Effect of Supplemental myo-Inositol on Growth Performance and Apparent Total Tract Digestibility of Weanling Piglets fed Reduced Protein Diets and Intestinal Cell Epithelial Barrier Integrity. Tobi Z. Ogunrhibido, Michael R. Bedford, Kolapo Ajuwon, Layi Adeola, Purdue University, AB Vista

Abstract: Myo-inositol is a breakdown product of phytate produced in the gut through the action of phytase. Although the effect of phytase-released phosphorus on growth performance of animals has been well characterized, there is still little understanding of myo-inositol effects. The objectives of this study were to determine the effects of added myo-inositol to a phytate-rich low-protein diet on growth performance and apparent total tract digestibility (ATTD) in growing piglets as well as to determine whether myo-inositol could directly affect intestinal epithelial cell proliferation and function in intestinal porcine epithelial cells (IPEC-J2). A total of 128 weanling piglets were allotted to four dietary treatments consisting of eight replicates per treatment and four piglets per replicate in a randomized complete block design for four weeks. The experimental diets comprised the positive control (PC; 20% crude protein (CP), negative control (NC; 17% CP), negative control plus 2.0g/kg myo-inositol (NC+INO; 17% CP) and negative control plus 3000FTU/kg phytase (NC+PHY; 17% CP). Weekly average daily feed intake (ADFI), average daily gain (ADG), gain-feed ratio (G: F) were recorded. Phytase supplementation in the protein-deficient NC diet increased the G:F ratio (P< 0.05) without myo-inositol effect on growth performance. Phosphorus digestibility in the phytase supplemented group increased compared to the PC, NC, and NC+INO groups whereas plasma myo-inositol concentration was significantly higher (P< 0.05) in the NC+INO group. Due to lack of myo-inositol effect on growth performance, an additional in vitro study was conducted to determine direct effect of myo-inositol on the intestinal epithelium that might not be reflected in growth performance. Myo-inositol increased mRNA abundance of selected nutrient transporters in a concentration-dependent manner (P< 0.05), enhanced barrier integrity in the IPEC-J2 monolayer and reduced paracellular permeability of FITC-dextran (P< 0.05). In conclusion, despite the lack of myo-inositol effect on animal performance, the in-vitro data indicates that myo-inositol may directly regulate gut barrier integrity.

Keywords: barrier-integrity, myo-inositol, phytase

Effect of Maternal Melatonin Supplementation During mid to Late Gestation on Fetal Piglet Hepatic Gene Expression. Thomas W. Dobbins, Amberly A. Dennis, Daniel Rivera, Thu Dinh, Caleb O. Lemley, Derris D. Burnett, Texas Tech University, Mississippi State University, University of Arkansas

Abstract: Using melatonin as a gestational therapeutic due to its antioxidant and vasodilative properties increases fetal morphometric measurements in ruminant models, however its effects on gestating swine and fetal circadian regulation remain unknown. This study evaluated the effects of dietary melatonin supplementation during gestation on fetal hepatic circadian regulatory and metabolic gene expression. Twenty-four pregnant sows were randomly assigned to either melatonin (20mg/d; MEL) or control (CON) and 0500h (AM) or 1700h (PM) harvest timepoint across fall and spring replicates. The fall replicate occurred from gestational day 38±1 to 99±1, while spring was days 41 to 106±1. At harvest small, medium, and large piglets were identified by body weight and their livers were collected. Data were analyzed using a linear mixed model by the MIXED procedure of SAS. Cry1 expression tended to increase (P=0.0575) in large fetuses compared to small during the fall, while large fetuses had the greatest expression, medium intermediary, and small least during the spring (P=0.0056). Cry2 was reduced (P< 0.001) in MEL offspring compared to CON in the fall. There was a Treatment × Class interaction (P=0.0104) for Cry2 expression during spring wherein, CON-AM was reduced compared to CON-PM, however no differences between MEL groups. A Treatment × Class interaction (P=0.0511) of Per2 expression was present in the fall, where expression of small control fetuses was reduced compared to remaining controls. Spring Per2 expression increased (P=0.0122) in large fetuses compared to other sizes, Per2 also increased (P=0.0039) in PM compared to AM. Fall IGF1 expression increased (P=0.0366) in large fetuses compared to medium and small, and spring IGF1 expression increased (P=0.0067) in large fetuses compared to small. These findings suggest that maternal melatonin supplementation during gestation modulates expression of hepatic circadian regulatory and metabolic genes which may impact growth and developmental efficiency postnatally in a seasonal manner.

Keywords: fetal programming, growth and developmental, melatonin