

## Induction of hypomagnesaemia in lactating dairy cows with a high grass tetany hazard ratio diet

B. Avery<sup>A</sup>, E.E. Dunne<sup>C</sup>, M.J. Callaghan<sup>B</sup>, S.A. Wainwright<sup>C</sup>, L.J. Edwards<sup>A</sup>, & A.J. Parker<sup>C</sup>

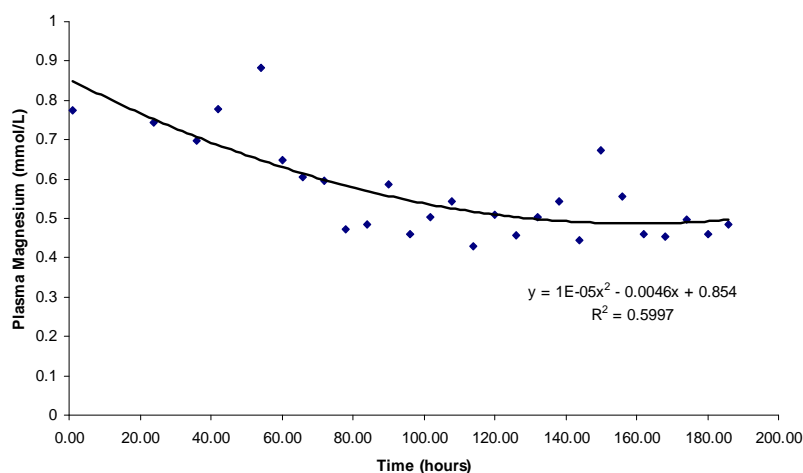
<sup>A</sup>Ridley AgriProducts Pty Ltd, 70-80, Bald Hill Road, Pakenham, Victoria, 3810

<sup>B</sup>Ridley AgriProducts Pty Ltd, 1325, Boundary Road, Wacol, Queensland, 4076

<sup>C</sup>School of Veterinary and Biomedical Science, James Cook University, Townsville, Queensland, 4811

Magnesium (Mg) is an essential mineral for all cattle, especially lactating cows and as such is routinely administered as a feed supplement. A diet low in Mg can have serious implications on performance and ultimately lead to hypomagnesemic tetany and death in ruminants. Similarly a diet high in potassium (K) can increase the risk of grass tetany due to its inhibitory effect on Mg absorption (Elliott, 2007). The aim of this study was to develop a method based on the manipulation of the Calcium (Ca), K and Mg ratio (grass tetany hazard ratio; Elliott, 2007) to induce hypomagnesemic tetany in lactating dairy cattle. If successful, this method can then be used to investigate the physiological response of lactating dairy cattle to Mg supplementation.

Four lactating multi-parous Holstein Friesian cows, 4-8 years in age and yielding approximately 20 litres of milk per day, were allocated to the study. The cows were housed in individual pens and fed *ad libitum* a total mixed ration consisting of chaffed Rhodes grass hay, whole cotton seed, concentrate pellets and a molasses-based liquid feed from 0 to 48 h. Blood samples were taken for mineral analysis. Individual indwelling venous catheters were inserted at 48 h and a blood sample taken from each cow. At 48 h, cattle were given a K challenge, by means of a total mixed ration with a grass tetany hazard ratio (K/Ca + Mg) in excess of 2.2 (Elliott, 2007). Blood samples were taken every 6 hours during the challenge period. Cattle were closely monitored for signs of clinical hypomagnesaemia.



**Figure 1. Mean plasma magnesium concentration (mmol/L) for four Holstein Friesian cows fed a total mixed ration diet with a grass tetany hazard ratio in excess of 2.2**

At the commencement of the study, the mean plasma magnesium levels were within the normal physiological range (0.70 – 1.23mmol/l) for this mineral (Radostits et al. 2000). Subclinical hypomagnesaemia was induced within 12 h of changing the diet (Figure 1). Although plasma Mg concentrations fell below safe physiological levels (Radostits et al. 2000), the cows were not observed to display clinical signs of hypomagnesaemia.

Through the manipulation of the grass tetany hazard ratio within a feed ration, a successful method of inducing hypomagnesaemia has been demonstrated in this study. We propose that this method can be used to investigate the physiological response of lactating cattle to Mg supplementation when challenged with a high grass tetany hazard ratio diet.

Elliott, M. (2007). "PrimeFacts 420 Grass Tetany in Cattle" (NSW Department of Primary Industries).

Radostits O.M. et al (2000). "Veterinary Medicine", 9th ed. (W.B. Saunders Company Ltd).

Email: ledwards@ridley.com.au