

Dietary Lysine Requirement for Maintenance is 49 mg/kg^{0.75} in a Population of Modern, High Productivity Sows

R.S. Samuel¹, S. Moehn¹, P.B. Pencharz² and Ronald O. Ball¹

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

Dietary lysine is the limiting amino acid in typical gestation and lactation diets for modern, high producing sows. The recommended daily lysine requirement of non-pregnant sows at maintenance, 36 mg/kg^{0.75} (NRC 1998), was estimated from research in the 1960's with growing pigs and sows. Genetic advances have substantially improved sow and pig performance; however little research has been conducted recently on amino acid requirements of sows. The current estimate was hypothesized to be too low for modern, high producing sows.

Non-pregnant *Hypor Hybrid* (Hypor Inc) sows (n=4; 222.6±0.7 kg BW) were adapted to 2.2 kg of a semi-synthetic diet containing 14.0 MJ ME/kg and 1.09 g/kg lysine. Each sow received 6 test diets, in random order, providing lysine intakes of 19.8, 25.2, 30.6, 41.4, 46.8 and 52.2 mg/kg^{0.75}. After adaptation to each diet, indicator amino acid oxidation using L-[1-¹³C]-PHE was determined simultaneously with indirect calorimetry for 4 h. Plateaus in oxidation were achieved within 1.5 h. PHE oxidation decreased as lysine intake increased and was lowest (P<0.05) at 46.8 mg/kg^{0.75} lysine. Maintenance lysine requirement, calculated by regression analysis, was 49 mg/kg^{0.75}. Heat production was linearly correlated (r² = 0.54) with PHE oxidation and was lowest (P<0.05) at lysine intake of 46.8 mg/kg^{0.75}. The mean RQ (1.029±0.028) showed that dietary energy was not limiting. RQ was also lowest (P<0.001) at lysine intake of 46.8 mg/kg^{0.75}.

Implications: The dietary lysine requirement for this population of sows was determined to be 49 mg/kg^{0.75}; this exceeds the current recommendation (NRC 1998) by 30%. HP and RQ were lowest when sows received adequate intake of dietary lysine, demonstrating that energy metabolism was also most efficient at this intake. Amino acid requirements of modern sows must be re-determined during maintenance, gestation and lactation.

(Supported by ALIDF, CARC, Alberta Pork and Degussa AG)