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Mineral nutrition – Sucklers

Feeding suckler cows over winter is often the period when they are dry and in the lead up to calving or can be when they have calved in the autumn and have a calf at foot. Both very different situations but the same principles apply to both with regards to how we should focus supplementation.

Mineral supplementation however is only part of the nutrition equation; the focus should be on making sure energy, protein and water requirements are met first. Making sure body condition score (BCS) is appropriate/maintained is key to successful calving and getting them back in calf.

The main minerals that we need to consider for the cows are:

- Calcium
- Magnesium
- Potassium
- Phosphorus
- Sodium
- Selenium
- Copper
- Iodine
- Vitamin E

Tables 1 and 2 show inclusion rates as recommended by the National Research Council and would be considered the baseline when looking at ruminant requirements.

Table 1: Macromineral requirement in growing/finishing beef cattle

Mineral	Percentage diet DM requirement	
	Pregnant	Lactating
Sodium	0.08 (0.2% in salt form)	0.1 (0.25% in salt form)
Calcium	0.18	0.58
Magnesium	0.12	0.20
Potassium	0.60	0.70
Phosphorus	0.18	0.27

Table 2: Micromineral requirement in growing/finishing beef cattle

Mineral	PPM (mg/kg) diet DM requirement
Selenium	0.10
Copper	10.00
Iodine	0.50
Vitamin E*	75 IU/kgDM

Above information adapted from NRC 2000 Nutrient Requirements of Beef Cattle

*Vit E inclusion dependent on Selenium status and type of feed therefore above value is an estimate

Macrominerals

Calcium (Ca)

- Most abundant mineral in the body, good levels in forage but can be reduced in mature or weathered forage. Legumes contain more than grasses. Grains have lower Ca levels. When dietary phosphorus (P) exceeds Ca then intakes are reduced. Low Ca intakes, especially in the period immediately post calving, will predispose to milk fever. Increasing Ca in the diet pre-calving will also predispose to milk fever as it will down regulate necessary metabolic control mechanisms.

Magnesium (Mg)

- Important for enzyme activation, glucose breakdown and other functions. Deficiency can present as excitability, anorexia, convulsions and salivation. Forage Mg concentrations will vary with plant species, soil levels, plant stage, season and environment. Legumes contain higher levels than grasses but forage are roughly twice as much as grains. Supplementation at 2-10% of the ration depending on confounding factors (ie 10% on lush spring grass). Low Mg intake interferes with Ca absorption and resorption therefore increasing the risk of milk fever.

Potassium (K)

- Third most abundant mineral in the body, involved in acid-base balance, osmotic pressure/water balance, muscle contraction and nerve impulse transmission + more. Deficiency can present as decreased feed intake and weight gains, depraved appetite, and rough hair coat. Forages usually good source (1-4% K) very high in lush pasture decreasing with age. High K levels in forages can affect Ca availability and therefore impact on milk fever incidence.

Phosphorus (P)

- Required for energy use and transfer, normal milk secretion and much more. Deficiency can have large implications, decreased growth, DM intakes and feed conversion efficiency. Forages are generally low in P compared with concentrates (opposite to Ca). Drought and increased forage maturity also decreases P content of forages. Recommended levels of P within a mineral supplement is generally 4-8% depending on forage conditions and concentrate inputs. Consider again the Ca:P ratio of the final ration. Elevated P intake can decrease the action of parathyroid hormone (PTH) leading to an increased likelihood of milk fever.

Sodium (Na)

- As a component in salt and often low in forage diets, Na works in conjunction with potassium (K) for nutrient transport into and out of cells. Inclusion can drive water intake and thus DM intakes. It can be provided as free choice mineral or as a lick. Inclusion with Mg can help to increase Mg palatability and therefore uptake. Excess Na can also predispose to milk fever.

Microminerals

Selenium (Se)

- Important part of selenoproteins including glutathione peroxidase – an antioxidant. Functions related to Vit E. Deficiency can lead to white muscle disease, reduced immune function, unthriftiness/weight loss and diarrhoea. In excess can cause lameness, anorexia, sore feet, cracked and deformed hooves. Inclusion in ration should not exceed 0.3ppm.

Copper (Cu)

- Essential component of many enzymes. Accumulates in the liver. Molybdenum (Mo), sulphur (S) and iron (Fe) all interact, significantly reducing bioavailability. Deficiency signs include, decreased growth, loss of pigmentation in hair, brittle bones and diarrhoea. Breed differences in requirements. Copper is more available in concentrate diets than in forage diets. Important to ensure good reproductive performance.

Iodine (I)

- Often noted in growing animals as young stock seen with goitre, or calves being born weak, hairless or dead. Deficiencies more usually associated with breeding herds rather than in growing animals. Iodine is an essential component of thyroid hormones, acting to regulate energy metabolism in the body.

Vitamin E

- Vitamin E serves as an antioxidant in the body, similar to Se. It is important in membrane and muscle structure and function. Elevated polyunsaturated fats in the diet (oils) will increase the demand for Vitamin E and high moisture feeds will lose Vitamin E faster than dried feeds. Signs of deficiency are linked with those of Se deficiency.

There are of course other minerals and vitamins that we need to be aware of and consider:

- Sulphur
- Chlorine
- Chromium
- Cobalt
- Iron
- Manganese
- Molybdenum
- Zinc

Nutrient requirement for all of the above minerals will vary depending on the age, weight, stage of production, breed, stress and mineral bioavailability. Mineral bioavailability is particularly important due to the levels of interactions that occur between different minerals that can impact significantly on availability to the animal.

Of the above minerals discussed, hypocalcaemia (milk fever) and hypomagnesaemia (grass tetany) are two of the more commonly encountered issues with incorrect mineral supplementation. It is therefore important to ensure that Ca and Mg levels are correct and there is not an oversupply of K, Na or P in the diet to predispose to these conditions.

Use of supplementary minerals needs to be targeted over the winter months to suit the status of the cow ie lactating or in the latter stages of pregnancy, both of which have very different mineral requirements. Both of these stages also have very different energy and protein requirements as well so it is important to make sure that these are also accounted for. If energy and protein levels are wrong then this will have a more significant impact on performance than mineral balance.

It is important to make sure that you take the time to evaluate the ration you are going to provide to your cows over the winter period with your nutritionist. Taking samples from the cows through your vet for metabolic profiling will help you to determine the effectiveness of your feeding program. A ration on paper is only as good as the information used to make it, have you had an analysis done of the forages being used? The cows will always be the best judge of a ration so do not forget to ask them what they think. Are they putting weight on, holding condition or losing weight. Do the faeces look normal? Are they eating what you have budgeted for?

If signs of milk fever or grass tetany are seen then act on them quickly as clinical cases are the tip of the iceberg, subclinical issues will exist that will need to be dealt with.