The management of trace elements in sheep
Bestwool Bestlamb phone seminar

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Agenda

• What are the key trace element deficiencies

• Understanding risk factors and diagnosis

• Cost effective supplementation
Important interactions

• Intensification of system often induces more severe deficiency
  – Fertiliser
  – Pasture species
  – Pasture growth (dilution)

• Seasonal interactions
  – Winter - spring - summer

• Complicated interaction with other minerals
What are the key trace element deficiencies?

– Copper

– Selenium

– Cobalt

– Iodine
Copper deficiency: Where?

- Coastal sandy soils
- Granite soils
- Peat soils
- other soils (interactions)
- High lime application
Copper deficiency

- Low copper areas
- Crown lands/forests
  Vic. G.P. pp 52-53
- Local government area boundaries
- Cities, towns

Kilometres

Mildura
Swan Hill
Horsham
Bendigo
Benalla
Seymour
Melbourne
Warrnambool

Bairnsdale
Warragul
Maffra
Leongatha
Ballarat
Colac
Hamilton
Seymour
Copper deficiency complicated

- Low pasture copper levels
  - Low levels in specific soils
  - Grass < clover
  - Green feed < dry feed

- Complicated interactions
  - Molybdenum (peat swamps, excess Mo applied)
  - Liming pasture makes Mo more available
  - High sulphur
Copper availability

Copper status:
- Adequate
- Marginal
- Deficient

Liver copper:
- Autumn break
- Decreasing
- Increasing
- Decrease depends on:
  1. Rainfall / pasture
  2. Molybdenum interaction

Plasma copper:

Red blood cell, tissue copper:

Seasons:
- Summer
- Autumn
- Winter
- Spring
- Summer
Copper deficiency: Clinical Signs

- wool:
  - Steely wool, loss of pigment in black wool
  - Don’t confuse with poor nutrition

- Low Growth (10-15% max more likely cattle high moly May-Oct)
  - Plasma copper must be low >1 month
  - Often Mo > 3 mg/kg DM or Cu:Mo ratio < 2

- Diarrhoea (more cattle)

- Infertility – over rated

- Skeletal abnormalities broken bones

- Enzootic ataxia (swayback) in young lambs
Copper deficiency: Diagnosis

- Blood and liver copper

- Also consider pasture Mo, S & Cu
  - Herbage Cu > 7 mg/kg (stock), 3 mg/kg pasture clover (response trial)
  - For every 4 mg/kg Moly, Cu availability reduces by 50%

- Soil copper: waste of time
Copper supplementation

- Care with too much copper – toxic
  - Especially when on dry feed
  - Sheep previously grazing Paterson’s Curse or Heliotrope

- Copper pellets (9-12 months)

- Oral drench copper sulphate
  - 1-2 monthly
  - Weekly where Mo high

- Copper injection
  - Registered for cattle

- Water dispenser (no good in winter!)

- Top dress pastures (up to every 15 years)
  - ~0.5 - 2 kg/ha depends on situation
Selenium deficiency: Where?
Selenium deficiency complicated

- Low pasture selenium levels
  - Lowest levels in spring & summer
  - Lowest in years of good autumn rain and lush clover growth

- Complicated interactions
  - Lower levels with heavy superphosphate applications
  - Dilution with extra pasture growth
  - High sulphur reduces Se availability

- Sheep very sensitive especially merinos < 12 mnths
Selenium deficiency Clinical Signs

- White muscle disease
  - Lambs (at birth or young lambs under stress)

- Illthrift, poor growth young sheep
  - 10% wool growth response

- Infertility, retained membranes

- Increased susceptibility to disease

- Bigger responses in sheep than cattle
Selenium deficiency: Diagnosis

- Blood and liver Selenium
- Blood Glutathione peroxidase
- Also consider pasture Se
  - Note no plant requirement
- Soil selenium: waste of time
Selenium supplementation

- Selenium pellets
  - 3 years sheep

- Long acting injection
  - Injection Deposel® (availability issue at moment)
  - 2 years protection in sheep

- Selenium in drench for sheep (short acting 6-8 weeks) and shorter acting injections

- Selenium in vaccine (dose enough for lamb at lamb marking)

- Water dispenser

- Selenium in super- Selcote (2 years)
Cobalt deficiency: Where?
Cobalt deficiency

- Cobalt converted to Vitamin $B_{12}$ in rumen
  - Required in various metabolic pathways including metabolism of propionate (cellulose)
  - Lowest in spring and lush years “starvation in the midst of plenty”

- Specific soils
  - Coastal calcareous soils
  - Mountain kraznosems (Co bound)
  - Granite soils
  - Liming and high super application will increase risk of deficiency

- Response does not occur in all years

- Some pasture response (required in nitrogen fixing rhizobia legume nodules)
Cobalt deficiency Clinical Signs

- Poor growth
  - 2-5 kg response in 5 weeks, 0.7 kg wool growth response

- non specific illthrift

- Photosensitization due to Liver damage

- Phalaris staggers Cobalt protective even though cobalt may not be deficient
Cobalt deficiency: Diagnosis

- Blood vitamin $B_{12}$ levels most common

- Liver vitamin $B_{12}$, cobalt

- Pasture cobalt levels ($<0.1$ mg/kg DM)

- Response trial
Cobalt supplementation

- Vitamin B12 injection
  - Up to 3 months
  - In vaccine +/- selenium

- Cobalt pellets
  - 3yrs sheep

- Cobalt oral supplementation/licks short acting

- Water dispenser

- Pasture application (consider pasture requirement too)
  - response variable especially calcareous soils with high Mn
Iodine deficiency

- Lush wet years (>100 mm in 3 months before lambing)
- Goitrogens (white clover brassica crop)
- Goitre
  - More commonly recognised in sheep
  - Spring calving high rainfall years (good autumn break)
  - Diagnosis Thyroid > 0.4 g / kg BW lamb

- Prevention
  - Potassium iodide drench sheep
  - Iodized salt licks
Conclusion

– Substantial economic response to trace element if deficiency present

– No response when not deficient: monitor

– Assess your herds status before spending money

– Intensification can induce more severe deficiencies

Acknowledgement:
Trace elements for pastures and animals in Victoria
www.dpi.vic.gov.au