

COBALT PREVENTS LIVER DAMAGE CAUSED BY TOXIC ANNUAL RYEGRASS

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Annual ryegrass toxicity (ARGT) is a neurological disease of livestock caused by the corynetoxin found in annual ryegrass infected by *Clavibacter toxicus* (Riley and Ophel 1992). Phalaris staggers can be alleviated by cobalt which might act by reducing the absorption of toxins possibly by stimulating microorganisms in the rumen to degrade toxins to non-toxic forms (Lee and Kuchel 1952). Since corynetoxin from ryegrass is also a cyclic hydrocarbon similar to the toxin from Phalaris staggers we investigated whether cobalt would protect sheep against toxic ryegrass.

Twenty Merino wethers maintained at 32 kg live weight on a basal diet of oaten straw containing 12% lupins were allocated to four treatment groups each of five sheep: Control (basal diet); Cobalt (basal diet plus 4 mg/day of cobalt drenched as an aqueous solution of $\text{CoSO}_4 \cdot 7\text{H}_2\text{O}$); Ryegrass (basal diet supplemented with 35 g/day of infected seed providing a cumulative dose over 21 days of 2.1 mg of corynetoxin per kg bodyweight) and Cobalt plus Ryegrass (basal diet plus cobalt and 35 g/day of infected seed). The experiment lasted 3 weeks during which time all the sheep continued to eat normally and showed no clinical signs of ARGT.

Toxic ryegrass induced a rapid rise in aspartate amino transferase (ASAT) after about two weeks indicating that muscle or liver tissue had been damaged by the corynetoxin. Cobalt completely prevented this rise in ASAT and protected the tissues from damage. Glutamate dehydrogenase, an enzyme which indicates damage to liver cells, showed a similar rise in response to toxic ryegrass but this effect was not completely suppressed by the cobalt supplement.

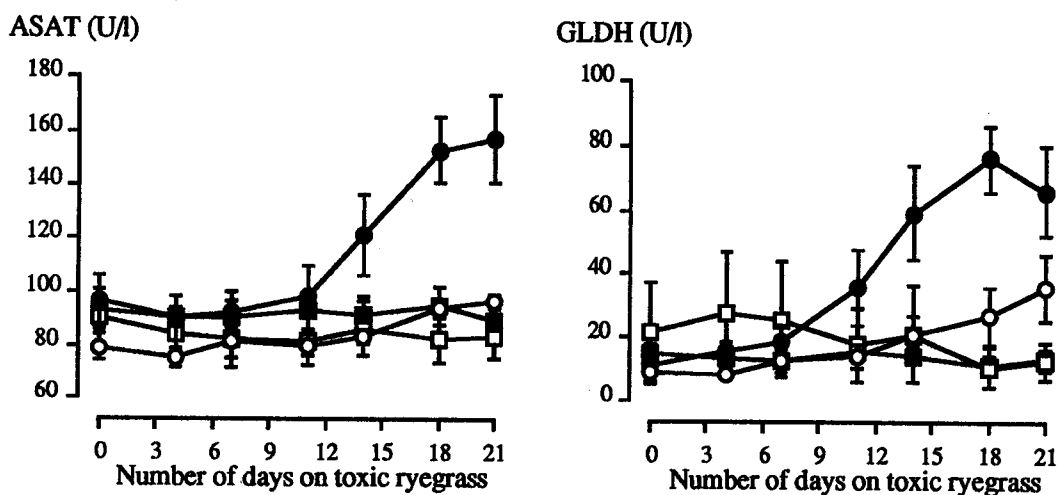


Fig. 1. Plasma concentration of aspartate amino transferase (ASAT) and glutamate dehydrogenase (GLDH) for Control (■), Cobalt (□), Ryegrass (●) and Cobalt & Ryegrass (○).

Liver damage associated with corynetoxin was suppressed by cobalt supplementation suggesting that in some way cobalt prevents the toxin from damaging tissues or reduces toxin absorption from the gastrointestinal tract. Evidence from the literature supports the latter and we suggest that the most likely mechanism is via microbial degradation in the rumen.

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