

Microencapsulated zinc oxide on piglets growth performance and intestinal architecture

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The aim was to compare low doses of microencapsulated zinc oxide (ZnO; Zincoret) in the diet of piglets with pharmacological level of ZnO on growth and ileal architecture. 144 weaned piglets, divided in 36 pens (n = 9), received a basal diet (NC; Zn at 45 mg/kg) or the basal diet with ZnO at 2850 mg/kg (PC), or with lipid microencapsulated ZnO at 187 or 437 mg/kg (Zn200 and Zn400). After 15 and 49 d, 6 pigs/group/time were euthanized to collect ileal mucosa for immunohistochemistry, histomorphology, and Na-dependent glucose transporter (SGLT-1) gene expression. Pigs BW and feed intake were recorded at 0, 14 and 42 d and ADG and FCR were calculated. Data were analyzed with 1 way ANOVA. At 14d the PC group had a 32% and 7% higher ADG and BW and a lower FCR compared with NC (P < 0.05), whereas Zn200 and Zn400 had intermediate values. At 42d both groups receiving microencapsulated ZnO had higher BW than NC and did not differ from PC (P = 0.01). ADG was on average 20% higher for PC and Zn400 than the NC (P = 0.01) and FCR was lower in all treated groups compared with NC (-22%; P < 0.01). At 14 d, villi length in Zn400 pigs was 9% and 6% higher than in NC and PC, respectively (P < 0.01) and the villi:crypts ratio (V:C), as well as % of mitotic cells, were higher in all treated groups compared with NC (P < 0.01). SGLT-1 gene expression was the lowest in Zn400 pigs. At 49d villi length and V:C ratio were the highest for PC compared with all of the other groups (+10% than NC; P = 0.01). Mitotic cells were the highest in Zn400 group compared with other groups (+3% compared with NC and PC; P < 0.01), whereas SGLT-1 expression tended to be lower in Zn200 and Zn400 groups compared with NC and PC (P = 0.06). Pigs receiving low doses of microencapsulated ZnO had performance comparable to those receiving pharmacological level of ZnO overall the post-weaning phase. Moreover, in the first 2 weeks, microencapsulated ZnO improved the ileal architecture as reflected by the increased V:C ratio and the % of mitotic cells. The reduced SGLT-1 m-RNA abundance might suggest a reduced availability of glucose in the lumen of ileum, therefore suggesting a lower amount of undigested nutrients.

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