FERMENTATION IN THE LARGE GUT AND SWINE DYSENTERY

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Previous research (Siba *et al.*, 1993a, 1993b) suggests that swine dysentery may be prevented in growing pigs that are infected with *Serpulina hyodysenteriae* by feeding a diet based on cooked white rice and animal protein. This highly-digestible diet resulted in low rates of microbial fermentation in the large intestine, and it is suggested that the nature of the diet may play a role in the control of swine dysentery (SD). However, rice is uneconomical to feed to pigs commercially. In this experiment, the efficacy of a variety of grains to control SD was tested. Grains were fed either "raw" or after steam-flaking for 20 min at 150°C, "cooked". Steam-flaking is likely to increase digestibility in the small intestine causing a lower volume of nutrients to be available in the large intestine for microbial fermentation. This environment may be less favourable for the colonisation and proliferation of *S. hyodysenteriae*.

Pigs weighing 8.7 ± 0.09 kg (mean ± SEM) were weaned at 28 days of age, allocated to groups of 9-10/pen, and fed diets containing either wheat, barley, groats, maize and sorghum in either "raw" or "cooked" form. Another group was fed a commercial diet. Each diet contained the grain supplemented with sources of animal protein, minerals, and vitamins, and contained approximately 14.7 MJ DE/kg, 18.5% CP and 1.1% available lysine. No antibiotic was added to the diets. Pigs were fed *ad libitum* for an average of seven weeks, at which time half were killed at a commercial abattoir. The remaining pigs were challenged with a virulent culture of *S. hyodysenteriae* and clinical signs of the disease noted. Diarrhoeic pigs were killed and a post-mortem examination conducted.

Table 1. Incidence of disease, and gut characteristics of slaughtered pigs.

	Disease incidence[1]		pH in proximal colon[2]		pH in distal colon[2]		Weight of large intestine (% BW)[2]	
Grain	Raw	Cooked	Raw	Cooked	Raw	Cooked	Raw	Cooked
Wheat	100	100	5.5	5.7*	6.2	6.4*	3.2	3.0*
Barley	100	100	5.3	5.7*	5.9	6.1*	4.2	3.5*
Groats	100	100	5.6	5.7	6.0	6.2	3.1	3.1
Maize	75	0	5.5	5.6	5.9	6.4*	3.0	2.8*
Sorghum	50	0	5.5	5.5	6.1	5.9	3.4	3.7*
Commercial	100		5.5		6.1		4.5	

[1]Percentage of pigs infected showing clinical signs of disease. [2]From pigs killed prior to infection with *S. hyodysenteriae*. *Indicates significance at P<0.05.

Results from an overall ANOVA indicate that steam-flaking increased the pH of the proximal and distal colon (P<0.001), and decreased the weight of the large intestine when expressed relative to body-weight (P<0.05). All pigs fed "raw" and "cooked" wheat, barley and groats succumbed to SD. A reduced incidence of disease was noted in pigs fed maize and sorghum, and no disease was observed in pigs fed these grains in a 'cooked' form. As maize and sorghum have the lowest levels of dietary fibre, and cooking reduces hind-gut fermentation, the results support the hypothesis that a lower level of fermentation in the hind-gut prevents SD. However, the diet containing 'cooked' sorghum caused an increased rate of fermentation (based on pH and gut size) compared to sorghum fed 'raw'. This suggests alternative modes of action for sorghum, and is being studied further.

References

SIBA, P.M., PETHICK, D.W. and HAMPSON, D.J. (1993a). *Proceedings of the XVth International Congress of Nutrition*, Adelaide, Australia, p.878.

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