The Deer Industry Association of Australia

FACT SHEET



# **COPPER DEFICIENCY**

### Overview

Copper is one of the most significant elements in body function being involved in at least 10 enzymes. These affect bone and connective tissue development, maintenance of nervous tissue, pigment, red and white cell development and overall growth. It is also implicated in reproductive performance.

Copper deficiency in ruminants may be primary or secondary.

**PRIMARY COPPER DEFICIENCY** results from dietary inadequacy. Copper is present in relatively small amounts in soils. Sandy coastal soils, low in organic matter in high rainfall areas, are most likely to have the lowest concentrations. Pastures that contain less than 3mg/kg dry matter of copper will produce signs of deficiency in grazing ruminants.

**SECONDARY COPPER DEFICIENCY** occurs in the face of apparently adequate dietary levels with a variety of conditioning factors. The most common conditioning factor is a dietary excess of molybdenum Mo levels above 10mg/kg. Dry pasture can induce copper deficiency.

Dietary excesses of molybdenum, sulphur and iron have been clearly identified as suppressants of copper uptake in ruminants-most likely by forming insoluble complexes with copper significantly reducing its absorbability.

The metabolism of copper in deer differs from other ruminants.

This is typified at least, by the marked variation in the onset of enzootic ataxia in deer compared with sheep.

Copper requirements also vary within deer with elk being more susceptible to copper deficiency than red deer on similar country.

The daily dietary copper requirements and many aspects of copper metabolism in deer have not been established.

Secondary copper deficiency in deer can be induced by the wrong combinations of feed or incorrect feeding methods.

Lupin grain is high in molybdenum while lucerne is high in sulphur. The combination can have a depressing effect on the absorption of copper. In addition feeding on the ground rather than in troughs, will lead to the ingestion of soil and hence iron which will further depress copper absorption.

## **Copper Deficiency and deer**

#### 1. Enzootic ataxia

- This is the disease most commonly associated with copper deficiency in deer. Other factors, possibly genetic, may be involved.
- It is a sporadic disease involving demyelination of the spinal cord and is not seen until deer are about 9 – 12 months of age (deer are born with high levels of liver copper).
- The symptoms are typically a lack of co-ordination in the hind limbs which is due to disruption of the nerve cells in the spinal chord
- The condition is progressive and irreversible with eventual paralysis, recumbency and death.

#### 2. Osteochondritis

Resulting in joint damage-especially to the hip and hock in yearling animals.

#### 3. Poor growth rates

#### 4. "Steely" coats

- Dull, harsh, brittle hair coat which may lighten in colour and may break off leaving bare areas.
- 5. Reduced immune function increasing susceptibility to other diseases.

#### 6. Lowered fertility in hinds has been reported.

#### Diagnosis

The most accurate diagnosis is based on the levels of copper in the liver, however, practical purposes, blood copper levels are used. It is necessary to test 10 deer from a herd before an accurate assessment can be made.

Serum copper levels in "normal" deer range from 8 to 24 umol/L.

Reference ranges	Liver(fresh) (umol/kg)	Serum (umol/L)
At risk	<60	<5
Marginal	60-100	5-8
Adequate	>100	>8

#### Prevention and treatment.

Copper oral "bullets" Copper injections Copper sulphate in licks or rations Pasture top-dressing with copper sulphate

Deer should not be treated with copper products unless the copper status of the herd is known. Copper toxicity, and deaths, may result if no deficiency state exists.

Injectable copper and rapidly absorbable oral preparations cause a rapid rise in blood and liver copper and may result in growth rate reduction and weight loss even in deer with copper status in the adequate range. Slow release oral supplementation presents a lower risk of toxicity.

Copper toxicity in sheep has been recorded in some regions with heavy clay soils high in copper and with low molybdenum levels. Note also that some plant species can accumulate copper- a definite diagnosis is essential.