



Livestock Factsheet

➤ Mineral Deficiencies in Livestock



Mineral deficiencies in sheep and cattle

Trace elements are required for animal growth and production. In plants these trace element levels can cause nutrient deficiencies in grazing animals. Mineral deficiencies commonly found in Victoria and discussed in this paper are Copper, Selenium and Cobalt.

Some trace elements are required for both plants and animals for example copper, others such as selenium are required more by animals than plants.

In cases of animal deficiency or toxicity, it is more economical to treat animal health than to amend the land by application of fertilisers/trace elements.

Methods for testing trace element deficiency

Plant tissue testing

Plant tissue testing is the preferred method for diagnosing the trace element status of a pasture. Different paddocks may have different trace element deficiencies due to factors such as soil type, pasture species and fertiliser history.

Soil Testing

Should be done along with plant tissue testing as this is where the plants gain their nutrients. It's more of an indirect measure of trace element status for grazing stock and therefore has a limited diagnostic value in that regard but aids in gaining knowledge for pasture trends.

Animal Testing

Body fluids (urine, blood and saliva) along with liver and bone tissue testing can be used to directly determine trace element deficiency or toxicity in animals.

The most definitive diagnosis can often be made from measured improvements in the health and production of animals following supplementation.

Clinical signs livestock are generally the rule of thumb in discovering problems on farm. Speak to your veterinarian or herd/flock advisor for further information on assessing trace element deficiencies in your livestock.

Trace Elements

Copper

Animals have a higher copper requirement than plants. It's needed for body, bone and wool growth.

Copper deficiency may be primary where the pasture being grazed does not carry sufficient copper or secondary where the dietary levels of copper are sufficient but other factors interfere with its utilisation. Such factors can include excess dietary molybdenum and lime application.

Historical data on copper levels should be used as a guide only. Fertiliser application may change copper levels on individual properties in regions/areas. Ask your DEPI regional contact for local detail on deficient areas.

Copper deficiency may occur in animals due to:

- grazing for extended periods on green feed as copper is more readily available in dry feed
- pasture type, as grasses have a lower copper level than clovers
- seasonality in Victoria with deficiency more likely to occur in the winter-spring period and resolving itself during the summer months
- high dietary intake of other elements, e.g. molybdenum, sulphate

Clinical Signs of copper deficiency may include:

- rough coat in cattle or steely wool in sheep
- fading of the coat, usually starting around the eyes. In cattle, this may include sandy coloured Herefords or a bronze coloured coat in Angus
- poor growth and body condition in cattle
- diarrhoea in cattle

- swayback in lambs
- sudden death (“falling disease”) in cattle

Excess copper can be toxic. For this reason, care should be taken when considering copper supplementation of livestock.

Selenium

Selenium (Se) is an essential element for animals but not plants. It is required for growth and prevention of white muscle disease in lambs and calves. White muscle disease (myopathy) is a degenerative disease affecting the skeletal and cardiac muscles causing weakness and death. Selenium also plays a role in providing resistance to disease and reproductive efficiency such as fertility and reduced incidence of retained afterbirth.

Seasonal variation can impact selenium levels of grazing livestock, with the lowest levels occurring in spring and summer. The dietary requirement is 0.05 to 0.1 mg Se/Kg of sheep and cattle (table 1). Many pastures in Victoria contain much less, sometimes failing to meet the requirements of stock. Known selenium deficient areas have acidic soils, high rainfall (> 500ml annual rainfall) and pastures with high super phosphate application and clover dominance.

Lambs in Victoria are more commonly known to be affected, with young stock being more affected during lush feed situations. White muscle disease in lambs and calves is more prevalent in years when there is good autumn rainfall and abundant supply of clover in spring.

Clinical Signs of selenium deficiency may include;

- ill thrift in young cattle and sheep
- poor growth
- reduced conception rates, especially in younger breeding heifers and ewes
- reduced wool production
- retained foetal membranes
- stiff legged gait
- sudden death

Flocks experiencing significant cases of white muscle disease annually should administer a selenium supplement to:

- rams and ewes prior to mating
- ewes in mid to late pregnancy to ensure adequate selenium levels are transferred to the foetus
- lambs at marking and weaning

Excess selenium can be toxic. For this reason, care should be taken when considering selenium supplementation of livestock.

Cobalt/Vitamin B12

Cobalt is essential for the production of vitamin B12 in the rumen. In plants cobalt is required in minute amounts by bacteria that fix nitrogen in legumes.

Cobalt, and therefore vitamin B12, deficiency can be seen in association with heavy liming and applications of superphosphate.

Seasonal variations in pasture cobalt levels are significant. Concentrations of cobalt in pastures and corresponding levels of vitamin B12 in livestock are lowest during the spring flush. This may be due to stock not ingesting soil when grazing lush, rapidly growing pastures. Soils provide a more concentrated source of cobalt for ruminants than pastures.

Cobalt deficiency in sheep and cattle occurs in soils measuring cobalt concentrations of less than 0.10 mg/kg dry weight (table 1). A blood test may be used to confirm deficiency but this is not widely available. Response to treatment may be the most accessible way to assess deficiency.

Animals deficient in cobalt and vitamin B12 may exhibit the following symptoms:

- poor appetite
- poor body condition
- weeping ‘rheumy’ eyes
- scaly ears
- anaemia
- decreased milk production
- death in severe and prolonged cases

Immediate treatment for animals showing clinical signs of deficiency is a vitamin B12 injection, which may last up to 3 months depending on the level of the deficiency.

Young, growing animals and pregnant/lactating animals have the highest requirement for vitamin B12.

Prevention and treatment strategies for mineral deficiencies

Mineral supplementations are available as injections, capsules (boluses), drenches, pour-ons or as loose licks depending on the mineral(s) to be supplemented. They can also be applied through fertiliser additives or pasture sprays but aren’t as effective at directly treating the animal. Before starting an intensive supplements program it is recommended you consult with your local veterinarian or ruminant nutritionist.



It is useful to know what mineral deficiencies are common for your area. This information can be found by contacting your local veterinarian or DEPI office for mineral deficiency data.

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	Cattle	Sheep
Macrominerals	g/kg	g/kg
Calcium	3.5	3.0
Phosphorus	3.0	2.0
Sodium	1.5	1.0
Chlorine	2.0	1.0
Potassium	5.0	4.5
Sulfur	1.5	2.0
Magnesium	1.5	1.0
Trace elements	mg/kg	mg/kg
Iron	40	40
Zinc	25	20
Manganese	25	25
Copper ²	5 to 12	5
Cobalt	0.10	0.10
Iodine	0.50	0.50
Molybdenum	0.10	0.10
Selenium	0.05	0.05

¹ Based on data presented by the ARC (1980), Grace (1983), NRC (1978), Underwood (1981) these amounts represent the average requirements for growth, pregnancy or lactation, in grazing livestock.

² Copper requirements are strongly affected by the concentrations of molybdenum, sulphur and iron.

Table 1. Recommended minimum element concentrations in pasture dry matter for grazing cattle and sheep¹ *Source: Victorian Resources Online, DEPI Victoria*

Further Links

Department of Environment and Primary Industries Victoria
<http://www.depi.vic.gov.au/about-us/our-regions>

Victorian Resources Online
http://vro.dpi.vic.gov.au/dpi/vro/vrosite.nsf/pages/trace_elements_pasture1

Making More from Sheep
http://www.makingmorefromsheep.com.au/healthy-contented-sheep/tool_11.7.htm

Zoetis Australia
<http://www.zoetis.com.au/documents/e/2043/9595,Selenium.pdf>.

For further information, please contact the VFF Livestock Group on 1300 882 833 or by email to Kate Henne at khenne@vff.org.au

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Take Home Messages

- In cases of animal deficiency or toxicity, it is more economical to treat animal health than to amend the land by application of fertilisers/trace elements.
- It is useful to know what mineral deficiencies are common for your area. This information can be found by contacting your local veterinarian or DEPI office for mineral deficiency data.



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