

Intestinal Development of Early-Weaned Pigs Receiving Diets Supplemented with Urea Cycle Amino Acids

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We have previously shown that dietary arginine (ARG) is essential for the young pig, although some synthesis occurs in the gut. Intestinal ARG synthesis depends upon a healthy normal gut and adequate nutrient intake. Adequate ARG synthesis does not occur when the gut is compromised by lack of food intake. Dietary supplementation of amino acids, such as ARG, that are specifically used by the digestive tract either for energy, function or structure may benefit the growth and development of the intestine and reduce the intestinal stress caused by weaning. The objective of this experiment was to examine performance and intestinal development in early-weaned piglets receiving commercial early-weaning diets supplemented with ARG, and some of its metabolic precursors, glutamate, citrulline and ornithine.

Forty-two, male, Yorkshire piglets (3.94 ± 0.43 kg) were weaned at ~12.5 days and fed control diet for 3 d to ensure that pigs were eating well. On day 3, the pigs were randomly assigned to diets supplemented with ARG, glutamate, citrulline, or ornithine at 0.93, 6.51, 0.94, and 0.90% of diet, respectively. Piglets received the diets for 12 days. Growth, organ weights and intestinal parameters were measured. Glutamate supplementation enhanced both total and mucosal growth in several sections of the intestine. Both glutamate and arginine supplementation prevented the weaning induced decrease in villus height and crypt depth in the duodenum.

Implications:

These results suggest that supplementation of arginine and glutamate in the diets of early-weaned piglets may enhance intestinal development and lead to better absorptive capabilities in the small intestine of the piglet. (Supported by Alberta Pork and Alberta Agricultural Research Institute.)