Dietary vitamin E and aspirin supplementation influence the performance and incidence of post-weaning colibacillosis in pigs experimentally infected with an enterotoxigenic strain of *Escherichia coli*

J.C. Kim[1], H.G. Payne[1], M.D. Langridge[1], J.P.A. Sweeny[1], B.P. Mullan[1] and J.R. Pluske[2]

[1]Department of Agriculture and Food, South Perth, WA 6151. [2]Murdoch University, Murdoch, WA 6150.

Increased biosynthesis of prostaglandin E_2 (PGE_2) from arachidonic acid, caused by immune system activation, negatively affects the performance and health of pigs (Wright *et al.*, 2000). Xu *et al.* (1990) reported that supplementation of 125 ppm aspirin, an anti-inflammatory agent, improved the daily gain and feed conversion ratio of weaner pigs. Furthermore, in chickens, a combined supplementation of aspirin and vitamin E (Vit E) synergistically depressed PGE_2 biosynthesis and reduced mortalities after an *E. coli* infection (Likoff *et al.*, 1981). The current experiment tested the hypothesis that Vit E and aspirin supplementation would have a synergistic effect on reducing post-weaning colibacillosis (PWC) and improving performance in pigs experimentally infected with an enterotoxigenic strain of *E. coli* (ETEC).

A total of 192 individually-housed male weaner pigs (Landrace x Large White) weighing 6.6 ± 0.04 kg (mean±SEM) were allocated to a 2 x 3 factorial experiment with the respective factors being without and with 125 ppm aspirin (acetylsalicylic acid; Bayer) and three levels of Vit E supplementations (50, 100, and 200 IU, *dl*-α-tocopheryl acetate; DSM). A wheat, soybean meal and skim milk powder-based basal diet was formulated to contain 15.3 MJ digestible energy (DE)/kg (10.7 MJ net energy (NE)/kg) and 0.9 g standardised ileal digestible lysine/MJ DE. Pigs were fed experimental diets *ad libitum* and fresh water was supplied through a bowl drinker. All pigs were challenged with *E. coli* serotype O149:K91:K88 at 7, 8 and 9 d after weaning. Pigs were weighed and feed intake was recorded weekly to calculate performance indices. Expression of diarrhoea as a faecal consistency score and the number of antibiotic treatments were recorded daily for 14 d after weaning. Faecal shedding of β-haemolytic *E. coli* was scored on a six-point scale after culturing faecal swabs on 5% horse blood agar plates and incubating overnight at 37 °C. Data were analysed by two-way analysis of variance (GenStat, 15th Edition; UK).

Table 1. *Interaction means for the effects of aspirin and vitamin E on performance and indices of PWC measured for 14 days after weaning in* E. coli*-infected pigs.*

Aspirin (A) (ppm)	0			125				*Significance*		
Vit E (E) (IU)	50	100	200	50	100	200	SEM	Aspirin	Vit E	A x E
ADG (g^{-1})	176	153	140	177	178	169	10.6	0.034	0.119	0.375
VFI (g^{-1})	195	174	167	183	185	167	10.0	0.998	0.090	0.503
FCR (g/g^{-1})	1.39	1.31	1.47	1.17	1.14	1.08	0.14	0.022	0.914	0.700
DI (%[2])	6.7^{ab}	6.5^{ab}	11.4^{bc}	7.6^{ab}	6.2^{ab}	4.2^{a}	1.72	0.126	0.701	0.043
Antibiotic treatments[3]	1.5^{ab}	1.7^{ab}	2.3^{b}	2.2^{b}	1.9^{ab}	1.1^{a}	0.36	0.724	0.910	0.023
E. coli score[4]	3.5^{b}	2.2^{ab}	4.2^{b}	3.0^{b}	1.5^{a}	2.5^{ab}	0.45	0.009	0.002	0.391

[1]ADG: average daily gain; VFI: voluntary feed intake; FCR: feed conversion ratio; [2]DI: Diarrhoea index (%); mean proportion of days with diarrhoea with respect to 14 d after weaning; [3]Mean numbers of antibiotic treatments; [4]Mean cumulative *E. coli* score per diet in the 14 d after weaning; [a,b,c]Means in a row not having the same superscript are significantly different (P<0.05).

Supplementation of aspirin alone improved (P<0.05) ADG and FCR. Significant interactions (P<0.05) occurred between aspirin and Vit E for indices of PWC, namely the DI and the number of antibiotic treatments. Aspirin and 100 ppm Vit E supplementation independently decreased (P<0.05) the β-haemolytic *E. coli* score. The results indicate differential effects of aspirin and Vit E supplementation on PWC, while aspirin supplementation independently improved ADG and FCR. These data support the proposition that a reduction in the ETEC-induced anti-inflammatory status after weaning supports enhanced production, possibly associated with a reduction in PGE_2 synthesis.

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