

AVAILABILITY OF CALCIUM IN OXALATE-CONTAINING TROPICAL
GRASSESTO HORSES AND CATTLE

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Dietary oxalate causes nutritional secondary hyperparathyroidism (NSH) in horses grazing several tropical grasses (McKenzie, Blaney and Gartner 1981). Hays containing 0.8 to 3.8% total oxalates produced negative calcium (Ca) balances of up to 41mg/kg live weight/day (Blaney, Gartner and McKenzie 1981a). The degree of negative Ca balance could not be reconciled with total Ca and total oxalate concentrations, but could be explained if a major fraction of Ca in the grasses was in the form of Ca oxalate crystals and this was unavailable for absorption. This was supported by the finding that horses in negative Ca balance could only absorb 6% of Ca from a single dose of Ca oxalate (Blaney, Gartner and McKenzie 1981b).

Balance studies to correct oxalate-induced negative Ca balances using supplements fed as a single large dose once weekly showed retentions of Ca ranging from 19 to 40% which accommodated Ca losses of at least 20mg/kg live weight/day (Gartner, Blaney and McKenzie 1981). Supplementation in the field prevented and cured NSH in endemic areas.

NSH occurs in stock horses in beef cattle areas in Queensland where hazardous grasses have become a virtual monoculture. The availability of Ca in these grasses to cattle was examined particularly as Ward, Harbers and Blaha (1979) reported that Ca in the form of Ca oxalate crystals in lucerne is apparently unavailable to ruminants. Horse and cattle balance data are compared below for intakes below and above Ca requirements.

Grass	Species	Intake ⁺	Faeces ⁺	Urine ⁺	Balance ⁺	Absorption [†] (%)
Kaz. setaria	Horse	22.2	49.5	4.0	-31.3	0
(1.3% oxalate)	Cattle	14.1	22.4	3.7	-12.1	52
Buffel	Horse	54.9	73.2	2.8	-21.1	7
(1.3% oxalate)	Cattle	48.5	38.8	0.2	9.5	53

⁺ mg Ca/kg live weight/day

[†] Estimated using endogenous faecal Ca excretion of 22.0 and 15.7 mg/kg live weight/day for horses and cattle respectively

A subsequent experiment showed absorption of Ca from single doses of Ca oxalate and Ca carbonate by cattle of 27 and 46% respectively. Thus oxalates only marginally affect the absorption by cattle of Ca from tropical grasses. The differences between cattle and horses can be explained by their anatomical differences in relation to the site of oxalate degradation and of Ca absorption.

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