

Ruminant Nutrition

The Rumen and Reticulum

- The rumen is adapted for the digestion of fibre.
- It is the largest stomach compartment of the adult ruminant.
- Food travels through the rumen and reticulum, it is fermented and broken down by micro-organisms, this produces protein and energy that can be utilized by the animal.
- The microbes in the rumen vary in species, depending on the animal's diet.
- Rumen microbes need time to adjust and change the specific population to be able to process the different times of fodder and grain.

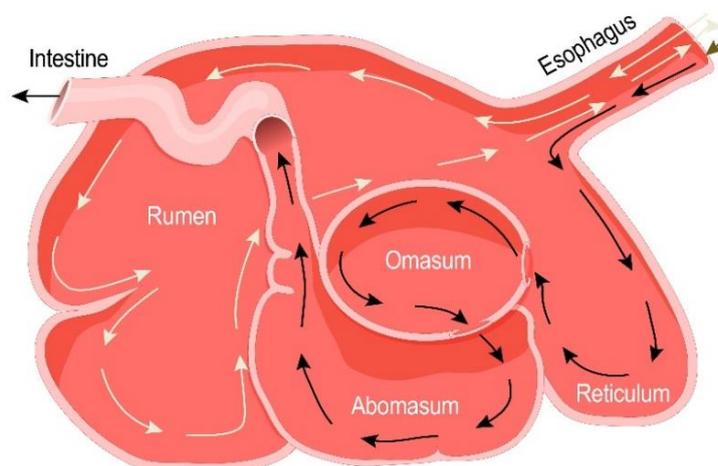
Omasum

- The omasum lies between the reticulum and the abomasum.
- Material entering the omasum is made up of 90%-95% water.
- The primary function of the omasum is to remove some of this water and further grind and breakdown feed.

Abomasum

- The abomasum connects the omasum to the small intestine.
- Acid digestion, rather than microbial fermentation, takes place in the abomasum much the same as the human digestive system.

Ruminant digestive system



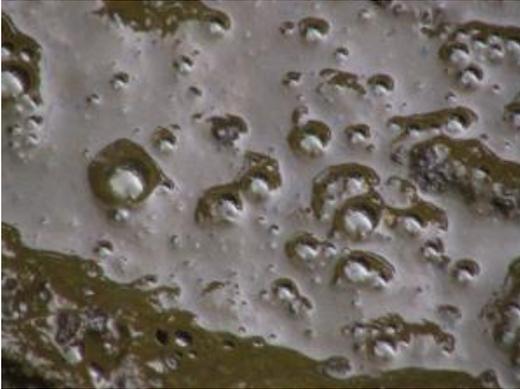
How do we know if the rumen is functioning correctly?

We look at the head and the tail.

If the animal is chewing it's cud it is ruminating, this is a good sign.

Manure composition is key, this will tell us how the process is working and what adjustments need to be made in the diet.

Watery Scours



- As sign cattle are going backwards
- Acidosis
- Poor feed conversion
- Limited nutrient absorption
- Cattle need fibre
- Immune system is challenged

Scours



- Cattle need fibre
- Feed conversion is still challenged
- Nutrient absorption is not as good as it could be
- This animal is still challenged

Perfect Pat



- Cattle are operating perfectly
- No challenge
- Utilising feed at an optimum level

A bit too firm



- Manure is starting to become a bit too firm
- A little too much fibre in the diet
- Adjustments need to be made

Hard Manure



- This manure is too hard
- Cattle will be showing signs of poor nutrition
- Cattle will be going backwards
- Animals need nutrients
- Protein and energy
- Immunity is challenged

Nutrient Requirements

Energy

- Energy is the essential nutrient for beef production, it provides the body with the capacity for growth, lactation, reproduction, movement, digestion and body condition.
- Energy is generated by the levels of carbohydrates, fat and true protein in the diet and when these levels are not sufficient fertility and milk production are the first areas to be affected in performance.
- To gain 1kg of weight, cattle need between 35 to 45 MJ ME above required maintenance.

Protein

- Protein is responsible for the formation, growth and maintenance of all body tissues.
- Protein must be present in adequate and correct proportions in all diets.
- They are the building units of the body and are concentrated in the muscle, internal organs, blood and milk.

- The need for protein is greatest in late pregnancy, lactation and in rapidly growing calves and young cattle.
- Protein stimulates activity of the rumen microbes which in turn stimulates intake of dry pasture and therefore increases the nutrient intake.
- The animal requires a source of rumen degradable protein (NPN) e.g., Urea also some undegradable protein (True Protein) e.g. Copra meal, canola meal etc.
- Symptoms of insufficient protein levels can be seen in reduced growth rates, poor milking ability and reduced muscle tone.

Rumen Degradable Protein (RDP)

- The portion of dietary protein that can be degraded in the rumen. RDP is used by the rumen microbes to convert feed nutrients to microbial protein. RDP can come in two forms, nitrogen (NPN) and true protein.

Undegraded Protein / Bypass Protein

- Is the protein that escapes being broken down in the rumen. This protein comes from protein meals etc. and is broken down in the small intestine much like a single stomach animal.

Macro Minerals

Calcium

- Essential to bone and teeth formation.
- Important for clotting of blood.
- Transmission of nerve impulses.
- Function of muscles.
- Calcium and Phosphorous have a symbiotic relationship. If either is depleted within the animal's system, both will be mobilized from the bone store.

Phosphorous

- Generally, the single most deficient macro mineral in Australian agriculture.
- Closely linked with Calcium- the ratio of Phosphorous and Calcium in ruminant diets is important.
- It is important in bone and teeth formulation and energy metabolism.
- Deficiency will cause poor growth rates, irregular oestrus or cycling in cows, low calving percentage etc.
- Animals can quite often chew bones or dead animals in highly Phosphorous deficient country.

Phosphorous Deficient country – Sandy red and yellow earths, Sandy eucalyptus forest/tea tree country, Spinifex and ant bed country, Northern black soil downs (gulf country)

Magnesium

- Closely linked with Calcium and Phosphorus in function and distribution.
- Has a function in relation to metabolism, cellular function and Neuro-muscular activity.
- Deficiency may cause low blood magnesium which can lead to grass tetany (grass staggers) and Neuro-muscular dysfunction and death may occur.

Sulphur

- Important structural component of amino acids which are the building blocks of protein.
- Essential in the vitamins Biotin and Thiamine and the hormone Insulin which is needed in controlling glucose uptake by cells.
- Sulphur deficiency cause a general reduction in rumen microbe activity and hence to non-specific problems of poor growth and eventual emaciation.

Sodium, Potassium, Chlorine

- These are the salts or electrolytes and are important in controlling water metabolism in the body, blood acidity, cellular and metabolic actions and nerve and muscle functions.

Trace Minerals

Iron

- Crucial to red blood cell formulation and oxygen carrying capacity.
- Anaemia is the most common problem resulting from Iron deficiency.

Copper

- Essential in the uptake and use of Iron in red blood cells.
- Important in the pigment formation of hair.
- Deficiency can result in anaemia, scouring, infertility, reduced growth rates, bone disorders, neurological disorders.

Cobalt

- Required by rumen micro-organisms to produce Vitamin B12, hence Cobalt deficiency leads to Vitamin B12 deficiency.
- Vitamin B12 is essential for energy production within the rumen.
- Cobalt and Vitamin B12 deficiency leads to reduced appetite and wasting, anaemia and death.

Selenium

- Deficiency can be extremely common.
- Dictated by factors such as – pasture type, soil type and acidity, rainfall and irrigation.
- Deficiency can lead to reduced immune system function, reduced growth, ill thrift, retained afterbirth, infertility and muscular disorders (white muscle disease).

Manganese

- Deficiency results in abnormalities of the skeletal system, reduced growth and reproductive problems.

Iodine

- Important in formation of Thyroid hormones.
- Influences metabolism, has a roll in immune function, muscle function, reproduction and foetal development.

Zinc

- Important to many enzymes involved with metabolism, hormone production, storage and secretion, electrolyte balance and immune system function.
- Deficiency causes skin abnormalities and joint stiffness, also reduced appetite and growth, skeletal and reproductive disorders.

