

## Health and Disease Issues

### Mineral Deficiencies

As well as energy and protein, sheep are known to need at least 14 different minerals in order to maintain good health and production.

<b>Mineral requirements of sheep per kilogram of dry matter intake.</b>		
<b>Mineral</b>	<b>Requirement</b>	<b>Toxic Level</b>
Calcium	0.22-0.82 %	-
Phosphorus	0.16-0.38 %	-
Magnesium	0.12-0.18 %	-
Potassium	0.50-0.80 %	-
Sulphur	0.14-0.26 %	-
Sodium	0.09-0.18 %	-
Iodine	0.10-0.80 ppm	50 ppm
Iron	30-50 ppm	500 ppm
Copper	7-11 ppm	25 ppm
Molybdenum	0.50 ppm	10 ppm
Cobalt	0.10-0.20 ppm	10 ppm
Manganese	20-40 ppm	1000 ppm
Zinc	20-33 ppm	750 ppm
Selenium	0.10-0.20 ppm	2 ppm
Fluorine	-	60-150 ppm

Source: Underwood & Suttle (2001)

## Calcium

Calcium is needed for the formation and maintenance of bones and teeth; transmission of nerve impulses; muscle contraction, blood clotting and the activation of several enzymes.

A dynamic system involving calcium, phosphorus and vitamin D exists to maintain a relatively stable concentration of calcium in the blood. Calcium and phosphorus are stored in bone and mobilised into the circulatory system to maintain adequate levels in the system.

Hypocalcaemia may occur when the body fails to mobilise enough calcium from the bones to maintain normal blood calcium levels.

### **Predisposing Factors:**

- Grain based diets with inadequate calcium supplementation
- Sudden stress and/or drops in temperature
- Sudden change in diet.

### **Signs and Symptoms:**

The disease strikes suddenly and usually affects a number of animals in the flock.

- Muscle weakness
- Paralysis and/or muscle tremors
- “Proppy” or staggering gait with head held high
- Inability to stand

### **Control and Prevention:**

Finely ground limestone (calcium carbonate) is commonly included (1 – 1.5% w/w) when feeding grains. Acid salts (ammonium sulphate, magnesium sulphate etc) included at 0.5% (w/w) may increase Calcium absorption from within the small intestine, improving overall calcium availability.

### **Treatment:**

Consult your veterinarian regarding the best options for diagnosis and treatment.

Affected animals generally respond quickly to an injection of commercial calcium solution at the recommended dose rate if treated quickly.

## Cobalt

See Vitamin Deficiencies – Vitamin B12

## Magnesium

Magnesium is an activator of many metabolic enzymes. These enzymes control reactions that range from the breakdown of glucose for energy to the replication of DNA, which is necessary for cell division.

Most magnesium is stored in the skeleton, but it is only in growing lambs that this store can be used to replete a magnesium deficient diet. Hypomagnesaemia (also known as grass staggers/tetany) occurs when blood magnesium levels fall below a critical level due to stock consuming feed that has

low available levels of magnesium, or as a result of increased body demands for magnesium. It can cause significant losses in production, even when there are no signs of illness.



### **Predisposing Factors:**

Hypomagnesaemia within intensive finishing systems is rare but may occur if:

- Cold, wet and windy conditions with little or no shelter resulting in short periods of fasting
- Animals are either fat and losing condition, or very thin
- Roughage used within the ration was produced from pasture heavily fertilised with nitrogen and/or potash fertiliser
- Calcium intake is excessive in comparison to magnesium intake.

Forages that are prone to causing hypomagnesaemia are generally deficient in magnesium and sodium and have an excess of potassium. Sodium is involved in transporting magnesium into cells, so it is critical to maintain adequate sodium to facilitate proper magnesium utilisation. Excess potassium consumption interferes with magnesium absorption from the gut, thus exacerbating the condition of low dietary magnesium.

### **Signs and Symptoms:**

- Restlessness and/or an over-alert appearance
- Staggers or excitability
- Aggressiveness (rare).

### **Control and Prevention:**

Magnesium stored in the body is not rapidly available so prevention involves supplementing the animals with magnesium during the period of greatest risk.

There are several magnesium supplements available including Causmag (magnesium oxide), magnesium chloride, magnesium sulphate (Epsom salts) and grass tetany blocks.

Supplementation may involve:

- Spraying a mixture of 500 grams of magnesium oxide and molasses mixed in two litres of water onto hay. Feed treated hay at the rate of 100 sheep per bale.
- Epsom salts (500g per 100 litres) or magnesium chloride (420g per 100 litres) may be added to the water supply
- Include Causmag etc within the grain ration (0.5-1% w/w)

Hypomagnesaemia risk can also be reduced through providing:

- Adequate salt
- High fibre and high energy diet
- Minimising physiological and environmental stress so as to not reduce magnesium absorption.

#### **Treatment:**

Treatment must be prompt to be effective. It is best to subcutaneously inject a combined calcium and magnesium solution.

#### **Phosphorus**

Phosphorus works in conjunction with calcium in the formation of bone and is a component of DNA. Phosphorus is also involved in the chemical reactions of energy metabolism.

75 to 80% of a sheep's phosphorus is stored in the skeleton.

Due to their mutual role in bone metabolism, calcium and phosphorus supplementation are usually considered simultaneously. The recommended calcium-to-phosphorus ratio in ruminant diets is 2:1.

Phosphorus deficiencies, although rare, may occur when sheep are fed:

- Dry, mature plants
- A ration with a high Ca:P ratio
- A ration low in vitamin D.

Signs of a severe P deficiency include depressed appetites, poor growth rates, softening of the bones, lameness and an increased susceptibility to bone fractures, defective teeth and reproductive problems.

Acute phosphorus deficiency is unusual in intensive feeding systems as cereal grains typically have sufficient levels of phosphorus. Calcium phosphates can be used to correct deficiencies.

#### **Potassium**

Potassium is a major intracellular cation ( + ion) essential for some enzyme functions, contraction of muscle, nerve impulse transmission and other functions of the nervous system. Potassium is also important to renal function, acid-base balance as well as electrolyte and water balance.

Potassium deficiency may lead to poor appetite, reduced performance, and stiffness, especially in the joints of the front legs. High levels of potassium may also interfere with magnesium absorption and may lead to a magnesium deficiency.

Grain often contains less than 0.5% potassium and supplementation may be necessary in high-concentrate rations containing limited quality fibre. Hays, haylage or silage made from lush pastures generally contain adequate levels of potassium.

## Sodium

The requirement for sodium and chlorine is commonly expressed as a salt requirement. Both sodium and chlorine function to maintain the volume, pH and osmosis of body fluids.

Sodium is involved in muscle and nerve function. The salt requirement for sheep on complete mixed rations is met when salt comprises approximately 0.5% of the total diet. Problems may occur if salt content of water is high.

## Zinc

Zinc is required for normal immune system function and by enzymes needed during the metabolism of protein and carbohydrate.

Deficiency symptoms:

- Ill thrift
- Excessive salivation
- Scabby skin on the legs
- Slow wound healing
- Loss of hair
- Dermatitis.

A deficiency of zinc is rare under normal feeding conditions.

High calcium intakes may interfere with zinc absorption in the gut and induce a zinc deficiency and calcium supplementation should therefore be carefully monitored and controlled in an intensive feeding system.

---

© Sheep Solutions. Unauthorised copying, distribution or technical use of this publication and its contents is prohibited.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (July 2013). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the user's independent adviser.