

# The acid test — how can we measure hindgut acidosis?

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A high level of starch in faeces is an indication that undigested starch is leaving the small intestine, therefore posing a risk of hindgut acidosis (Godfrey *et al.* 1992). This condition is not easily identified and may have serious consequences for animal health and cause economic problems (Rowe 1997). This paper summarizes three studies that examined quick, indirect methods to predict hindgut fermentation. It was hypothesised that in cattle fed concentrated diets, analyses of faeces could indicate the presence of hindgut acidosis and be related with each other and with depressed feed intake or reduced feed conversion efficiency.

In the first trial Angus and Angus-crossbred steers ( $n = 130$ ) were fed for 113 days on a barley-based ration. Daily feed intake was recorded, and each fortnight fresh faecal samples were taken when the animals were weighed for determination of pH, dry matter and total nitrogen. There were no correlations among any of the measured faecal characteristics with feed conversion efficiency and liveweight gain.

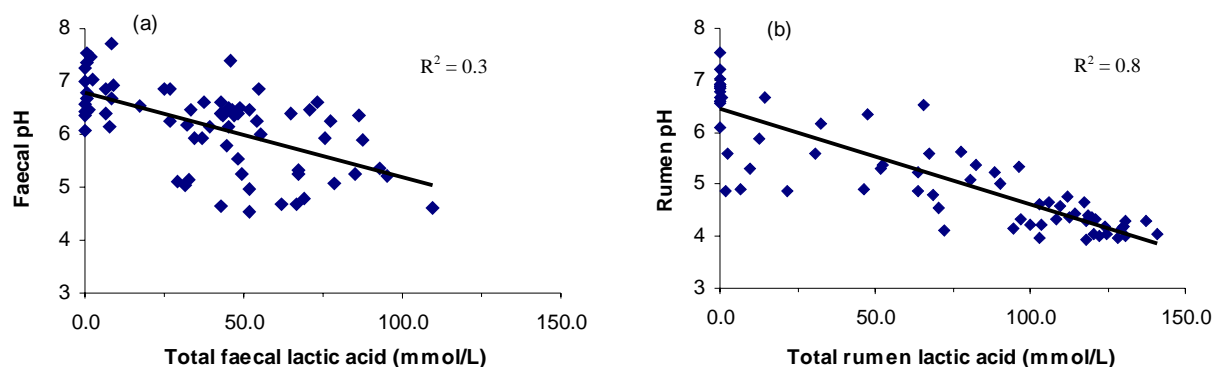
In a second study samples of faeces were taken from feedlot cattle fed steam flaked wheat and barley-based rations. When grain was heavily steam flaked ( $\sim 42$  kg/hL) there was less than 4% starch in the faecal dry matter. However, when grains were poorly flaked ( $\sim 53$  kg/hL) faecal dry matter contained over 10% starch. Variation in faecal starch was not correlated with faecal pH, nitrogen or dry matter.

In a third experiment we determined the relationship between rumen and hindgut acidosis using a carbohydrate overload model in which wheat grain was administered as a slurry into the rumen on two consecutive days. There was a surprisingly poor relationship between faecal pH and faecal lactate levels 48 h after the carbohydrate challenge, given the good relationship between pH and lactate in rumen fluid (Figure 1).

In all studies many of the faecal samples contained a large amount of mucus. Although speculative, these secretions may elevate the faecal pH and mask potential differences in nitrogen and dry matter normally associated with acidosis and microbial fermentation. It is possible that products of fermentation such as lactate or VFA may be better indicators of hindgut acidosis than pH alone.

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.

Rowe, J.B. (1997). 'Acidic gut syndrome': is it a problem for animals and humans? In: *Recent Advances in Animal Nutrition in Australia 1997*, pp. 47–54 (eds. J.L. Corbett, M. Choct, J.V. Nolan and J.B. Rowe). University of New England, Armidale, Australia.



**Figure 1** Faecal (a) and rumen (b) characteristics of cattle 48 h after grain challenge and rechallenge at 24 h.