

# Dietary regulation of arginine synthesis in the neonatal piglet

D.L. Wilkinson<sup>1</sup>, R.F.P. Bertolo<sup>2</sup>, J.A. Brunton<sup>2</sup>, A.K. Shoveller<sup>1</sup>, P.B. Pencharz<sup>3</sup> and R.O. Ball<sup>1</sup>

<sup>1</sup>Swine Research and Technology Centre, 4-10 Agriculture/Forestry Centre, University of Alberta, Edmonton, AB T6G 2P5; <sup>2</sup>Dept Biochemistry, Memorial University, St John's, NL; <sup>3</sup>Hospital for Sick Children, Toronto, ON, M5G 1X8; **Email:** ron.ball@ualberta.ca

Arginine is synthesized in the intestine of the neonate, however it is not known how endogenous arginine synthesis is regulated, and the degree to which proline and glutamate are used as precursors for arginine synthesis.

Primed, constant intraportal and intragastric infusions of L-[U-<sup>14</sup>C]proline and L-[3,4-<sup>3</sup>H]glutamate, and intragastric L-[guanido-<sup>14</sup>C]arginine were used to measure whole body and first pass intestinal arginine synthesis in 10 neonatal piglets fed arginine adequate (1.80g/kg/d) or deficient (0.20g/kg/d) diets for 5 days.

Proline, but not glutamate, was an important precursor for arginine synthesis. Endogenous arginine synthesis from proline had obligatory (0.36g/kg/d), and maximal (0.68g/kg/d) levels. Whole body arginine synthesis from proline increased by 0.32g/kg/d ( $p < 0.01$ ) when dietary arginine was deficient, although first pass intestinal synthesis did not change. Arginine deficient animals demonstrated a trend toward lower nitric oxide production ( $p < 0.09$ ).

## Implications:

Dietary arginine intake regulates whole body arginine synthesis from proline in the neonatal piglet. The maximal rate of arginine synthesis (0.68g/kg/d) is not enough to supply the whole body metabolic requirement for arginine in the young pig which we previously estimated to be ?????.

(Supported by Alberta Pork, AARI and NSERC.)