

Nonruminant Nutrition: Amino Acids

151 Influence of standardized ileal digestible tryptophan:lysine ratio on growth performance of 6- to 10-kg nursery pigs. S. Nitikanchana^{*1}, M. D. Tokach¹, S. S. Dritz¹, J. M. DeRouche¹, R. D. Goodband¹, J. E. Nemecheck¹, J. L. Nelssen¹, and J. Usry², ¹Kansas State University, Manhattan, ²Ajinomoto Heartland LLC, Chicago, IL.

A total of 255 nursery pigs (PIC 327 × 1050, initially 6.3 kg and 3 d postweaning) were used in a 28-d growth trial to determine the effects of standardized ileal digestible (SID) Trp:Lys ratio on growth performance. Treatment diets were fed from d 0 to 14 and a common diet was fed from d 14 to 28. The 6 SID Trp:Lys ratios were 14.7, 16.5, 18.4, 20.3, 22.1, and 24.0%. The diets contained 58% corn, 25% soybean meal, and 10% dried whey and were formulated to 1.30% SID Lys. Pigs were allotted on d 3 after weaning with 6 or 7 pigs per pen and 7 replications per treatment. From d 0 to 14, increasing SID Trp:Lys ratio improved ADG (linear, $P = 0.02$) and generated a tendency for improved ADFI and G:F (linear, $P = 0.06$ and quadratic, $P = 0.08$, respectively). Although ADG and ADFI were linear, the greatest numeric response was observed at a SID Trp:Lys ratio of 20.3%. From d 14 to 28, when the common diet was fed, ADFI increased (linear, $P = 0.05$) as SID Trp:Lys ratio increased in the previous period, but no differences were found in ADG and G:F. For the overall trial (d 0 to 28), ADG and ADFI increased (linear, $P = 0.02$ and $P = 0.03$, respectively) with increasing SID Trp:Lys ratio, with the greatest response observed at 20.3%. Gain:feed was unaffected by SID Trp:Lys ratio. Thus, the SID Trp:Lys ratio for 6- to 10-kg nursery pigs in this study appears to be at least 20.3%.

Table 1. Effects of SIDTrp:Lys ratio on growth performance

Item	SID Trp:Lys ratio, %						SEM	P <	
	14.7	16.5	18.4	20.3	22.1	24.0		Linear	Quadratic
d 0 to 14									
ADG, g	226	244	244	266	258	260	11.67	0.02	0.33
G:F	0.69	0.71	0.71	0.76	0.75	0.72	0.020	0.08	0.08
d 14 to 28									
ADG, g	487	468	489	504	482	501	11.66	0.18	0.88
G:F	0.69	0.67	0.67	0.69	0.68	0.67	0.015	0.65	0.92
d 0 to 28									
ADG, g	356	356	365	385	370	380	8.94	0.02	0.60
G:F	0.69	0.69	0.68	0.71	0.70	0.68	0.012	0.50	0.35

Key Words: amino acid ratio, lysine, nursery pigs, tryptophan

152 Isoleucine requirement in post-weaned piglets. M. Gloaguen^{*1,3}, N. Le Floc^{h1,2}, E. Corrent³, Y. Primot³, and J. van Milgen^{1,2}, ¹INRA, UMR1079, SENAH, Saint-Gilles, France, ²Agrocampus Ouest Rennes, UMR 1079, SENAH, Rennes, France, ³Ajinomoto Eurolysine s.a.s., Paris, France.

The branched-chain amino acids (BCAA: valine, leucine, isoleucine) are considered to be among the next-limiting amino acids for growth in piglets after Lys, Thr, Met+Cys and Trp. Most studies dealing with the Ile requirement use blood cells as a protein source. Blood cells have a very low Ile content and high or very high Leu and Val contents. However, the BCAA share the first 2 steps of their catabolism and a supply of one BCAA may affect the availability of the other BCAA. The objective of this study was to determine the Ile requirement for growth with a diet without blood cells. Two dose-response studies

were carried out with blocks of 6-week-old piglets (12 kg) and performance was monitored during 3 weeks. All diets were sub-limiting in standardized ileal digestible (SID) lysine (1.0%) consisting of 46% wheat, 30% corn, 6% barley and 6% corn gluten meal and differed in the quantity of crystalline L-Ile. In the first experiment, 75 piglets were allotted to 1 of 5 levels of SID Ile:Lys (40, 47, 54, 61, 68%). Addition of Ile up to a level of 47% SID Ile:Lys increased ADG (334, 503, 516, 543 and 509 g/d) and G:F (0.53, 0.62, 0.62, 0.64 and 0.62 g/g). For this study, the Ile requirement could not be determined by regression analysis. A second study was carried out with 84 piglets allotted to 1 of 6 levels of SID Ile:Lys (40, 43, 46, 49, 52, 55%). The supplementation of Ile increased ADG (378, 465, 450, 573, 554 and 545 g/d) and G:F (0.53, 0.57, 0.60, 0.62, 0.60, 0.59 g/g). Maximum ADG and G:F were reached respectively at 49 and 48% SID Ile:Lys using a curvilinear-plateau model. Reducing the SID Ile:Lys content from 49 to 40% resulted in a 32% decrease in ADG. When the diet does not contain blood cells, the Ile requirement may be as low as 49% SID Ile:Lys in post-weaned piglets. With the currently available crystalline amino acids, this recommendation allows further reducing the crude protein content in piglet diets.

Key Words: amino acids, isoleucine, pigs

153 Estimation of the ideal tryptophan:lysine ratio in 10- to 20-kg pigs. G. I. Petersen^{*} and H. H. Stein, *University of Illinois, Urbana.*

Two experiments that were designed to determine the ideal Trp:Lys ratio in 10 to 20 kg pigs were conducted utilizing 2 differing types of diets. In Exp. 1, a corn-corn gluten meal (CGM)-field pea diet was used, and in Exp. 2, a corn-high protein distillers dried grains (HP DDG) diet was used. In both experiments, a basal diet was formulated to contain 0.85% standardized ileal digestible (SID) Lys and 0.10% SID Trp. Five additional diets were formulated in each experiment by adding 0.02, 0.04, 0.06, 0.08, or 0.10% L-Trp to the basal diet. These diets, therefore, contained 11.7, 14.1, 16.5, 18.8, 21.2, or 23.5% SID Trp relative to the concentration of SID Lys. All diets were fed to pigs for 21 d, starting when pigs were 10.32 ± 0.95 kg or 10.05 ± 1.05 kg (Exp. 1 or 2, respectively). In both experiments, estimates for SID Trp:Lys were calculated using a broken line analysis, a quadratic analysis, and the intercept of the broken line and the quadratic line was also determined using ADG, G:F, and plasma urea nitrogen (PUN) as response criteria. In both experiments, there was a linear and a quadratic increase ($P < 0.05$) in final BW, ADG, and G:F, and a reduction (linear and quadratic, $P < 0.05$) in PUN with an increased Trp:Lys ratio. Using broken line analysis, estimates for the ideal Trp:Lys ratio of 20.1, 19.5, and 16.7% were determined in Exp. 1, and estimates of 18.1, 17.4, and 17.0% were determined in Exp. 2 with ADG, G:F, and PUN, respectively, as response criteria. Estimates based on the quadratic analysis were 26.1, 24.0, and 19.1% in Exp. 1, and 21.5, 20.1, and 19.3% in Exp. 2, with ADG, G:F, and PUN, respectively, as response criteria. When the intercept of the broken line and the quadratic analyses were obtained, estimates for the ideal Trp:Lys ratio of 22.2, 22.1, and 18.6% in Exp. 1 and 20.0, 18.9, and 18.6% in Exp. 2, were calculated for ADG, G:F, and PUN, respectively. Based on these data, it is suggested that the ideal SID Trp:Lys ratio in 10 to 20 kg pigs is approximately 18%.

Key Words: ideal protein, lysine, pigs, tryptophan