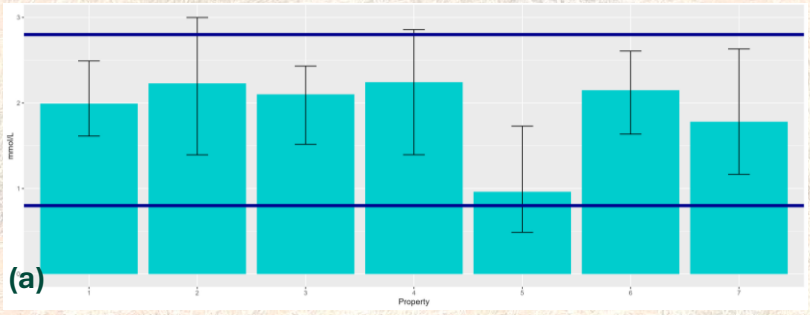


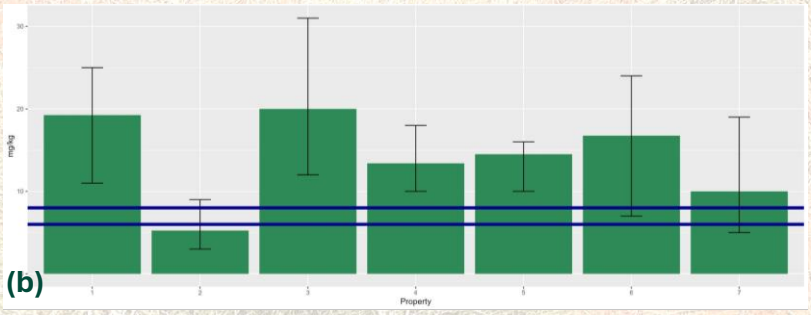
SA Rangeland Mineral Testing

Meeting the macro and micro mineral requirements for cattle is essential for growth, health and reproduction. However, Australian soils are commonly deficient in several of these minerals with cattle often requiring nutritional supplementation. Research in other states has demonstrated the health and productivity benefits of correcting mineral deficiencies, particularly Phosphorous, although this work is yet to be adequately validated across the South Australian rangelands.

This project tested cattle (blood and faeces), soil and water from seven stations across northern South Australia in spring of 2023. A range of minerals and water/soil quality traits were measured.

Figure: ***Phosphorous concentrations in (a) blood and (b) soils for 7 SA rangeland cattle stations. Horizontal lines indicate the "normal range" for phosphorous in blood (for maintenance) or pastoral soils.***





Key Project Findings

- At the time of sampling, mineral status of cattle was appropriate for majority of cattle and properties tested.
- Based on sampling, there was no clear need for supplementation in these areas, at that time.
- In many cases environmental calcium (Ca) was high, resulting in a high Ca:P ratio. A high Ca:P ratio can result in phosphorous (P) being tied up and not utilised appropriately.
- Moderate to high fluoride levels were detected in some bore water. High fluoride levels can reduce P absorption.
- Faecal NIR wasn't a reliable indicator of feed quality on the sites and further validation of this method is required for South Australian pastoral species.
- Future work in SA rangelands should undertake testing over multiple seasons and land types to accurately define mineral status and supplement requirements for these areas.



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Mineral and trace element deficiencies and toxicities in cattle.

Adapted from Outback Lakes Group 2013 Final Report.

Mineral	Function in body	Deficiency symptoms	Toxicity Symptoms	Comments
Phosphorous	Required for muscle contraction, bone strength, oxygen delivery and metabolism	Poor skeletal growth Loss of appetite Pica o Consumption of abnormal materials (eg dirt or bark) Infertility	Sudden death, some animals found with head swelling May predispose animals to water belly (see above – Calcium)	High levels of P can induce a calcium deficiency, therefore a Ca:P greater than 2:1 is desirable
Calcium	Essential mineral component of skeleton. Also assists in muscular contraction, blood coagulation and hormone secretion.	Milk fever o Muscle tremors o Staggers o Unable to stand Water belly o Straining to urinate o Swollen abdomen o Hunched up appearance Poor skeletal growth Bone abnormalities Reduced milk production	Toxicity rarely occurs High levels of calcium in late pregnancy may predispose animals to milk fever	Calcium deficiency can be induced by comparatively high phosphorus levels, a Ca:P greater than 2:1 is desirable
Copper	Key component of the immune system; basic role in red blood cell development	Poor growth (calves) Faded coat colour Thin, wavy, harsh coat Anaemia Osteoporosis Abnormal gait Swayback Diarrhoea Infertility Reduced immune response Sudden death	Accelerated breathing Weakness Excessive thirst Dark brown urine Arched back Jaundice Diarrhoea Death	Copper deficiency can be induced by comparatively high molybdenum levels, a Cu:Mo greater than 5:1 is desirable
Selenium	Required for normal growth and fertility	White muscle disease o Sudden death of young calves o Poor growth (calves) o Stiff-legged gait (calves) o Weak and unable to stand Diarrhoea Low milk yield Poor fertility Retained fetal membranes Mastitis Premature calves/abortion	Most toxic of the trace minerals Respiratory distress Anorexia/Emaciation Diarrhoea Hair loss Lameness Shedding of hooves Death	Strong link with Vitamin E deficiency. Selenium deficiency may exacerbate an Iodine deficiency.
Sodium	Important component to create the movement of water throughout the body	Pica Salt craving Dehydration Hypothermia Excessive water intake Loss of appetite Rough coat Weight loss Reduced milk production	Reduced growth rate Anorexia Water retention Vomiting Diarrhoea Excessive water intake Muscular spasms Convulsions	

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