



NSW DEPARTMENT OF
PRIMARY INDUSTRIES

Realistic Rations - Readers' Note

This document is part of a larger publication. The remaining parts and full version of the publication can be found at:

<http://www.dpi.nsw.gov.au/agriculture/livestock/dairy-cattle/feed/publications/realistic-rations>

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Appendix 1: Measuring dry matter

You can use a microwave oven to measure the dry matter percentage of your feed. The method is easy, although it is time consuming. You need accurate kitchen scales that can measure to one tenth of a gram, a knife or scissors to chop the forage into small pieces, a brown paper bag and a glass of water.

When you collect your pasture, hay or silage sample, make certain it represents a true sample of what the cows are eating. If the pasture is ryegrass with 30% clover, make certain the sample is of the same composition.

1. Weigh the paper bag on the kitchen scales.
2. Chop up about 75 g of forage into centimetre lengths and put this into the paper bag.
3. Weigh the paper bag with the sample. This is the wet sample.
4. Put the paper bag and the glass (which should be three quarters full of water) into the microwave.
5. Microwave the bag and sample for 4 minutes. Let the sample stand for 4 minutes.
6. Weigh the bag and sample.
7. Microwave for another minute. Make certain the glass of water is still three quarters full. Refill if necessary. Let the sample stand for one minute.
8. Weigh bag and sample.
9. Repeat steps 7 and 8 until there are no further changes in weight.

Calculate the results as follows:

$$\begin{aligned} & \text{Wet sample weight} \\ & = \text{weight of wet sample plus bag (step 3)} \\ & \quad \text{minus bag weight (step 1).} \\ & \text{Dry sample weight} \\ & = \text{final weight of bag and sample minus} \\ & \quad \text{bag weight.} \end{aligned}$$

Dry matter percentage

$$= \frac{\text{dry sample weight} \times 100}{\text{wet sample weight}}$$

Appendix 2: Minerals & vitamins for the lactating cow

Macrominerals are needed in large amounts. The important ones are:

Calcium (Ca)
Phosphorus (P)
Magnesium (Mg)
Potassium (P)
Sodium (Na)
Chlorine (Cl)
Sulphur (S)

Microminerals are needed in small amounts. Those important to dairy cows are:

Cobalt (Co)
Copper (Cu)
Iodine (I)
Iron (Fe)
Manganese (Mn)
Molybdenum (Mo)
Selenium (Se)
Zinc (Zn)

Vitamin deficiencies are rare in Australia. Those that could potentially cause problems are:

Fat soluble vitamins

Vitamin A
Vitamin D
Vitamin E

Water soluble vitamins

Vitamin B1 (thiamine)
Vitamin B3 (niacin)
Vitamin B12 (cyanocobalamin)
Biotin
Folic acid

Macrominerals

Calcium

Calcium is required for bone formation, muscle action, milk production and general body function. There are low levels in grains, and as all plants age the levels decrease.

Deficiency can cause milk fever, displaced abomasum (where the abomasum moves to the left hand side of the abdomen and becomes compressed by the rumen) and retained afterbirth.

Phosphorus

Phosphorus is required for bone formation, milk production, energy metabolism and general body function. Grains have higher levels than grass, but as all plants mature the levels decrease.

Deficiency can cause low fertility and milk yield as well as poor appetite.

Magnesium

Magnesium helps in many enzyme processes in the cow and is needed by rumen microbes to grow.

Low levels in lush pastures can cause grass tetany. Low levels in the blood can interfere with calcium absorption and cause milk fever.

Potassium

Potassium is involved in water balance and acid–base balance, as well as muscle function. It is involved in the manufacture of protein. Mature forages have low levels.

Excess potassium fertiliser can cause udder oedema and milk fever.

Deficiency of this mineral is unlikely

in grazing dairy cows.

Sodium

Sodium is essential for the nerves and for the water and acid–base balance.

Deficiency is uncommon.

Signs of low sodium are salt cravings, loss of appetite and body condition, and increased nervousness.

Most supplement contain salt in the diet (approximately 1% of the ration).

Chlorine

Chlorine is also needed to ensure a proper salt or acid–base balance in the animal. It is also needed for stomach secretions.

Supplement with salt in the ration or salt licks. Deficiency is uncommon.

Sulphur

Sulphur is needed by both the cow and rumen microbes to make essential amino acids. It is involved in many body functions.

Some B vitamins contain sulphur.

There are significant interactions between sulphur, copper and molybdenum when high pasture sulphur and molybdenum levels prevent copper uptake.

Sorghum based diets (including sudan, sudax and other sorghum hybrids) are usually deficient in sulphur.

Sulphur can be supplemented in the feed or provided to the cows by a mineral block.

Microminerals

Note: It is best to seek professional advice from a veterinarian or other farm adviser on the dose rates for these micro minerals. Excess amounts of these substances can cause toxic signs in cattle and may result in death.

Cobalt

Cobalt is needed by the rumen microbes to

synthesise vitamin B12. It is essential for the production of propionic acid which is the precursor of glucose.

Cattle do not store large amounts of cobalt, so vitamin B12 production relies on a steady supply of cobalt in the ration.

Deficiency signs include reduced growth rate, especially in young animals., rough coat and ill thrift that does not respond to worming or improved ration.

Supplementation is usually by cobalt bullets in the rumen.

Copper

Copper is needed for the enzymes that control energy metabolism, pigmentation and blood formation.

Deficiency signs include weight loss, diarrhoea and a pale rough coat, and infertility. High molybdenum levels will cause a copper deficiency.

Supplement with copper oxide (as an addition to the ration or as a rumen bolus) or copper sulphate which can be added to the water or given as a drench.

Iodine

Iodine is found in the thyroid hormones that control energy, metabolism, growth and development, and skin and hair formation.

Deficiency can occur in calves as a goitre (lump in the neck) or in cows as reproductive failure.

Supplement with potassium iodide in the feed.

Iron

Iron is an essential component of haemoglobin in the blood, and of the immune system.

Deficiency rare in grazing cattle; all feed sources are generally adequate, but anaemia occurs in milk-fed calves occasionally.

Use ferrous sulphate or ferrous chloride to supplement.

Manganese

Manganese is involved in fat and protein synthesis, brain metabolism and various enzyme systems. Deficiency can reduce fertility and cause cystic ovaries and impaired growth or skeletal and birth abnormalities.

Supplement with manganese oxide or manganese sulphate.

Molybdenum

Molybdenum is mainly required for the function of the enzyme xanthine oxidase, which is involved in excretion.

Very high and very low levels of molybdenum affect the metabolism of copper. Cattle grazing high molybdenum pastures may show signs of copper deficiency.

There may be high levels of Molybdenum in plants grown on high pH (alkaline) soils.

Selenium

Selenium prevents white muscle disease; it has an enzyme function in protecting cell membranes from damage by oxidation. It also important in maintain an effective immune system.

Selenium deficiency often occurs with vitamin E deficiency. Signs are poor reproduction, retained placenta, mastitis and general ill thrift.

Supplement with selenium bullets, drenches or sodium selenate in the feed.

Zinc

Zinc is involved in many body functions in the cow. It activates 30 different enzymes and enhances the action of the reproductive hormones.

Deficiency symptoms include reduced feed intake, feed efficiency, stiff joints and cystic ovaries. In feed lot cattle, zinc

supplementation may be helpful in preventing foot problems.

Supplement with zinc oxide, zinc sulphate or zinc methionine.

Vitamins

Vitamins A, D and E

Vitamin a has numerous functions, including maintenance of the skin and other tissues and prevention of night blindness.

Vitamin D mainly acts to help calcium metabolism.

Vitamin E has a similar role to selenium and helps the immune system and muscle formation.

B vitamins

Vitamin B1 (thiamine) can be synthesised in the rumen, but feedlot cattle can become deficient and need thiamine injections.

Niacin can help with energy metabolism for preventing ketosis, but it can be costly. Some rations containing high percentages of fat may include niacin to maintain rumen function.

For vitamin B12 see cobalt.