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Trace elements

Fert$mart advisor advice on trace elements for Tasmanian pastures.

Boron (B)

There is unlikely to be a boron deficiency in pastures if soil pH is less than 7. Need to apply Boron to bulb brassicas such as turnips but not rape and hybrids like pacer. Boron is involved in cell division and development and deficiencies are often seen as stunting and deformation of growing points in plants. Pollen development and viability is also closely linked to adequate boron nutrition. Great care must be taken with Boron applications as the band between deficiency and toxicity can be narrow, hence seek qualified advice on boron use and rates of application. While soil analysis can give an indication of boron status of the soil dried leaf analysis of the crop provides more accurate data for decision making.

Soil test values > 0.1 mg/kg indicate Boron is non-limiting. Deficiencies may occur if soil pH >7.

Copper (Cu)

Copper is necessary for chlorophyll formation in plants and is a catalyst for a number of key reactions within the plant for normal growth. Plants with copper deficiency are often weaker in the cell walls, lower in proteins, fail to flower and may be more prone to fungal attack.

Soil test levels (DPTA method) of Cu: <0.5 mg/kg = low; > 0.5 mg/kg = adequate.

If soil copper levels are low and there is known deficiency in livestock, then feed supplements containing copper are an efficient means of administering it to animals.

If a pasture response to a field trial of copper is found, apply copper in fertiliser prior to or at planting to ensure the emerging plant roots are able to access available copper for uptake. Copper Sulphate or Copper Oxysulphate can be added to fertiliser and applied directly to pasture to elevate herbage copper concentrations. For sheep and cattle, rates are 5-10 kg/ha copper sulphate annually in autumn. Copper takes at least a month to get into herbage through the fertiliser so to ensure adequate levels have been reached in the herbage, test the herbage 4-6 weeks after application.

Manganese (Mn)

Manganese functions primarily as a part of enzyme systems in the plant. It has a direct role in several important metabolic processes including chlorophyll production. It has an important role in seed germination and accelerates plant maturity. Phosphorus and calcium availability are increased via adequate manganese nutrition. Manganese is immobile in the plant and deficiency is first seen in the younger leaves.

Soil test levels should be > 20 mg/kg (CaCl extr) at pHw<5.

Soils with high organic matter content (peat soils) and or pH levels greater than 7.0 often require additional manganese inputs. Conversely waterlogged and low pH soils often show manganese toxicity.

Manganese deficiency in the tested crop can usually be corrected by a foliar application of manganese sulphate at rates of up to 3.5 kg/ha.

Molybdenum (Mo)
Molybdenum is vital in nitrate metabolism in a wide range of crops particularly in pastures, cucurbits, legumes and brassicas. Molybdenum is vital for Rhizobia bacteria to fix soil atmospheric nitrogen into nitrate in legume root nodules. In acid soils (pH < 5.5), molybdenum availability is reduced often resulting in crop deficiency.
If the soil copper level is close to marginal (0.5 mg/kg), it is advisable to apply copper with the molybdenum as high molybdenum levels in pasture can induce a copper deficiency in livestock.
Clovers and Lucerne – Apply every 4-5 years as sodium molybdate (50g/ha) or molybdenum trioxide (75g/ha) mixed with superphosphate.

Selenium (Se)
Selenium is an essential element for animals, but not plants. Selenium is required by sheep and cattle for growth, and for prevention of white muscle disease. White muscle disease in lambs and calves in spring is most prevalent in years when there is good autumn rain-fall and abundant clover growth in spring.
Soil selenium levels are insensitive indicators of animal selenium status and the selenium nutrition of grazing livestock is assessed from blood and liver selenium levels The most efficient way of treating stock with selenium is by either drench or vaccine.
Concentrations in pasture whole tops less than 0.02 mg Se/kg DM are associated with deficient levels of selenium in blood of grazing animals, and pasture concentrations greater than 0.05 mg Se/kg DM are adequate for grazing livestock.
Apply 10 g selenium per hectare in superphosphate mixtures.

Zinc (Zn)
Zinc is involved in the synthesis of plant growth substances, enzyme systems, and is essential for promoting certain metabolic reactions. It is necessary for the production of chlorophyll and carbohydrates. Zinc is non mobile in the plant and hence deficiency is first seen in the young leaves.
As zinc is virtually immobile in the soil hence the crops requirements are best applied prior to or at planting. The plant roots need to physically intercept zinc in the soil to allow uptake.
Soil application (at planting) - Banding zinc with phosphorus at planting is an efficient means of delivering zinc to the plants roots. If applied as a starter fertiliser component, the amount should be at least 1 kg of zinc/ha (about 10 kg/ha of product).
Critical levels for zinc are: Soil pH <7.0 = 0.4 mg/kg; Soil pH >7.0 = 0.8 mg/kg.
Soils with less than 0.5 mg/kg of zinc are likely to require added zinc for optimum crop production. 2.5kg/ha of elemental zinc (equivalent to 10 kg/ha of zinc sulphate will correct most deficiencies and the effect will persist for 3-10 years, depending on soil type.

In summary, for pastures:
Some trace element deficiencies (e.g. Selenium) are typically treated with a stock drench or vaccine.
Molybdenum: Apply every 5 years.
Copper: If soil test level is low (<0.5 mg/kg) and there is known deficiency in livestock, feed supplements containing copper are an efficient means of administering it to animals.
Boron: Unlikely to have a boron deficiency in pastures if soil pH under 7. Bulb brassica crops (such as turnips) will respond to boron if soil levels are low (< 0.1 mg/kg).