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DIETARY NON-STARCH POLYSACCHARIDES: INTERACTIONS WITH WEANER PIG GROWTH AND POST-WEANING COLIBACILLOSIS

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Growth setbacks and the occurrence of post-weaning colibacillosis in piglets in the first week post-weaning can have a major influence on the overall time taken to reach market weight. The inclusion of non-starch polysaccharides (NSP) in the diet has been advocated as a means of reducing the severity and incidence of post-weaning colibacillosis by accelerating large intestinal development (Bolduan *et al.*, 1988). The aim of this experiment was to study the effects of differences in post-weaning dietary NSP on pig growth, gut development, and intestinal proliferation of haemolytic *Escherichia coli*.

Large White-x pigs ($n=69$) weaned at 21-25 days of age (mean weight 7.2kg) were randomly assigned to 'uninfected' ($n=30$) or 'experimentally-infected' ($n=39$) groups, and offered *ad libitum* one of three diets differing in NSP content for a period of 7 d. A hammer-milled wheat and barley-based diet (commercial) served as a reference diet. The other diets were pregelatinised rice with an animal protein supplement (rice/AP) or the same rice diet with 10% guar gum added (rice/GG) to increase the NSP content. Rice/AP was low in total NSP (0.7g/100g DM), rice/GG was high in soluble NSP (6.4g/100g DM) but not insoluble NSP (0.2g/100g DM), and the commercial diet had some soluble NSP (2.2g/100g DM) but mostly insoluble NSP (7.6g/100g DM). The 'experimentally-infected' group was orally inoculated 48 h post-weaning with 50mls each of $10^{8.5}$ /ml haemolytic *E. coli* serovar O8; K88; K87. One week after weaning, all pigs were reweighed and then euthanased for collection of intestinal samples for pH and bacterial counts.

Table 1. Growth rate, large intestinal weight and pH of proximal colon contents in uninfected weaner pigs, and small intestinal haemolytic *Escherichia coli* populations in experimentally-infected weaner pigs (mean \pm SEM).

	Commercial	Rice/AP	Rice/GG	P value
<u>Uninfected pigs</u>				
Growth rate (g/d)	57 \pm 30 ^a	141 \pm 21 ^b	85 \pm 15 ^a	<0.05
Empty large intestine (g)	128 \pm 39 ^a	95 \pm 4 ^b	125 \pm 9 ^a	<0.05
pH proximal colon contents	5.97 \pm 0.13 ^a	6.25 \pm 0.07 ^b	5.33 \pm 0.06 ^c	<0.0001
<u>Experimentally-infected pigs</u>				
<i>Escherichia coli</i> (cfu/g) ¹	4.1 \times 10 ⁴ ab	1.3 \times 10 ⁴ a	8.0 \times 10 ⁹ b	<0.05
Haemolytic <i>E. coli</i> (% of total)	29.6 \pm 16.1 ^a	3.6 \pm 1.4 ^b	28.8 \pm 8.9 ^a	<0.05

^{a,b,c}Mean values in the same row with different superscripts differ significantly. ¹Colony-forming units per g mucosal scraping.

Pigs fed the rice/AP diet were heavier, and had lighter large intestines and less fermentation in the large intestine (as indicated by the higher pH of colon contents) than pigs fed the rice/GG and commercial diets. The addition of guar gum to the base rice diet was associated with increased proliferation of haemolytic *E. coli* in the small intestine. Although the total number of haemolytic *E. coli* colonies did not differ significantly between pigs fed the commercial and rice/AP diets, there were significantly greater proportions of haemolytic *E. coli* cultured from pigs fed the commercial diet. Contrary to expectations, results from this study indicated that reducing concentrations of soluble NSP in the diet increased pig performance in the first week post-weaning, and reduced the extent of proliferation of haemolytic *E. coli* in the small intestine.

References

BOLDUAN, G., JUNG, H., SCHNABEL, E. and SCHNEIDER, R. (1988). *Pig News and Information*. 9:381-385.