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201 The effects of the supplementation of a Zinc-amino acid complex in pig nursery diets with differing pharmacological levels of zinc oxide and complexity. Wesley Schweer¹, Alyssa S. Cornelison¹, Mike Socha¹, Todd E. Williams², Lucas Rodrigues¹, ¹Zinpro Corporation, ²Pipestone Research

Abstract: Diet complexity (DC), which has significance in nursery pig production, generally refers to a greater number of highly digestible ingredients. Increased DC may have even greater significance in scenarios of reduction or withdrawal of zinc oxide (ZnO) in nursery diets. The objectives were to determine 1) the impact of adding Zn-amino acid complex (Zinpro ProPath Zn) to mid- (MC) and low-complexity (LC) diets on nursery pig performance and health compared with a high complexity (HC) diet, and 2) the impact of Zinpro ProPath Zn in diets with and without pharmacologic levels of ZnO. A total of 2,400 mixed-sex weanling pigs [initial body (BW) weight = 5.79 ± 0.15 kg] were assigned to 1 of 5 dietary treatments during nursery (42 d) as follows: 1) HC; MC diet with 2) MC+ZnO or without 3) MC-ZnO) pharmacologic ZnO; and LC diet with 4) LC+ZnO) or without 5) LC-ZnO) pharmacologic ZnO. All diets except HC were supplemented with Zinpro ProPath Zn (125 mg/kg Zn) and ZnO [3,000, 2,000, and 0 mg/kg Zn during Phases I (14 d), II (14 d) and III (14 d), respectively]. Different DC were achieved by manipulating the inclusion of spray-dried plasma, soy protein concentrate, and whey protein. Growth performance, onset of feed intake, fecal dry matter, number of injectable treatments administered, and serum acute-phase response were assessed. Pigs fed HC (20.0 kg) had greater final BW (FBW) compared with pigs fed MC-ZnO (18.8 kg), which had greater FBW compared with pigs fed LC-ZnO (17.5 kg; SEM = 0.34; P < 0.05). Average daily feed intake (ADFI) was greater in pigs fed HC (0.46 kg/d) compared with MC-ZnO (0.43 kg/d) and LC+ZnO (0.42 kg/d), which had greater ADFI compared with LC-ZnO (0.39 kg/d; SEM = 0.01; P < 0.05). Similarly, average daily gain (ADG) and gain to feed ratio (G:F) were greater in pigs fed HC (0.33 kg/d, 0.72 kg/kg, respectively) compared with pigs fed LC (0.27 kg/d, 0.67 kg/kg, respectively), regardless of ZnO (SEM = 0.01; P < 0.05). There was no effect of dietary treatments on the fecal dry matter or on the onset of feed intake of pigs (P > 0.10). The number of injectable treatments administered was greatest in LC-ZnO (62.7%), followed by LC+ZnO (50.6%), MC regardless of ZnO (44.0%), and HC (36.7%; SEM = 1.04; P < 0.05). Serum alkaline phosphatase was less in LC-ZnO than the other groups (229.8 vs. 280.9 ± 11.9 IU/L; P < 0.05). Taken together, feeding HC diets during the nursery appears to be effective in improving performance and health of pigs, particularly when compared with MC and LC diets without ZnO. Moreover, the addition of Zinpro ProPath Zn may partially attenuate the negative effects of ZnO removal in MC, but not LC, diets.

Keywords: nursery, pigs, zinc
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197 Effects of dietary zinc supplementation strategy on immune response, bacterial load and disease severity in growing gilts infected with Mycoplasma hyopneumoniae.

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Abstract: The objective of this study was to assess impacts of dietary zinc (Zn) supplementation strategy on immune response, bacterial clearance, and disease severity in growing gilts infected with Mycoplasma hyopneumoniae. Weaned gilts [n = 96; 21-d old; initial body weight (BW) = 6.94 kg], were used in a 63-d experiment which consisted of a pre- (d 0-35) and post- (d 35-63) M. hyopneumoniae challenge. On d 0 (-35 d post-inoculation; dpi), gilts were confirmed negative for M. hyopneumoniae and PRRSv and assigned randomly to 1 of 2 dietary treatments with 8 pens/treatment and 6 gilts/pen. Treatments were: 1) Control; 125 mg/kg Zn from ZnSO4, and 2) Zn-blend; 125 mg/kg Zn with 50 mg/kg Zn from Zn-amino acid complex (ZnAA) and 75 mg/kg Zn from ZnSO4. Dietary treatments were fed in 4-phases with pharmacological levels of zinc oxide included in the first 2 phases. Phase 1 (d 0) control and Zn-blend diets contained 3,121 and 3,256 mg/kg total Zn, respectively. Phase 2 (d 0-14) control and Zn-blend diets contained 3,657 and 3,593 mg/kg total Zn, respectively. Phases 3 (d 14-35) and 4 (d 35-63) control and Zn-blend diets contained 213 and 193 mg/kg and 229 and 212 mg/kg total Zn, respectively. At 0 and 1 dpi, all gilts were inoculated intratracheally with 10 mL of a lung homogenate containing 1×10^5 CCU/mL of M. hyopneumoniae strain 232. Blood and tracheal secretions were collected on -35, 0, 7, 14, 21, 28 dpi. Blood samples were evaluated for antibody detection, and tracheal secretions were analyzed by PCR. Number of coughs were recorded daily from 7 to 28 dpi. At 28 dpi, gilts were humanely euthanized, and bronchoalveolar lavage fluid (BALF) and macroscopic lung lesion observations were collected. Gross lung lesions were scored, and lung tissues were fixed for histopathology. Normally distributed data were analyzed in a generalized linear model with the fixed effect of diet and repeated measures for days post-inoculation. Non-normal data were analyzed using a Mann Whitney U Test using the NPAR1WAY procedure of SAS with a fixed effect of diet or a Chi-square test. Gilts consuming control diets tended (21.68 vs. 20.90 Ct, P = 0.08) to have less relative bacterial load than those consuming Zn-blend diets, over time. No differences in mean sample-to-positive ratio or proportion of gilt seroconversion (P > 0.05) were detected between treatments. There were no differences in mean concentrations of IL-1α, IL-1β, IL-6, IL-8, IL-10 (P > 0.05) in BALF for gilts consuming control or Zn-blend diets. There were no differences in mean macroscopic (P = 0.73) or microscopic (P = 0.67) lung scores, and coughing index score (P = 0.25) over the entire period between gilts consuming the different dietary Zn supplementation strategies. In conclusion, growing gilts consuming diets containing different Zn sources exhibited similar signs of infection during the acute phase of a M. hyopneumoniae infection.

Keywords: growing gilts, Mycoplasma hyopneumoniae, zinc