Efficacy of Celmanax™ to replace zinc oxide in nursery pig diets

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Background and objectives: Celmanax™ is an enzymatically hydrolyzed yeast product with immunomodulatory[1] and reproductive performance enhancing properties in swine[2,3]. Increases in piglet weaning weights have been observed when Celmanax is added to sow lactation diets. The objective of this study was to evaluate if this pre-weaning benefit extends into the nursery phase, to determine the effect of Celmanax addition to nursery diets, and compare both with conventional zinc oxide (ZnO) usage in the nursery.
Material and methods: Eight treatments were arranged in a 2 x 2 x 2 factorial with seven replicates/treatment. The three treatment factors tested included: 1) Celmanax (0 or 200 g/MT) in the sow lactation ration; 2) Celmanax (0 or 200 g/MT) in the nursery; and 3) ZnO (0 or 2500 ppm) in the first two nursery phases. Pigs were weaned at 18 days of age, transported to a commercial research nursery, and housed in mixed sex pens (n=10/pen). Upon arrival, pigs were weighed, sexed, blocked by initial body weight (BW) and pen location, and were randomly allocated to treatments using a Randomized Complete Block Design. Pigs were *ad libitum* fed a three-phase mash nursery diet [Ph1, Ph2 and Ph3, 0-7, 7-21, and 21-42, respectively] in a 42-day trial. Individual BW and feed consumption by pen was recorded at each phase change and the end of the study, and used to calculate average daily gain (ADG), average daily feed intake (ADFI) and feed efficiency (FE). Blood samples were obtained on d 42 by venipuncture from two pigs/pen for immune gene expression analysis. The main effects of block, Celmanax™-sow, Celmanax™-nursery, and ZnO and their two- and three-way interactions were analyzed using General Linear Model. Least Squares Means were separated using the PDIFF option of SAS (Ver 9.2, Cary NC).
Results: Celmanax fed to sows during lactation resulted in heavier pigs entering the nursery ($p<0.01$), and these pigs had greater ($p< 0.01$) ADFI in Ph1, greater ADG in Ph2, and had heavier BW ($P<0.01$) at d 42 than pigs from sows fed diets devoid of Celmanax; Pigs fed ZnO in the nursery also had greater ADFI in Ph1 ($p< 0.05$), as well as greater ($p<0.01$) ADG and FE in Ph2 and heavier ($p<0.01$) BW at d 42. Celmanax fed in the nursery did not significantly affect nursery performance. ZnO resulted in a lower gene expression of the inflammatory cytokine, TNFα; whereas, there was a tendency ($p<0.10$) for a higher expression of TNFα in pigs fed Celmanax in the nursery and pigs from sows fed Celmanax. Pigs from Celmanax fed sows also had a tendency for greater ($p=0.06$) gene expression of the regulatory cytokine, SOC3; whereas, nursery pigs fed Celmanax tended to have a greater ($p=0.06$) expression of the chemokine, IL-8.
Conclusion and discussion: Improving the pre-weaning enteric health status of piglets could potentially reduce the dependency on zinc during the nursery phase. This and other studies[4-6] have demonstrated improved nursery pig performance with ZnO addition; however, the heavier weight of pigs from Celmanax-fed sows at the beginning of the nursery phase and additional ADG and ADFI after weaning resulted in similar overall nursery performance as pharmacological ZnO. Both ZnO and Celmanax modulated immune gene expression, however they differed in their immunomodulatory mode of action.

References

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