A clinical study of induced perennial ryegrass (lolitrem-B) intoxication in NZ horses.
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Perennial Ryegrass Staggers is caused by mycotoxins from the endophyte Neotyphodium lolii that grows in perennial ryegrass, Lolium perenne. The major toxin is Lolitrem – B that acts as a BK potassium channel blocker as shown in Figure 1.

Figure 1: Action of lolitrem-B.

We fed 9 horses with known amounts of Lolitrem-B contained in perennial ryegrass hay and seed, according to Massey University Animal Ethics Committee guidelines. Clinical, neurologic, electrolyte, and electrodiagnostic monitoring proceeded for at least 2 weeks before, during and 2 weeks after feeding the trial feed. All horses showed clinical signs and all recovered.

Major neurologic signs documented were:
• Muscle tremor
• Muscle fasciculation
• Vestibular ataxia
• Eyeball tremor
• Behaviour change

Heart rate and evidence for the presence of allodynia (excessive response to a physiologic, non-painful stimulus) were obtained (see Figure 2).

Figure 2: Heart rates before and during exposure to Lolitrem-B containing feed.
Possible causes of this include effect via BK channel receptors in adrenal glands, dorsal root ganglia or hypothalamus, or via contaminating ergovaline (dopamine-D₂ agonist).

Magnetic motor evoked potentials (mMEPs) were recorded and demonstrated possibly impaired motor conduction (Figure 3), in spite of there being no clinical weakness evident to the examiners.

![Figure 3: Examples of right extensor carpi radialis mMEP latencies for Horse #1.](image)

Early change in the fractional excretion of solutes (Δ FEₓ), induced by frusemide (frusemide ~ Δ FEₓ(0 – 15min)), before and after 2 weeks of exposure to lolitrem B (Figure 4), was observed. This parameter reflects how renal BK channels handling electrolytes respond to high-pressure urine flow.

![Figure 4: Changes in <frusemide ~ Δ FEₓ(0 – 15min)> before and after 2 weeks exposure to lolitrem-B.](image)

Summative reports of these studies were presented to Massey Equine, Southern North Island Equine and NZ Equine Veterinary Practitioners and at the Pan-Pacific Veterinary Conference, Brisbane. Two papers are currently under review for Equine Veterinary Journal.

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