

LACTATE IN THE DIGESTIVE TRACT OF SHEEP FOLLOWING GRAIN FEEDING

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The changes that occur in sheep and cattle when large quantities of carbohydrate are introduced into the rumen include: a build up of lactic acid and reduced pH in the rumen, damage to the rumen epithelium and a pasty or soupy consistency of the faeces. The detrimental effect of large intakes of carbohydrates may be prevented by the gradual introduction of animals to grain over a period of two to three weeks, by transferring rumen contents from animals adapted to grain into those about to receive grain for the first time, or by the use of antibiotic feed additives that modify the pattern of fermentation and prevent the accumulation of lactic acid. The efficacy of methods to prevent grain poisoning have principally been investigated in terms of their effect on rumen fermentation. Changes in the intestines associated with high intakes of cereal grain have been less well documented than changes in the rumen, but it has been suggested that post ruminal changes may be important in the pathogenesis of "grain poisoning" (Lee 1977).

The objective of this experiment was to compare the effect of various strategies to reduce grain poisoning on the composition and characteristics of digesta from sheep offered 1.4 kg. of barley grain. Changes in the composition of digesta in the rumen, small intestine and caecum were measured in sheep (n=8) given the following treatments: a gradual introduction to barley (over 8 days); no introduction; virginiamycin (60 mg/day for 4 days); or rumen inoculum (600 ml./day for 4 days) prior to grain feeding.

The rumen pH was higher ($P<0.05$) and the number of sheep with a rumen lactate concentration of more than 5 mmol/L was significantly lower ($P<0.05$) in sheep receiving no introduction compared to sheep receiving the gradual introduction to barley. Conversely the pH was lower ($P<0.05$) and the molar proportion of lactate higher ($P<0.05$) in the caecum of the sheep receiving no introduction compared to sheep receiving the gradual introduction to barley.

	Gradual introduction	No introduction	Virginiamycin	Rumen inoculum	S.E.D.
Rumen					
pH	5.28	5.68	5.75	5.70	0.190
Lactate %	31.5	0.9	0.6	0.4	†
Total mmol/L	106.5	104.8	94.1	105.3	9.20
Small Intestine					
pH	6.81	6.96	7.02	7.26	0.157
Lactate ‡	55.4	30.0	39.5	34.7	
Lactate transformed*	0.84	0.58	0.68	0.63	0.086
Total mmol/L	32.2	20.7	16.7	15.3	6.09
Caecum					
pH	6.10	5.43	5.92	6.17	0.260
Lactate %	14.4	69.7	17.7	23.8	11.27
Total mmol/L	114.8	101.4	90.2	86.7	11.27

† Number of animals with rumen lactate > 5 mmol/L in each treatment group compared using Fisher's exact test, ‡ Retransformed means, * Molar proportion transformed to arc sin value.

Both virginiamycin and the transfer of rumen fluid from well adapted animals appeared to be as effective as the gradual introduction of barley in controlling lactate accumulation in the caecum and maintaining the pH in this organ. The results of this study support the suggestion of Lee (1977) that changes in post ruminal fermentation may be important in the pathogenesis of grain poisoning.

LEE, G.J. (1977). *Aust. J. Agric. Res.* 28: 1075.