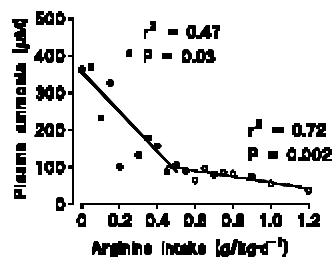


Neonatal Piglets with Small Intestinal Atrophy Fed Arginine at Concentrations 100 to 300% of NRC Were Arginine Deficient

Janet A. Brunton¹, Robert F.P. Bertolo¹, Paul B. Pencharz² and Ronald O. Ball¹

¹Alberta Pork Research Centre, 4-10 Agriculture/Forestry Centre, University of Alberta, Edmonton, Alberta, T6G 2P5; ²Hospital for Sick Children, Toronto, ON, M5G 1X8
Email: ron.ball@ualberta.ca

The small intestine (SI) is responsible for arginine (ARG) synthesis in the neonatal piglet; thus, intestinal injury or disease may increase dietary ARG requirement. Piglets (N=20, 2 d old) received 2 venous catheters for diet, isotope infusion and blood sampling. After 5 days of intravenous feeding of a complete elemental diet (to induce gut atrophy), piglets were randomized to diets with 0 - 1.2 g ARG/kg/d (requirement = 0.4 g/kg/d, NRC, 1998). ARG status was assessed by hourly measures of plasma ammonia and ARG. The diet was stopped if ammonia increased over 150 uM or at 24 h. A flooding dose of ³H-phenylalanine (phe) was given 30 min prior to study end to measure liver protein synthesis. High ammonia was observed in 8 of 10 pigs receiving 0



to 0.45 g/kg/d. The slope of plasma ammonia vs ARG intake declined rapidly up to 0.45 g/kg/d (Fig). Ammonia continued to decline in pigs receiving up to 1.2 g/kg/d ARG (Fig), indicating that ARG intake for maximum urea synthesis was still limiting. Liver bound ³H-phe SRA showed that protein synthesis increased with ARG intake (N=11, $r^2 = 0.64$, $P = 0.002$). Piglets receiving <0.7 g/kg/d had plasma ARG that was >2SD below the sow-fed mean.

Implications: Piglets receiving ARG at concentrations 100 to 300% of NRC requirements exhibited signs of ARG deficiency, likely due to the lack of de novo synthesis in the SI. Thus, ARG supplementation to starter diets at concentrations above NRC recommendations are likely necessary to enhance gut recovery and to sustain protein synthesis and growth performance during weaning. (Supported by Molly Towell Perinatal Research Foundation and Alberta Pork. J.A. Brunton is supported by an AHFMR Fellowship.)