Nonruminant Nutrition: Energy and amino acids

Evaluation of the true ileal digestible (TID) lysine requirement for 7 to 14 kg pigs. A. M. Gaines1, 2, D. C. Kendall1, G. L. Allee3, 4, M. D. Tokach1, S. S. Dritz2, 4, and J. L. Usry4, 5

University of Missouri-Columbia, Columbia, 1 Kansas State University, Manhattan, 2 Ajinomoto Heartland Inc., Chicago.

Several studies have estimated that the TID lysine requirement for 7 to 14 kg pigs may be as high as 0.720, 0.730, and 0.725, respectively. Diets used in the above experiments were formulated to contain 10, 11, and 12% L-Lys-HCl with 0.200, 0.235, and 0.260 Trp:Lys. Blood samples were collected from pigs fed nutritionally adequate diets prior to reaching a target weight of 11 kg. Both experiments utilized 5 dietary treatments differing in amino acids:lysine (SAA:LYS) for late nursery pigs using two sources of supplemental methionine (DL-methionine vs. Alimet®). For Exp. 1, a total of 330 nursery pigs (TR4 × C22; 11.4 ± 0.10 kg) were allotted to one of nine dietary treatments in a randomized complete block design with six replicate pens per treatment. The control diet (Diet 1) was formulated to contain 10.5% true ileal digestible lysine (TID) with no supplemental Alimet® or DL-methionine (49% SAA:Lys). Diets 2-9 consisted of the control diet supplemented with four levels of DL-methionine or Alimet® that corresponded to SAA:Lys ratios of 54, 59, 64, and 69%, respectively. For Exp. 2, a total of 341 nursery pigs (Genetiporc; 12.8 ± 0.56 kg) were allotted to one of six dietary treatments in a randomized complete block design with six replicate pens per treatment. The control diet (Diet 1) was formulated to contain 1.05% TID lysine with no supplemental DL-methionine (49% SAA:Lys). Diets 2-5 consisted of the control diet supplemented with four levels of DL-methionine that corresponded to SAA:Lys ratios of 54, 59, 64, and 69%, respectively. To evaluate the effect of methionine source on growth performance, the SAA:Lys ratio was increased (linear, P = 0.09) ADG (472, 500, 509, 500, and 495 g/d) and improved (linear, P = 0.01; quadratic, P = 0.01) G/F (0.756, 0.703, 0.669, 0.677, and 0.663). There was no effect of methionine source on ADG (P > 0.34) and (or) methionine source × SAA:Lys interactions (P > 0.89) for ADG, ADFI, or G/F (Diets 2-9). In Exp. 2, increasing the SAA:Lys ratio increased (quadratic, P = 0.05) ADG (605, 642, 631, 636, and 619 g/d) and improved (linear, P = 0.01; quadratic, P = 0.03) G/F (0.598, 0.617, 0.613, 0.620, and 0.616). There was no effect of methionine source on ADG (P = 0.16) or G/F (P = 0.28). Results from these two studies indicate that the ideal ratio of SAA:Lys is as high as 59.0%, regardless of methionine source.

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Determination of the TID tryptophan:lysine ratio for 90 kg barrows. D. C. Kendall1, B. J. Kerr2, R. D. Boyd3, J. W. Frank1, A. M. Gaines1, B. Ratliff1, R. W. Fent1, and G. L. Allee1, 5 University of Missouri-Columbia, 2 USDA-ARS-MWA-SOMMRRU, Ames, IA, 3 The Hanor Company, Spring Green, WS.

A 29 d experiment was conducted to determine the TID tryptophan:lysine (Trp:Lys) ratio for 91 to 124 kg barrows (n=210, TR4 x PIC C-22). Pigs were allotted in a completely randomized design and fed one of five dietary treatments with six replicates of seven pigs per pen. A four point titration curve was constructed with a basal diet (0.55% TID lys, 3.47 Mcal ME/kg, 9.3% CP) formulated to contain 0.76% ADG Trp (0.130 Trp). Additional amino acids were supplied from synthetic sources to meet minimum ratios. L-Trp was added at the expense of corn, creating the three other Trp:Lys treatments (0.165, 0.200, and 0.235 Trp:Lys). A control corn-soybean meal meal diet was formulated to contain 0.55% TID lys, 3.47 Mcal ME/kg, 11.7% CP, and 0.110% TID Trp (0.200 Trp:Lys). Blood samples were collected from four pigs/pen at d 0 and d 29 for determination of blood urea nitrogen (BUN). A linear increase in ADG (0.985, 1.11, 1.12, and 1.16 kg/day, respectively; P<0.001) and ADFI (P<0.01) was observed with increasing Trp:Lys for the 29 d trial. There were quadratic improvements in d 29 BW (P<0.06) and G:F (0.304, 0.327, 0.327, and 0.330, respectively;