Tryptophan requirement of young, growing sows during pregnancy

Moehn, S.*, D. J. Franco*, J.K. Josephson[*], P. B. Pencharz[†] and R. O. Ball*

*Department of Agriculture, Food and Nutritional Sciences, University of Alberta, Edmonton, AB T6G 2P5 and [†]Research Institute, Hospital for Sick Children, Toronto, ON, M5G 1X8

Accelerated conceptus growth in the last trimester may increase amino acid and energy requirements of pregnant sows. The objective of this study was to determine the Trp requirement in early (EG, d 35 to 53) and late (LG, d 92 to 111) gestation using the indicator amino acid oxidation (IAAO) method. Six 2nd parity sows received 6 diets each based on corn, corn starch and sugar in both EG and LG at a constant allowance of 2.4 kg/d. Diets in EG contained Trp at 20, 40, 60, 80, 100 and 120 % of the current Trp requirement (2.5 g/d) in EG and 60, 80, 100, 140, 160 and 180% in LG. Sows were fed 2 mg/(kg BW·h) of L[1-^{13}C]Phe over 4 h in 8 ½-hourly meals. Requirements were determined as the breakpoint in IAAO using 2-phase nonlinear models. Sows, 167.7 kg (SE 3.93) at breeding, gained 44.3 kg (SE 3.63) during pregnancy and had litters of 14.5 piglets (SE 0.43) weighing 19.0 kg (SE 1.41). The Trp requirement was greater ($P = 0.002$) by 52% in LG (2.6 g/d) compared to EG (1.7 g/d). The increase ($P = 0.001$) in Phe retention from EG (2.94 g/d) to LG (8.28 g/d) agreed with a gain of 1 g/d N per fetus in LG and indicated that maternal protein gain was similar in EG and LG. Heat production was greater ($P = 0.008$) by 3% in LG compared to EG. Lipid retention decreased ($P < 0.01$) from EG to below zero in LG. Young sows strive to maintain fetal and maternal protein growth even if lipid retention becomes negative. This shows the importance of meeting amino acid requirements in late pregnancy.

Support: ALIDF, ACAAF, Alberta Pork, Ontario Pork, Ajinomoto