The effects of wheat bran inclusion on piglet performance in the nursery and removal of pharmaceutical zinc

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Background and objectives

Wheat bran (WB) has been demonstrated to promote intestinal health and improve piglet performance (Molist et al. 2011 & 2012). One proposed mechanism for this effect is that WB inhibits the attachment of bacteria, specifically enterotoxigenic *Escherichia coli* (ETEC) K88, to the intestine (Gonzaláz-Ortiz et al. 2014) thereby reducing the risk of ETEC-K88 induced diarrhoea. The objective of this trial was to determine whether WB inclusion (0 vs 4%) in commercial diets could improve piglet performance and health both with and without pharmaceutical levels of zinc (150 vs 2500 ppm Zn).

Materials and Methods

This trial was conducted at the University of Leeds Research Farm. 100 mixed sex piglets (JSR 9T x GC 900) weaned at 26.5 ± 0.7 days of age (initial BW = 8.01 ± 0.65kg) were randomly allocated to one of 4 dietary treatments (6 pens/treatment, 4/5 pigs/pen) in a 2x2 factorial combination of two levels of WB (0 vs 4%) and Zinc (150 vs 2500ppm). Diets were based on typical commercial diets, containing milks, soya and fish and were iso-energetic and balanced for amino acids. Pigs were fed according to a two-phase regime; diet 1 (1-12 days; SID lys = 13.5 g/kg; NE = 10.19 MJ/kg) and diet 2 (13-20 days SID lys = 12.8 g/kg; NE = 9.8 MJ/kg). Pigs were weighed individually at weaning and on days 12 and 20. Feed intake was recorded daily by pen. Pigs were scored daily for faecal consistency, health and cleanliness.

Results

Piglets fed 2500ppm Zn had significantly better growth and feed conversion than those fed 150ppm Zn, this was driven by significant improvements from weaning to day 12 of this trial (Table 1). Addition of WB to the diet significantly improved FCR from weaning to day 12 but there were no other significant effects on performance (Table 1). There were significant interactions between Zn level and WB inclusion, with those receiving the lower level of Zn responding more positively to WB inclusion. There were no differences in faecal, health or cleanliness scores between treatments on this trial.

Table 1: Main effects of zinc and diet on piglet performance

	Zinc level		Wheat bran level		SEM	P-Values		
	150ppm	2500ppm	0%	4%		Zinc	WB	Zinc x WB
Day 1-12 (Diet 1)								
ADFI (g/pig/d)	231	248	236	243	8.9	0.212	0.606	**0.042**
ADG (g/pig/d)	167	227	189	206	12.3	**0.004**	0.347	**0.028**
FCR (g/g)	1.43	1.11	1.34	1.20	0.04	**0.001**	**0.043**	**0.023**
Day 13-20 (Diet 2)								
ADFI (g/pig/d)	562	613	569	606	18.8	0.076	0.182	0.188
ADG (g/pig/d)	407	451	409	450	21.1	0.163	0.192	0.900
FCR (g/g)	1.41	1.37	1.41	1.37	0.05	0.582	0.615	0.385
Overall (day 1-20)								
ADFI (g/pig/d)	364	394	369	388	11.7	0.263	0.087	0.076
ADG (g/pig/d)	264	317	277	303	13.0	**0.011**	0.172	0.162
FCR (g/g)	1.39	1.25	1.36	1.28	0.03	**0.007**	0.155	0.494
Day 12 weight (kg)	10.03	10.73	10.24	10.52	0.15	**0.006**	0.214	**0.033**
Day 20 weight (kg)	13.30	14.34	13.51	14.12	0.26	**0.012**	0.116	0.161

All results expressed as least square means; ANOVA performed by JMP with zinc inclusion or fibre source as the factor and replicate as the covariates

Conclusions and discussion

Inclusion of high levels of Zn significantly improved piglet performance. Addition of WB to the diet resulted in a significant improvement in piglet growth and FCR when included in the 150 ppm Zn diet suggesting that WB inclusion in piglet diets may be useful to maintain piglet performance in the absence of high levels of Zn.

References

Gonzaláz-Ortiz, G. Pérez, J. F. Hermes, R. G. Molist, F. Jiménez-Diaz, R. & Martín-Orúe, S. M. (2014) Screening the ability of natural feed ingredients to interfere with the adherence of enterotoxigenic Escherichia coli (ETEC) K88 to the porcine intestinal mucus. *British Journal of Nutrition*, **111** (4); 833-842.

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