

Mineral nutrition

Mineral nutrition can often be overlooked when formulating cattle rations because they account for a very small proportion of daily dry matter intake in beef cattle diets. However, it has been shown that cattle growth and reproductive performance can be compromised if the correct mineral nutrition is not put in place. Vitamins and minerals are important in cattle diets because they are components of vital functions such as bone development and immune and nervous system function.

Macrominerals and Microminerals

Minerals are divided into two categories macrominerals (major minerals) and micro minerals (trace minerals) based on the amount required in the animals diet. Macrominerals required by beef cattle include sodium, calcium, magnesium, potassium and phosphorus. Microminerals include selenium, copper and iodine.

The nutrient requirement of the above minerals will vary depending on age, weight, stage of production, breed, stress and mineral bioavailability. Mineral bioavailability is the amount of the mineral which becomes available to the animal after administration.

Mineral	% diet DM requirement		
	Pregnant	Lactating	Growing/Finishing Cattle
Sodium	0.08 (0.2% in salt form)	0.1 (0.25% in salt form)	0.08 (0.2% in salt form)
Calcium	0.18	0.58	0.31
Magnesium	0.12	0.20	0.10
Potassium	0.60	0.70	0.60
Phosphorus	0.18	0.27	0.21

Above information adapted from National Research Council 2000 Nutrient Requirements of Beef Cattle

Macromineral requirements of suckler cows and growing/finishing cattle

Sodium: Important for nutrient transport, often low in forage diets. Research has shown that inclusion of sodium can drive water intake and therefore increase dry matter intakes.

Calcium: Most abundant mineral in the body. Forage contains good levels of calcium, but grains have lower levels. Low calcium intakes immediately after calving can predispose suckler cows to milk fever.

Magnesium: Important for enzyme activation and glucose breakdown. Deficiency can present as excitability, anorexia, convulsions and salvation. Low magnesium intake can interfere with calcium absorption and resorption therefore increasing the risk of milk fever.

Potassium: Involved in muscle contraction and nerve impulse transmission. Deficiency can present as decreased feed intake, weight gains and appetite. Forages are usually a good source of potassium, however cereals are typically low, with high concentrate diets often requiring supplementation.

Phosphorus: In growing cattle phosphorus is required for skeletal development and muscle building and in suckler cows it is used for normal milk secretion. Forages are typically low in phosphorus compared with concentrates.

Micromineral requirements of suckler cows and growing/finishing cattle

Mineral	Parts per million (mg/kg) diet DM requirement	
	Suckler cow	Growing/finishing cattle
Selenium	0.10	0.10
Copper	10.00	10.00
Iodine	0.50	0.50

Above information adapted from National Research Council 2000 Nutrient Requirements of Beef Cattle

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

Selenium: Selenium deficiency can lead to white muscle disease, reduced immune function, unthriftiness/weight loss and diarrhoea. In excess it can cause lameness and anorexia.

Copper: Copper is the most over supplemented mineral. It is an essential component of many enzymes, however it accumulates in the liver with young animals being most susceptible to toxicity. Copper is more available in concentrate diets than in forage diets.

Iodine: Iodine is an essential component of thyroid hormones. Deficiencies are usually associated with suckler herds rather than growing/finishing systems.

Diagnosis

Detecting mineral deficiencies is often difficult because the symptoms, including poor growth and reproductive performance and can be associated with many diseases. An effective diagnosis may include clinical signs, soil analysis, forage analysis, feed or supplement analysis, blood analysis and liver biopsies. It is important that mineral supplementation is discussed with your vet or nutritional advisor.

Mineral supplementation

Mineral supplementation can take many forms, either directly through the application of drenches or boluses or indirectly through the use of blocks and licks. These vary in effectiveness with the best forms being through the addition of small daily amounts of a pre-mixed mineral to the ration or through a bolus which release set amounts of minerals each day over a set period of time. Other forms including drenches and licks provide short term solutions or may not be ingested in the same amount by each individual animal and therefore intakes cannot be guaranteed.

Summary

Minerals enable the animal to make use of the nutrients provided in the ration and when lacking may inhibit normal growth and function. Similarly, in excess they can be toxic and can lead to poor performance or even death in extreme circumstances. It is important that the mineral nutrition is correct but that the macro elements of nutrition including energy, protein and water requirements are met first and foremost.

Further information on trace elements can be found in the BRP+ document

[Trace Element Supplementation of Beef and Sheep.](#)

Peter Aitken recently recorded a teleconference for AHDB Beef & Lamb on mineral nutrition for suckler cows and growers and finishers. The recording can be found on the AHDB Beef & Lamb [YouTube channel](#).