ing pigs is 30% Met, 60% Met+Cys, 65% Thr, 22% Trp, 70% Val, 52% Ile, 101% Leu, 31% His, 54% Phe, and 40% Tyr. For the amino acids we have studied, these estimates include a safety margin because requirement estimates were obtained using a curvilinear-plateau model, ensuring that the requirement of most pigs in the population is met. A 10% deficiency relative to the requirement results in a growth reduction of 1.0, 9.3, 7.0, 3.8, 3.5, 3.2, and 0.6% for Trp, Val, Ile, Leu, His, Phe, and Tyr, respectively. The reduction in growth was mostly due to a reduction in feed intake. An excess supply of an amino acid can reduce the availability of other amino acids due to competition for catabolism and transport. For example, the use of blood cells (high in Val, Leu, His, and Phe) increases the Ile requirement while excess Leu aggravates the effect of a Val deficiency. Knowledge of the response of animals to the amino acid supply allows formulating diets with a precision protein profile that approaches that of ideal protein.

Key Words: amino acids, ideal protein, pigs

036 **Validating dietary approach to determine the Trp:Lys ratio for pigs.** M. A. D. Goncalves[1,*], M. D. Tokach[1], S. S. Dritz[1], K. J. Touchette[2], J. M. DeRouchey[1], J. C. Woodworth[1], R. D. Goodband[1], *[1]Kansas State University, Manhattan, [2]Ajinomoto Heartland, Inc., Chicago, IL.*

Three experiments were conducted to validate a dietary approach to determine the optimal standardized ileal digestible (SID) Trp:Lys ratio for pigs. Corn–soybean meal–based diets with 30% DDGS were used with different SID Trp:Lys ratios (14.5 vs. 20%), CP (3% points difference), and SID Lys levels (0.05% below requirement at the end of the phase vs. 0.01% above requirement at the beginning of the phase). Lysine requirements were estimated using NRC (2012) model. All experiments had 11 pens/treatment, were 21 d in duration, and used 1183 to 1232 gilts (PIC 337 × 1050) with 24 to 28 pigs/pen. Initial BW for the 3 experiments were 22.8, 57.7, and 87.4 kg, respectively. Dietary treatments in all experiments were 1) High CP, High Lys, and High Trp:Lys (HHH), 2) Low CP, High Lys, and High Trp:Lys (LHH), 3) Low CP, Low Lys, and High Trp:Lys (LLH), and 4) Low CP, Low Lys, and Low Trp:Lys (LLL). Data were analyzed using Proc Mixed with pen as the experimental unit. Lowering CP (HHH vs. LHH) did not influence performance in any experiment, except G:F were greater in HHH compared to LHH in Exp. 1 and 3. Decreasing lysine (LHH vs. LLH) reduced ADG and G:F in Exp. 1 but did not significantly reduce ADG or G:F in Exp. 2 or 3. Decreasing Trp:Lys ratio (LLH vs. LLL) decreased ADG and G:F in all experiments. It appears that Lys was not as limiting as expected in Exp. 2 and 3, but pig performance was improved when Trp:Lys was increase from 14.5 to 20%. In conclusion, a low CP diet formulated 0.05% below the SID Lys requirement at the end of the dietary phase appears to be valid to ensure pigs are below their Lys requirement to test the Trp:Lys ratio.

Table 036.

Diet	HHH	LHH	LLH	LLL	SEM
Exp. 1					
CP, %	23.2	20.2	17.6	17.6	–
SID Lys, %	1.09	1.09	0.92	0.92	–
ADG, g	713[c]	727[c]	654[b]	492[a]	13.8
G:F	0.617[d]	0.586[c]	0.521[b]	0.487[a]	0.010
Exp. 2					
CP, %	20.7	17.6	16.2	16.2	–
SID Lys, %	0.92	0.92	0.80	0.80	–
ADG, g	760[b]	779[b]	754[b]	661[a]	17.1
G:F	0.415[b]	0.405[b]	0.391[b]	0.363[a]	0.010
Exp. 3					
CP, %	18.9	16.0	14.6	14.6	–
SID Lys, %	0.79	0.79	0.65	0.65	–
ADG, g	1033[c]	986[bc]	965[b]	868[a]	18.3
G:F	0.386[a]	0.370[b]	0.360[b]	0.339[c]	0.004

[a,b,c,d] $P < 0.05$.

Key Words: amino acids, pigs, tryptophan

037 **Effect of feeding reduced-CP, amino acid supplemented diets on dietary nitrogen and energy utilization and volatile fatty acid excretion in wean-to-finish swine.** A. M. Jones[1,*], D. T. Kelly[1], B. T. Richert[1], C. V. Maxwell[2], J. S. Radcliffe[1], *[1]Purdue University, West Lafayette, IN, [2]University of Arkansas, Fayetteville.*

Thirty-two barrows (initial BW 8.66 ± 0.136 kg) were used to evaluate the effect of feeding reduced-CP, amino acid (AA) supplemented diets on nutrient and VFA excretion. Pigs were randomly allotted to the following diets: 1) Control: Corn–SBM–DDGS diets with no synthetic AA, 2) 1X reduction in CP, 3) 2X reduction in CP, and 4) 3X reduction in CP. Diet 4, the 3X reduction in CP, was balanced on the seventh limiting AA. Diets 2 and 3 were then formulated to have stepwise and equally spaced reductions in CP between Diets 1 and 4. Diets 2 through 4 were supplemented with synthetic amino acids as needed to meet amino acid needs based on NRC (2012) requirements. All diets were formulated to have identical ME content. Feed was supplied twice daily at approximately 95% of ad libitum intake for each dietary phase to minimize orts. Four nursery phases (d 0–7, d 7–14, d 14–28, and d 28–42) and 5 grow–finish phases (21 d phases) were fed. Pigs were housed in stainless-steel metabolism pens (1.22 m^2) equipped with a nipple waterer and stainless steel feeder. Two pigs were housed per pen during the nursery phase, with one pig being removed on d 42 postweaning. Collections started with nursery phase 3 and during nursery phases pigs were allowed an 8-d adjustment period to the diets followed by a 3 d total collection of feces, urine, and orts. During the Grow–Finish phases, pigs were acclimated to diets for the first 10 d of each phase, and then feces, urine, and orts were collected for 3 d. Acetic ($P < 0.001$), propionic ($P < 0.04$), and butyric acid ($P < 0.04$) concentrations in the feces were linearly decreased by