Dietary effects on faecal acidity in dogs

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The dog has evolved as a carnivore and the introduction of high levels of cereal grains to their diets is a relatively new phenomenon. It is unlikely that dogs have developed the digestive enzymes and absorptive capacity to cope with cereal–based diets (Rowe *et al.* 1997). Microbial digestion in the dog occurs in the large intestine but the effects of extensive hind gut fermentation associated with consumption of large quantities of carbohydrates has not been studied. Raftilose® is a fructo–oligosaccharide that is not digested by endogenous mammalian enzymes and passes to the large intestine where it is rapidly fermented to volatile fatty acids and lactic acid. For this reason Raftilose is a suitable carbohydrate for studying hind gut fermentation.

The objectives of this study were: (1) to investigate the effect of a commercial tinned dog food on faecal acidity and consistency; and (2) to develop a model for studying hind gut fermentative acidosis in monogastrics.

Two experiments were conducted using a total of 24 dogs in a 2 x 3 factorial design (n = 4). Dogs were fed one of two basal diets, either fresh meat or commercial tinned dog food and three levels of Raftilose (0,2 or 4 g/kg $BW^{0.75}$). The tinned food selected for this study contained relatively high levels of carbohydrates (Rowe *et al.* 1997; see product T4). All animals were initially fed a basal diet of meat during a pre–treatment period of three days, and then fed the test diets for five days. Stools were collected daily from each animal and faecal pH was measured immediately after collection; the remainder was dried to constant weight at 60°C.

Dogs fed commercial tinned dog food had lower faecal pH and dry matter content than those fed fresh meat (Table 1). There was a dose–related decrease in pH and dry matter with the addition of Raftilose to the diets. For each 1 g of Raftilose/kg $BW^{0.75}$ in the diet, faecal pH fell by 0.75 units (R^2 = 0.94) and DM decreased by 5 percentage points (R^2 = 0.94); DM was positively correlated with pH (R^2 = 0.85). There was a significant (P=0.03) interaction between diet and Raftilose with respect to pH but not DM.

Acidic faeces and soft stools are common signs that characterise hind gut acidosis and were clearly seen in those dogs fed the commercial tinned food. Raftilose proved to be a useful carbohydrate for producing fermentative acidosis, providing a consistent and repeatable model with a good dose response.

Very low faecal pH was recorded in some of the dogs without any obvious adverse affects. Other studies in monogastrics have found that the faecal pH is likely to be higher than the pH measured in the colon due to absorption of short chain fatty acids. It is not clear if colonic acidity has any adverse effects in the dog. In ruminants, horses and pigs, hindgut acidity can lead to systemic acidosis and secondary effects such as laminitis and diseases of the hindgut. This is an important issue because even on the tinned food alone the average faecal pH was 6.2. Dogs fed tinned diet for a period of 12 days showed a gradual but continuing decline in faecal pH down to an average of 5.7. In other studies we have measured an average faecal pH of 5.1 in dogs fed a dry commercial dog food for four weeks. We do not know if these levels of fermentative acid accumulation in the hind gut of dogs has implications for the health of the animal.

Rowe, J.B., Choct, M., Brown, W., and Day, K. (1997). Variation in the carbohydrate composition of dog food. In: *Recent Advances in Animal Nutrition in Australia 1997,* p. 242 (eds. J.L. Corbett, M. Choct, J.V. Nolan and J.B. Rowe). University of New England, Armidale NSW.

Table 1 Faecal pH and percent dry matter when dogs (n = 4) were fed a basal diet of fresh meat or commercial tinned dog food and three levels of Raftilose (g/kg$BW^{0.75}$).

	Fresh meat			Tinned dog food				P value	
Raftilose:	**0**	**2**	**4**	**0**	**2**	**4**	**SED**	**Diet**	**Raftilose**
Faecal pH	7.3	6.5	5.5	6.2	5.3	4.9	0.25	0.001	0.001
Faecal DM	39.1	34.7	22.2	23.0	21.6	19.6	3.49	0.001	0.002