

for providing supranutritional levels of Se in human diets. Similar data has recently been published regarding lamb and Se supplementation can increase Se delivery to the milk. Unpublished data from our laboratory indicates that supranutritional levels of Se alters vascularity in some tissues and spares fetal weight loss while increasing fetal muscle DNA concentrations when born by nutrient restricted dams. Current re-

search and interest in the area of Se-containing functional foods for health benefits highlights the need for assessing effects of dietary Se on both application and mechanistic components of tissue accretion, metabolism, and growth.

**Key Words:** Meat, Milk, Selenium

## Nonruminant Nutrition - Proteins and Amino Acids

**196 Comparison of commercial methionine sources in diets for 9 to 23-kg nursery pigs.** R. L. Payne\*, D. Hoehler, and M. Rademacher, *Degussa Corporation, Kennesaw, GA.*

Previous trials have reported that the bioefficacy of liquid MHA-FA is considerably lower than its Met-precursor concentration of 88% relative to DL-Met. The objective of this trial, conducted at the Swine Graphics Enterprises commercial research nursery, was to verify the results of previous bioefficacy research by testing if 65 parts DL-Met can replace 100 parts liquid MHA-FA. Six-hundred and sixteen mixed-sex crossbred pigs (PIC 1055 x PIC 280) with an average initial BW of 9 kg were randomly allotted based on sex and age to seven treatments. The treatments were a basal diet deficient in Met or the basal diet supplemented with three levels of DL-Met (0.03, 0.04, and 0.06%) or three levels of liquid MHA-FA (0.046, 0.062, and 0.092%). The Met-deficient basal diet contained 0.22% Met, 1.30% Lys, 0.85% Thr, 0.24% Trp, 0.70% Ile, and 3,440 kcal of ME per kg of diet and it was adequate in all other nutrients with the exception of Met. The basal diet was 69.9% corn, 3.4% soybean meal, 10% animal plasma and 10% whey. Each treatment was replicated 8 times (2 sexes x 4 pens each) with 11 pigs per replicate, and the trial lasted from d 21 to 42 post-weaning. The pigs were weaned on average on d 16 of age, and then from d 0 to 21 post-weaning, pigs were fed the same diet program adequate in all nutrients. Daily gain, ADFI, and feed:gain were improved ( $P < 0.01$ ) when pigs were fed diets with DL-Met or liquid MHA-FA, regardless of supplementation level, compared with those fed the basal diet. Furthermore, ADG (367 g/d) and feed:gain (1.69) were greatest ( $P < 0.01$ ) in pigs fed diets with the highest levels of Met supplementation (0.06% DL-Met and 0.092% liquid MHA-FA). Within each inclusion level pairing (0.03 vs. 0.046, 0.04 vs. 0.062, or 0.06 vs. 0.092), there were no differences in ADG, ADFI, or feed:gain ( $P > 0.05$ ) when 65 parts DL-Met replaced 100 parts liquid MHA-FA in this trial. According to multi-linear regression analysis, liquid MHA-FA was 68.4% as efficient for ADG and 63.9% as efficient for feed:gain relative to DL-Met in this trial.

**Key Words:** Amino acid, Methionine, Nursery pig

**197 Lysine requirement of pigs fed ractopamine HCl in a commercial facility.** C. R. Neill\*<sup>1</sup>, S. S. Dritz<sup>1</sup>, M. D. Tokach<sup>1</sup>, J. L. Nelssen<sup>1</sup>, R. D. Goodband<sup>1</sup>, J. M. DeRouchey<sup>1</sup>, and J. L. Usry<sup>2</sup>, <sup>1</sup>*Kansas State University, Manhattan, KS*, <sup>2</sup>*Ajinomoto Heartland LLC, Chicago, IL.*

A total of 2,834 gilts (PIC L337x C22) were used in three 21-d experiments in a commercial research barn to evaluate the effects of lysine

levels on pig growth and carcass performance when fed Ractopamine HCl (RAC). There were 7 replicates per treatment and 21 to 24 pigs per pen in all three experiments. In Exp. 1, 919 gilts (99.3 kg) were used to evaluate six TID lysine levels (0.75, 0.85, 0.95, 1.05, 1.15, 1.25%). All diets contained 6.75 ppm of RAC. As lysine level increased there was a linear increase ( $P < 0.03$ ) in ADG (0.96, 0.98, 1.00, 1.04, 1.06, 1.01 kg) and G:F (0.36, 0.38, 0.38, 0.39, 0.40, 0.39). In Exp. 2 and 3, treatments included a control diet formulated to 0.65% TID lysine without RAC and diets containing 0.75, 0.85, 0.95, 1.05, and 1.15% TID lysine with 5 ppm RAC. There were 983 (98.6 kg) and 932 (102.6 kg) gilts in Exp. 2 and 3, respectively. All diets were corn-soybean meal based and contained high levels of synthetic amino acids (0.325% of L-lysine HCl with added threonine, methionine, and tryptophan) in Exp. 2, but only 0.075% L-lysine HCl in Exp. 3. As lysine level increased, there was a linear increase ( $P < 0.05$ ) in ADG (0.84, 0.92, 0.94, 0.95, 1.05, 1.00 in Exp. 2; 0.88, 0.96, 1.00, 1.05, 1.03, 1.06 kg in Exp. 3.) and G:F (0.32, 0.36, 0.36, 0.37, 0.39, 0.39 in Exp. 2; 0.34, 0.37, 0.39, 0.41, 0.41, 0.42 in Exp. 3). Pigs fed RAC in Exp. 2 and 3 had increased ( $P < 0.003$ ) ADG and G:F compared to pigs fed the control diet. For carcass data, percent lean and lean premium were linearly improved ( $P = 0.03$ ) in Exp. 1 with increasing levels of TID lysine, but were not changed in Exp. 2. Average backfat and FFLI were linearly improved ( $P < 0.03$ ) in Exp. 3 with increasing levels of TID lysine. These experiments suggest that pigs fed RAC require at least 0.95% or 26 g/d of TID lysine and at least 25 g of TID lysine/kg of gain.

**Key Words:** Lysine, Pigs, Ractopamine HCl

**198 Effects of crystalline amino acids, ractopamine, and sodium bicarbonate on physiological pH in swine.** K. Dorton\*, T. Engle, R. Enns, and D. Anderson, *Colorado State University, Fort Collins.*

Eighteen barrows were utilized in a crossover design study to determine the effects of dietary inclusion of crystalline amino acids, ractopamine (RAC), and sodium bicarbonate ( $\text{NaHCO}_3$ ) on urine and blood parameters indicating physiological pH in swine. This experiment was divided into 6 periods (P1 - P6): P1) 11 d adjustment phase; P2) 5 d baseline; P3) 4 d treatment; P4) 4 d treatment crossover; P5) 2 d  $\text{NaHCO}_3$  addition; and P6) 2 d  $\text{NaHCO}_3$  crossover. Treatments consisted of: T1) soybean meal (high protein diet; HP), T2) crystalline amino acids (low protein diet; CAA), T3) HP + RAC (20 ppm), or T4) CAA + RAC (20 ppm). Diets were formulated to meet lysine requirements for control and RAC-fed pigs (0.8% lysine for T1 and T2, 1.1% lysine for T3 and T4). During P5 and P6, treatments consisted of the above treatments with and without the addition of 2.5%  $\text{NaHCO}_3$ . Diets were formulated to meet or exceed NRC (1998) requirements for energy, protein, vitamins, and minerals. During P3 and P4, barrows that received CAA had