

Incidence of ryegrass staggers in white rhinoceros (*Ceratotherium simum*) at Auckland Zoo

Most perennial ryegrass (*Lolium perenne*) plants in pastures in New Zealand contain a naturally occurring fungal endophyte, *Neotyphodium lolii*. Endophyte-infected perennial ryegrass produces alkaloids that vary in concentration during the year. Some alkaloids enhance the persistence and productivity of ryegrass pastures by protecting them against insect attack. However, when other alkaloids are consumed they can reduce animal performance and lead to health problems. The alkaloid lolitrem B, for example, causes the neuromuscular disorder ryegrass staggers (Fletcher et al 1999). Clinical symptoms of ryegrass staggers in animals range from slight muscular tremors through to staggering and complete collapse. Severely affected animals create management problems and are prone to accidental death. Outbreaks occur sporadically, particularly in summer and autumn and affect sheep, cattle, deer, horses, llamas (*Lama glama*) and alpaca (*Lama pacos*). Lolitrem B appears to be a stable compound, which tends to be concentrated in the leaf sheath at the base of the ryegrass plant and in the seed-heads (di Menna et al 1992; Keogh et al 1996). Hay made from endophyte-infected perennial ryegrass contains large numbers of seed-heads and lolitrem B concentrations can be high, especially if it is made in late summer or autumn and, consequently, animals fed such hay are at risk of developing ryegrass staggers.

Ryegrass staggers in two white rhinoceros (*Ceratotherium simum*) was recorded at Auckland Zoo in March 2001. Mazithi, a 17-year-old female, showed a sudden onset of head and leg tremors, was unsteady on her feet, uncoordinated, and lethargic for 5 days. She was recorded as having displayed similar symptoms in December 1999 and January 2001. Mandhia, a 24-year-old male, also showed similar symptoms for 2 days, and a veterinarian made a provisional diagnosis of ryegrass staggers. Both rhino were kept in the same enclosure and were each being fed one small bale of pasture hay, one to two biscuits of lucerne hay and 1–2 kg of horse and pony pellets (NRM New Zealand Limited, Auckland) per day. The hay, which was purchased from a farm in Auckland, was removed from their diet and replaced with barley straw and lucerne hay, and after 2 days the rhino recovered uneventfully.

A sample of hay was sent to Dexcel, Hamilton. A sub-sample was dissected into ryegrass, other grasses and weeds, then dried at 95°C for 36 h in an oven, then weighed. Separate samples of the hay, perennial ryegrass leaf and stem, and perennial ryegrass seed-head fractions were frozen to –20°C, freeze-dried and ground to pass a 1 mm sieve, before analysis by AgResearch, Palmerston North, for lolitrem B concentration, using high performance liquid chromatography (Spiering et al 2002).

The hay sample contained 40% perennial ryegrass, 28% other grasses and 32% weeds. The concentrations of lolitrem B detected were 1.0 mg/kg dry matter (DM) in the total hay, 1.7 mg/kg DM in the perennial ryegrass leaf and stem, and 5.6 mg/kg DM in the perennial ryegrass seed-head samples.

Previous research has shown that sheep (di Menna et al 1992) and horses (Fink-Gremmels and Bull 2000) can develop staggers when they consume a diet of perennial ryegrass containing lolitrem B concentrations of about 2.0 and 1.2 mg/kg DM, respectively. The

rhinoceros and horse belong to the order Perissodactyla, and it is possible that rhino are also sensitive to lolitrem B. However, no other animal at the zoo showed signs of ryegrass staggers, including zebra (*Equus burchelli*), which were fed the same pasture hay.

To avoid ryegrass staggers, livestock, including those in zoos or wildlife parks, should not be fed hay made from perennial ryegrass infected with wild endophyte. Hay made from endophyte-free perennial ryegrass, annual ryegrass (*L. multiflorum*), red clover (*Trifolium pratense*) and lucerne (*Medicago sativa*) do not contain endophyte or lolitrem B. Perennial ryegrass cultivars infected with the novel endophyte AR1 (no lolitrem B production) are now available (Tapper and Latch 1999), and hay made from them will not cause ryegrass staggers.

References

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