

Controlling carbohydrate induced laminitis in horses

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Horses consuming large quantities of rapidly fermentable carbohydrate in the form of starch or sugars may develop laminitis. The first step in the development of this condition is almost certainly severe acidosis associated with reduced volatile fatty acid production and the uncontrolled accumulation of lactic acid. The risk of this fermentation pattern developing can be reduced or eliminated by controlling the gram positive bacteria such as *Streptococcus bovis* and *Lactobacillus sp.* which are primarily responsible for production of lactic acid at low pH during anaerobic fermentation within the gut. Founderguard™ is the formulation of virginiamycin for use in horses and is designed to deliver active compound to the hindgut and mix with caecal digesta. Two experiments were conducted to demonstrate that Founderguard™ provided good protection against the development of laminitis provided that it is administered prior to the carbohydrate challenge.

Twenty one horses were used, eight control animals, eight treated with Founderguard™ prophylactically for three days before carbohydrate challenge and five treated with Founderguard™ therapeutically six hours after the carbohydrate challenge. All horses were dosed with ground wheat (12 g/kg liveweight) prepared as a slurry and pumped into the stomach using a model similar to that of Garner *et al* (1975, Am J Vet Res, 36, 441). This was given in two equal amounts with an interval of 6 hours between doses. Samples of

blood were taken at eight hour intervals for analysis of D-lactic acid and blood gases (the table shows lowest pH and highest lactate values during the 48 h period). All animals were slaughtered 48 h after the first dose of wheat. Hoof sections were taken from the mid-dorsal hoof wall and preserved for histological examination. Four categories of histological damage were described as follows : (Score 1) normal, no visible lesions ; (Score 2) mild changes at the tips of the primary epidermal lamellae (PEL) ; (Score 3) changes at the tips of the PEL and changes in between the PEL ; (Score 4) changes at the tips of the PEL, in between the PEL and changes between the secondary epidermal lamellae.

Animals treated prophylactically with Founderguard™ had lower ($P < 0.01$) blood D-lactate (from gut microbes) and maintained a higher ($P < 0.05$) blood pH than the control animals or those treated after administration of the wheat. None of the animals treated prophylactically with Founderguard™ showed clinical signs of lameness compared to approximately 75 % of those in the control and therapeutic treatment groups. There was a significant correlation between clinical lameness and histological diagnosis ($R^2 = 0.86$). It was concluded that by preventing lactic acidosis in the hindgut, Founderguard™ reduced the risk of laminitis. Administration of Founderguard™ after carbohydrate challenge was not effective in controlling acidosis or laminitis.

Treatment	n	Blood D-lactate		Blood pH		Faecal pH		Histology	
		Mean	s.e.	Mean	s.e.	Mean	s.e.	Mean	s.e.
Control	8	0.81	0.267	7.27	0.018	5.69	0.144	1.05	0.384
Therapeutic	5	0.29	0.135	7.25	0.017	5.55	0.150	1.00	0.472
Prophylactic	8	0.08	0.022	7.32	0.012	6.40	0.078	0.16	0.105