

Increasing dietary cystine decreases gastrointestinal glutathione synthesis in early weaned piglets

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Commercial early-weaning (EW) diets utilize feedstuffs that are easily digestible and highly palatable for EW piglets. These feedstuffs (eg spray dried plasma, whey, oat groats) contain unbalanced ratios of methionine: cysteine (MET: CYS). We previously showed that diets containing CYS at concentrations greater than 50% of the MET content negatively impacted small intestinal growth and mucosal depth in EW piglets (*Advances in Pork Production 14:A11, 2003*). Increased dietary CYS intake may have altered glutathione (GLUT) synthesis, resulting in the reduced growth and gastrointestinal parameters. GLUT, derived from CYS, is a ubiquitous tri-peptide that is involved in many biological functions (cellular redox status, antioxidant, maintenance of intestinal health). The effect of increasing dietary CYS intake on the incorporation of CYS into mucosal glutathione in piglets was examined.

Male piglets (n=32, 2d old), implanted with jugular, femoral and gastric catheters were maintained on a complete elemental diet for 5 days. On d5, piglets were randomly assigned to receive one of eight test diets containing a fixed amount of MET ($0.25 \text{ g kg}^{-1}\text{d}^{-1}$) and graded CYS ($0.0 - 0.50 \text{ g kg}^{-1}\text{d}^{-1}$). After 18 hours of test diet feeding piglets underwent a 6 h direct oxidation experiment utilizing L [$1-^{14}\text{C}$] CYS followed by tissue sampling. As dietary CYS intake increased there was decreased CYS incorporation into mucosal GLUT.

Implications: GLUT is important for maintaining gastrointestinal health and function. There was a decrease in incorporation of CYS into GLUT, as dietary CYS intake increased, indicating decreased synthesis of GLUT, in the small intestine. EW diets should be formulated so that dietary CYS intake does not exceed 50% of the MET intake to ensure adequate mucosal GLUT synthesis, optimal growth and gastrointestinal development in the EW piglet.

Supported by Alberta Pork, Alberta Agricultural Research Institute and Degussa AG.