

Intestinal Development of Pigs from Sows fed a Zinc Amino Acid Complex

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Overcoming post-weaning growth depression in newly weaned pigs is an important economic concern in swine production. The stress of weaning and loss of passive immunity from sow's milk increase the susceptibility of weaned pigs to infectious bacteria. Despite an increase in growth and feed intake of weaned pigs receiving high levels of zinc supplementation there is limited therapeutic benefit and protection from diarrhea caused by the proliferation of *Escherichia coli* in the immediate post-weaning period. Therefore, intestinal development was evaluated in newly weaned pigs from sows fed a barley, soybean meal-based diet with no additional zinc (Control) or supplemented with 2500 mg/kg diet of zinc amino acid complex (ZnAA; Availa[®] Zn) from d-80 of gestation until farrowing. At 14 ± 3 d four male pigs were weaned and received a saline injection without or with lipopolysaccharide from *Escherichia coli* O26:B6 (120 µg/kg BW; Sigma, MI). Twenty-four h after weaning intestinal sections of the duodenum, jejunum and ileum were collected and prepared for histological analysis of morphology. Pigs from ZnAA-fed sows had significantly ($P < 0.05$) higher villous height (258 µm versus 225 µm), lower crypt depth (78 µm versus 85 µm) and a higher villous height to crypt depth ratio (3.7 versus 2.9) in the jejunum than for those pigs from Control-fed sows indicating a healthier integrity of the intestinal epithelium. Intra-epithelial lymphocyte counts per 250 µm length of villous epithelium were higher ($P < 0.05$) in the duodenum, jejunum and ileum of pigs from ZnAA-fed sows (5.5, 3.6 and 4.0, respectively) compared to those pigs from Control-fed sows (4.2, 2.8 and 2.9, respectively) suggesting better immune function. Mucus secreting goblet cell counts were also higher ($P < 0.05$) in the jejunum (10.5 versus 9.1) and ileum (17.1 versus 15.0) of pigs from ZnAA-fed sows compared to those pigs from Control-fed sows.

Implication: Supplementation of ZnAA to gestating sows had a positive effect on small intestinal development and immune function of newly weaned pigs and may prove to be beneficial for reducing the incidence of diarrhea at weaning.