Micro-Encapsulated Zinc Oxide as a Means of Controlling Post-Weaning Diarrhoea in Pigs

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The pharmacological use of zinc oxide (2,500-3,000 ppm ZnO) is widely accepted as an efficient means of controlling post-weaning diarrhoea (PWD) in piglets and is being used worldwide as an alternative to antibiotics (Mullan et al. 1995). However, the strategy is criticized because high levels of zinc are excreted into the environment through the effluent system. Recently, a microencapsulated zinc oxide (ME-ZnO) product (Shield Zn®, CTC Bio Inc., South Korea) claimed to reduce PWD while at a reduced concentration of ZnO of 100 ppm. The ME-ZnO was evaluated relative to ZnO to assess its efficacy in controlling PWD. The hypothesis tested was that inclusion of ME-ZnO will efficiently control PWD and reduce faecal zinc excretion.

An experiment with a split-plot design for which the whole plots were arranged in randomised blocks was conducted. Challenge versus no-challenge with enterotoxigenic E. coli (at 72 h, ETEC, serogroup O149: K91:K88, 10 mL of 10⁸ CFU) were the factors in the whole plot, and the three dietary treatments (control, 3000 ppm ZnO and 100 ppm ME-ZnO) formulated to 15 MJ digestible energy (DE)/kg and 0.88 g standardised ileal digestible lysine/MJ DE were used as subplots (n=12). Vitamin mineral premix used for all diets supplied 100 ppm zinc as ZnO. A total of 72 individually housed weaner pigs (Landrace x Large White x Duroc cross-bred, castrate and female, 1:1) weighing 5.6±0.11 kg (mean ± standard error of mean) were used in a three week feeding experiment immediately after weaning. Incidence of PWD was assessed for 14 days after weaning, Blood and faecal samples were collected on d 14 to assess plasma zinc and faecal zinc excretion.

Figure 1. Effect of diet (control, ZnO, ME-ZnO) on the diarrhoea index (% days with diarrhoea for 14 days after weaning) and faecal zinc excretion (mean ± standard error of mean). The diet effect was significant (P<0.001), while ETEC challenge and the interaction between diet and ETEC challenge was not (P>0.05).

The results showed that 100 ppm ME-ZnO suppressed the expression of PWD in both ETEC-challenged and non-challenged pigs, and kept the faecal zinc levels to the levels of that found in the pigs fed a control diet without additional ZnO supplementation. The results suggest that under the experimental conditions the expression of PWD could be reduced by supplementing 100 ppm ME-ZnO in the diets for weaner pigs without increasing faecal zinc excretion levels. A combination of good hygiene and management with use of microcapsulated zinc may reduce faecal zinc excretion and reduce the impact of E. Coli scouing but not impact on antibiotic removal except when used for E. Coli scouing.