM).
Duodenum	The first of three parts of the 40m-long small intestine.
Early lactation	In this resource, the early lactation period begins when the cows enter the milking herd and includes the mating period.

Effective Fibre (eNDF)	Effective Neutral Detergent Fibre (eNDF) = hemicellulose + cellulose + lignin A measurement of the NDF that is most effective at stimulating rumination and saliva production, and generally relates to the chop length or particle size of the fibre.
Energy	There are four main types of energy: gross, digestible, metabolisable and net energy. Energy in the diet is derived from carbohydrates, fats, and proteins (if in excess of requirements) and is generally measured in megajoules (MJ) or megacalories (Mcal).
Enzymes	Substances that cause a chemical reaction to occur without changing themselves.
Ergosterol	A sterol found in the cell membrane of fungi and protozoa that can be converted to Vitamin D.
Fat soluble vitamins	Can be stored in large volumes in body fat but providing too much can result in toxicity. Vitamins in this group are A, D, E, and K. Vitamin K can be synthesised by rumen microbes, so only A, D, and E must be supplied by the diet.
Fats/Lipids	Compounds that are insoluble in water. Fats/lipids are important for optimal cell function and provide a source and storage of energy (body fat). On a weight basis, fats contain twice the energy content of carbohydrates.
Fatty liver	A metabolic disorder that occurs when triglycerides accumulate in the liver to more than 5mg/100mg liver tissue. This reduces the liver's ability to produce glucose and detoxify ammonia, and contributes to the risk of ketosis and liver dysfunction.
Fibre	The structural component of carbohydrates. Fibre describes the material that forms the structure of the plant and is found in the cell wall. It consists of the structural carbohydrates (cellulose and hemicellulose) and also includes lignin.
Free fatty acids	Fatty acids that have been hydrolysed from the glycerol backbone. This occurs in the rumen following the digestion of triglycerides (3 fatty acids and a glycerol backbone) and in circulation prior to uptake into various tissues. Also see non esterified fatty acids (NEFA).
Gluconeogenesis	The process of converting propionate to glucose in the liver. This is an important process in the dairy cow as ruminants do not absorb sugars straight from the digestion system, but rather have to synthesise the large quantities of glucose needed for milk production (and tissue function) in the liver.
Gross energy (GE)	The total amount of energy in the food. Not all gross energy is available for use by the animal as some is not digestible and is excreted in the faeces.
Hemicellulose	A structural carbohydrate found in the plant cell wall. Sugar molecules (units) are joined via β linkages, and are then folded around on each other to form a complex structure. Hemicellulose provides structural support for the plant.
Hormones	Substances that move around the body and stimulate tissues or cells into action.
Hydrogenated	The chemical reaction between hydrogen and another compound or element (e.g. carbon). For example: the process of converting an unsaturated fatty acid to a saturated fatty acid in the rumen involves the addition of a hydrogen molecule to a carbon molecule and is termed biohydrogenation.
Hydrolysis	The chemical process in which a molecule of water reacts with a substance to cause that substance to break apart. For example: when water reacts with a triglyceride, the fatty acids are split from the glycerol backbone.
Ileum	The third of three parts of the 40m-long small intestine. The ileum's main function is absorption of vitamin B12, bile salts and whatever nutrients were not absorbed by the jejunum.

Jejunum	The second of three parts of the 40m-long small intestine. The lining of the jejunum is specialised for the absorption of proteins.
Ketone bodies	Compounds produced by the liver from fatty acids during periods of negative energy balance. Ketone bodies include acetoacetate, beta-hydroxybutyrate (BHBA), and their breakdown product, acetone.
Ketogenesis	The biochemical process where ketone bodies are produced from the break down of fatty acids.
Ketosis	A metabolic disease that occurs when the cow is in a state of severe negative energy balance and there is excess production of ketone bodies. Ketosis can be either clinical or sub-clinical.
Lactate (lactic acid)	A short-chained fatty acid that is produced during microbial fermentation in the rumen. Normally, only a small amount of lactic acid is produced in the rumen and acts as a precursor for glucose synthesis in the liver. However, if there is a lot of starch in the diet, or if it is introduced too quickly, the microbes that digest this starch, multiply rapidly and produce lactic acid. Excess lactic acid in the rumen can cause rumen acidosis.
Lactose	The major carbohydrate secreted in milk. Lactose acts to regulate the amount of water in milk and consequently milk volume.
Large intestine	Final compartment of the digestive tract and consists of the caecum, colon and rectum.
Late lactation	In this resource, late lactation refers to the period from 200 days after calving until cows are dried off.
Lignin	An organic substance that is indigestible and provides the plant with mechanical strength. Lignin is not a carbohydrate, but can bind to the structural carbohydrates (cellulose and hemicellulose) making them less accessible to rumen enzymes, therefore less digestible.
Linoleic acid	One of the main unsaturated fatty acids in pasture. Linoleic acid (C18:2) has 18 carbons and 2 double bonds and undergoes biohydrogenation in the rumen to produce various fatty acids.
Linolenic acid	One of the main unsaturated fatty acids in pasture. Linolenic acid (C18:3) has 18 carbons and 3 double bonds and undergoes biohydrogenation in the rumen to produce various fatty acids.
Lipolysis	The process where triglycerides are broken apart into free fatty acids and a glycerol backbone. Lipolysis typically occurs when a cow is in a state of negative energy balance.
Long chain fatty acids	Fatty acids that contain 16 carbons or more. They are pre-formed fatty acids that come from the diet or mobilisation of body tissue. They contribute approximately 40% of the fat secreted in milk; however, this is dependent on the energy status of the cow and the diet.
Macro-minerals	Minerals that are present in milk and body tissue in proportions greater than 100 ppm. Macro-minerals include: calcium, phosphorous, magnesium, potassium, sodium, and sulphur.
Megacalorie	A unit used to measure energy. One megacalorie is equivalent to one million calories.
Mastication	The process of chewing where plant material is ground down by the teeth.
Megajoule	A unit used to measure energy. One megajoule is equivalent to one million joules.
Metabolism	The set of life-sustaining chemical transformations within the cells of living organisms. The three main purposes of metabolism are the conversion of food/fuel to energy to run cellular processes, the conversion of food/fuel to building blocks to produce proteins, lipids, nucleic acids, and some carbohydrates, and the elimination of nitrogenous wastes.

Metabolisable energy (ME)	The energy that remains after the digestive process.
Microbe	A microscopic organism. Microbes in the rumen enable the dairy cow to digest plant material into usable sources of carbohydrate, protein and fat.
Microbial protein	The protein formed in the rumen when microbes digest rumen degradable protein and non-protein nitrogen compounds. Microbial protein provides a source of metabolisable protein for the cow.
Micro-minerals	Minerals present in milk and body tissue in proportions less than 100 ppm. Micro-minerals include: cobalt, copper, iodine, and selenium.
Mid lactation	In this resource, mid lactation refers to the period post-mating until approximately 200 days after calving.
Milk fever	A metabolic disorder that occurs when a cow has lowered levels of blood calcium (hypocalcaemia). It usually occurs within the first 24 hours post-calving, but it can still occur 2 to 3 days post-calving. It can be categorised as clinical or sub-clinical and can result in downer cows and death.
Milksolids	The sum of milk fat and milk protein produced by the cow.
Minerals	Are "essential" components of the diet and have a metabolic role in the cow. A mineral deficiency can result in reduced milk production, morbidity, and decreased reproductive performance.
Monogastric	A mammal that has a stomach with a single chamber.
Non esterified fatty acids (NEFA)	Fatty acids that are formed from the breakdown of stored triglycerides. NEFA are produced when body tissue is mobilised during periods of negative energy balance and are used as an indicator of the energy status of the cow. The higher the blood NEFA content, the more negative the energy status of the cow.
Negative energy balance	When energy output (milk production, cow maintenance, and activity) is greater than energy input (intake).
Net energy	The energy remaining after some metabolisable energy is lost as heat. This energy is the final energy available for the cow to use for metabolic activities including maintenance, milk production, pregnancy, activity, growth, and condition gain.
Neutral Detergent Fibre (NDF)	Neutral Detergent Fibre (NDF) = hemicellulose + cellulose + lignin A measurement of the fibre that remains after treating the plant with a non acidic, non alkaline detergent and contains both the indigestible and digestible fibre fractions. NDF generally relates to the bulkiness of the feed.
Non-protein nitrogen (NPN)	Compounds that contain nitrogen but do not contain amino acids e.g. urea. Microbes in the rumen are able to use non-protein nitrogen to synthesise microbial protein which provides a source of metabolisable protein for use by the cow.
Non-structural carbohydrates	The soluble sugars and starches found within the plant cell.
Oesophagus	The tube that connects the mouth to the rumen and is involved in rumination and belching.
Oleic acid	An unsaturated fatty acid found in the diet or formed from incomplete rumen biohydrogenation of linoleic or linolenic acid. Oleic acid has 18 carbons and 1 double bond. It is also one of the predominant fatty acids stored as triglycerides in adipose tissue.

Omasum	The third stomach compartment that has the primary function of absorbing water. It also controls particle size of digesta leaving the rumen.
Palmitic acid	A saturated fatty acid with 16 carbons and no double bonds.
Papillae	Tiny projections of the surface of the rumen. The papillae increase the surface area of the rumen to allow better absorption of nutrients.
Pepsin	A type of digestive enzyme secreted in the abomasum of the adult cow for digesting and breaking down proteins.
Peptides	A dietary protein that has been degraded in the rumen by micro-organisms into short chains of amino acids. Peptides can be further degraded to individual amino acids and even further to ammonia. Rumen micro-organisms use peptides, amino acids and ammonia to create microbial protein and grow.
Phospholipids	Lipids that are used by rumen microbes for cell membrane function. Microbial phospholipids make up 10-15% of the lipids leaving the rumen.
Portal blood	Blood that travels to the liver.
Prehension	The process of grazing when the cow uses her tongue to grasp a clump of grass, pull it into her mouth, and bite through it with her lower teeth and upper dental pad.
Propionate (propionic acid)	One of the three main volatile fatty acids produced during carbohydrate fermentation. Propionate is produced by the rumen microbes that ferment starch. Propionate is converted to glucose in the liver of the dairy cow via a process known as gluconeogenesis. This is a very important process in the dairy cow as ruminants do not absorb sugars straight from the rumen, but rather have to synthesise all of their required glucose in the liver.
Proteins	Compounds made up of amino acids that are essential for body metabolism, growth, reproduction, and milk production.
Proteolysis	Break down of proteins into smaller polypeptides or amino acids.
P:F Ratio	The ratio of milk protein to fat. It can indicate the energy status of the cow, but can also be influenced by the composition of the diet. P:F ratio should only be used in conjunction with other measures such as pasture residuals, milk protein %, and milksolids yield.
Reticulum	The second stomach compartment. The main function is to filter smaller digesta particles and move them into the omasum, while passing the larger particles into the rumen.
Rumen	The largest compartment of the adult ruminant stomach that is adapted for digesting fibre. The rumen contains large numbers of many types of micro-organisms (often referred to as microbes). These microbes feed on plant material eaten by the cow and through the process of fermentation produce end products that provide energy and nutrients to the cow.
Ruminant	A mammal that has a complex 4-chambered stomach, and re-chews food 'cud' that has been regurgitated.
Rumination	The process where newly eaten feed is returned to the mouth for further chewing; this extra chewing breaks the feed down into smaller pieces, thereby increasing its surface area and making the feed more accessible to the digestive enzymes. As a result, the rate of microbial digestion in the rumen is increased. This process is often referred to as 'chewing her cud'.

Rumen degradable protein (RDP)	Protein in the diet that is degradable in the rumen. The amount that is degraded depends on the rate of degradation and the rate of passage through the rumen. Rumen degradable protein can be used by the rumen microbes to produce microbial protein (providing an energy source e.g. carbohydrates, are also available).
Rumen stasis	The complete collapse of rumen function. Excess lactate production in the rumen leads to a marked decrease in rumen pH, a reduction in rumination activity, reduced saliva production and ultimately rumen stasis and acidosis.
Saliva	Acts as a lubricant for easier chewing and provides a medium for rumen bacteria to attach to feed particles. It also acts as a buffer to maintain rumen pH.
Saturated fatty acid	Fatty acids that contain no double bonds. They are less toxic to rumen bacteria than unsaturated fatty acids and thus pass through the rumen unaltered, similar to by-pass or protected fatty acids.
Short chain fatty acid	Fatty acids synthesised in the mammary gland from acetate (and to a lesser extent butyrate). They contain 16 carbons or less and make up approximately 60% of the milk fatty acids that are secreted.
Soluble sugars	Non-structural carbohydrates. They consist of individual sugar molecules (glucose and fructose) and are found in the leaves of plants. They are rapidly digested and used by microbes in the rumen.
Soluble protein	The fraction of rumen degradable protein, that is instantly available to the rumen microbes, meaning they are degraded and used quickly to produce microbial protein.
Stearic acid	The saturated product following complete biohydrogenation of fatty acids such as linoleic or linolenic acid. Stearic acid contains 18 carbons and no double bonds.
Starches	Non-structural carbohydrates. They consist of individual sugar molecules joined together. Found in the grains, leaves, plant stems and bulbs, they are digested more slowly than soluble carbohydrates.
Structural carbohydrates	Include hemicellulose and cellulose. Sometimes these are referred to as fibre (although fibre also includes lignin which is not a structural carbohydrate). Structural carbohydrates are the fibrous part of the plant cell wall.
Substitution	A physiological phenomenon that occurs when grazing cows eat supplementary feeds. Substitution simply means that when supplements are fed, the increase in total dry matter and energy intake is less than the amount of supplement offered.
Trace elements	Minerals that are required in small amounts e.g. mg/cow/day or less than 100 parts per million in the diet.
Transition period	In this resource the transition period refers to the month prior to calving until the end of the colostrum period.
True protein (TP)	A component of crude protein. True proteins consist of amino acids and can be broken down into rumen degradable protein (RDP), or undegradable dietary protein (UDP).
Triglycerides	A compound containing a glycerol backbone with three fatty acids attached. The fatty acids can be either saturated or unsaturated. The majority of dietary lipid, lipid stored in adipose tissue and secreted in milk fat is in the form of triglycerides.
Triglyceride rich lipoproteins (TGLP)	Little parcels that transport triglycerides into the lymph vessels and then the general circulation. They are directed to different parts of the body depending on the status of the cow.
Undegradable dietary protein (UDP)	The proportion of dietary protein that is resistant to degradation in the rumen and passes through to the small intestine undegraded. The undegraded protein is broken down into amino acids in the small intestine, absorbed through the intestinal wall and provides a source of metabolisable protein for the dairy cow.

Unsaturated fatty acid	Fatty acids that contain one or more double bonds. The number and position of double bonds alters the way in which the fatty acid is digested and can also alter its biological activity. Unsaturated fatty acids are toxic to rumen bacteria, in particular the bacteria that digests fibre so are biohydrogenated in the rumen. The extent of biohydrogenation determines the resulting fatty acids.
Villi	Finger like projections found in the small intestine that increase the surface area and add absorption.
Vitamins	Organic molecules that are essential for good health and production. Vitamins have a function in processes that allow for growth, the absorption and metabolism of feed, as well as brain function, immune function and fertility.
Volatile fatty acids	There are three main volatile fatty acids produced from microbial fermentation of carbohydrates. These are acetate (acetic acid), propionate (propionic acid), and butyrate (butyric acid).
Water soluble vitamins	Cannot be stored in the body tissue and must be provided through diet. These vitamins are typically synthesised by rumen microbes and include the B complex vitamins and vitamin C.