

INCREASING RUMEN PROPIONATE PRODUCTION IN SHEEP USING THE  
IONOPHORE LASALOCID : EFFECT ON GLUCOSE PRODUCTION

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Ionophore antibiotics such as lasalocid increase the proportion of propionate relative to the other volatile fatty acids (VFA) produced during rumen fermentation. The increased efficiency of energy capture with this pattern of fermentation appears to be the principal way in which these compounds improve feed conversion efficiency. The aim of the experiment reported here was to investigate the effects of increased propionate production on glucose entry rate and on the proportion of glucose synthesised from propionate.

Six Merino wethers (mean liveweight 48.6 kg) housed in metabolism crates were given 700 g/d of a pelleted diet consisting of (g/kg): cereal hay (540), oats (400), fish meal (40) minerals and vitamins (20). The ration was fed in equal portions each hour from a belt feeder. After four weeks on this basal diet measurements were made of rumen propionate production using a continuous intraruminal infusion of [2-<sup>14</sup>C] propionate. Three days later blood glucose entry rate was measured using an infusion of [U-<sup>14</sup>C] glucose. During the 8 h intraruminal infusion of [2-<sup>14</sup>C] propionate, blood samples were taken to determine the proportion of blood glucose derived from propionate. Lasalocid was then included in the diet to provide 150 mg/kg feed and measurements of propionate and glucose production were repeated 14 d later. The very high concentration of lasalocid (approx 5 times that normally used) was selected to produce extreme differences in the pattern of rumen fermentation with minimal toxic side effects (Messersmith and Hanson, 1982). Samples of rumen fluid were taken on alternative days to monitor rumen VFAs.

	Diet		SED
	Basal	+ Lasalocid	
Rumen propionate % of total VFA	19.2	40.6***	2.1
Total VFA mmol/L rumen fluid	76.1	56.3*	8.7
Propionate production mmol/h	29.9	45.4**	4.4
Glucose entry rate mmol/h	16.7	19.0	1.2
Proportion of glucose C derived from rumen propionate	0.22	0.78***	0.07

Total VFA concentration was reduced through the antibiotic effect but propionate concentration and production were significantly increased. The principal effect of the higher level of propionate production was to increase the proportion of glucose carbon derived from propionate. It is possible that this was due to the increased availability of this substrate and also due to decreased supply of amino acids through microbial production in the rumen being depressed by the antibiotic. Although higher, glucose entry rate was not significantly increased by additional supply of propionate. It is likely that ionophore antibiotics may improve the efficiency of protein digestion and amino acid metabolism both by decreasing the degradation of dietary protein in the rumen (Rowe et al 1983) and through decreasing the requirement for amino acids for gluconeogenesis.

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