

Does faecal pH influence milk production in lactating dairy cows?

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The rapid fermentation of carbohydrates in the gut of animals fed diets containing high levels of grain can lead to the accumulation of acid, and a low pH in the rumen, hindgut and faeces of cattle or sheep (Dunlop 1972; Godfrey *et al.* 1992). Whether acid accumulation in the hindgut of ruminants affects their productivity is unclear. Faecal pH has been found to be a good indicator of pH in the caecum of ruminants (Clayton *et al.* 1999) and can be used to determine the acid load in their hindgut.

Two experiments were conducted to investigate the effect of virginiamycin (VM), an antibiotic feed additive active against Gram positive bacteria producing lactic acid, on milk production in cows fed high levels of cereal grains. VM has been shown to maintain higher pH in digesta and faeces in grain-fed ruminants. Experiment 1 was conducted over 28 days and involved 71 dairy cows which were fed 10 kg of high grain pellets per head daily. VM was included in the pellets at 0 or 300 mg per head daily. Experiment 2 was conducted over 62 days and involved 153 dairy cows fed 8, 11 or 14 kg daily a 50:50 mix of barley and lupin grain, each of these amounts with or without 300 mg VM. Statistical analysis was carried out using repeated measures analysis (SAS Institute Inc. 1997).

Addition of VM to the diet resulted in a significantly higher faecal pH in both trials. This indicates that pH in the caecum and colon of these animals was also higher (Clayton *et al.* 1999). The increase in milk yield observed in Experiment 1 with VM addition was associated with an increase in rumen pH. In experiment 2, there was no increase in rumen pH nor milk yield with VM inclusion. These results suggest that rumen pH may play a more important role in affecting milk yield than hindgut pH.

Clayton, E.H. and Rowe, J.B. (1999). Predicting caecal pH from faecal pH. *Recent Advances in Animal Nutrition in Australia* **12**, 13A.

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Godfrey, S.I., Boyce, M.D., Rowe, J.B. and Speijers, E.J. (1992). Changes within the digestive tract of sheep following engorgement with barley. *Australian Journal of Agricultural Research* **44**, 1093–1101.

SAS Institute Inc. (1997). SAS/STAT Software: changes and enhancements through release 6.12. SAS Institute Inc., Cary, NC.

Table 1 Faecal and rumen pH and milk yield of dairy cows fed a high grain pellet without (Control) or with VM at 300 mg per head daily.

Measurement	Control	VM	SED	P values		
				VM	Time	Time x VM
Experiment 1						
Rumen pH	6.90	7.00	0.08	0.09	0.04	0.09
Faecal pH	6.59 ^a	6.72 ^b	0.04	<0.01	<0.01	0.41
Yield (L/hd)	23.32	23.89	0.49	0.09	<0.01	0.68
Experiment 2						
Rumen pH	6.80	6.88	0.07	0.425	<0.01	0.62
Faecal pH	6.48 ^a	6.59 ^b	0.04	<0.01	<0.01	0.50
Yield (L/hd)	26.60	26.70	0.46	0.466	<0.01	0.24

Means in each row with different superscripts differ significantly ($P < 0.05$).