1.80, 2.00, 2.20, and 2.40) improved (linear, P < 0.03) ADG (808, 818, 857, 864, 868, 877 ± 23 g/day), feed efficiency (0.31, 0.31, 0.32, 0.32, 0.33, 0.34 ± 0.005), and (quadratic, P < 0.01) lean percentage (53.9, 53.9, 53.6, 53.6, 54.2, 54.2 ± 0.15 %). Numeric improvements (linear, P = 0.12) in IOMFC ($106.64, 106.66, 106.98, 107.09, 107.60, 107.81 ± 1.40/pig) were observed as lysine increased. The equation (lysine:calorie ratio = -0.0133 × BW, kg + 3.6944) describes the lysine:calorie ratio that optimized performance and IOMFC from 40 to 120 kg.

Key Words: Lysine, Pigs, Economics

191 Determining an optimum lysine:calorie ratio for 35 to 120 kg gilts in a commercial finishing facility. R.G. Main, S.S. Dritz, M.D. Tokach, R.D. Goodband, and J.L. Nelssen, *Kansas State University, Manhattan*.

Our objective was to determine the optimum lysine:calorie ratio (g total dietary lysine/Mcal ME) for 35 to 120 kg gilts (PIC L337 × C22) in a commercial finishing environment. Four trials were conducted using randomized complete block designs (42 pens/trial, 4,520 pigs). Six treatments of increasing lysine:calorie ratio were used in each study. Diets were corn-soybean meal-based with 6% choice white grease. Lysine:calorie ratios were attained by adjusting the amount of corn and soybean meal. No crystalline lysine was used. As in trial 1 (35 to 60 kg, reported in 2002), increasing lysine:calorie ratio (1.96, 2.24, 2.52, 2.80, 3.08, and 3.36) in trial 2 (60 to 85 kg) increased (quadratic, P< 0.02) ADG (916, 935, 960, 973, 951, 936 ± 12 g/d), feed efficiency (0.40, 0.41, 0.41, 0.43, 0.40, 0.41 ± .005), income over marginal feed costs (IOMFC; $14.42, 14.68, 14.90, 15.14, 14.13, 13.80 ± .27/hd), feed cost per kg of gain ($0.32, 0.32, 0.32, 0.33, 0.35, 0.36 ± .004), and reduced (linear, P< 0.01) backfat. In trial 3 (78 to 103 kg), increasing lysine:calorie ratio (1.53, 1.78, 2.03, 2.28, 2.53, and 2.78) improved (quadratic, P< 0.02) ADG (807, 813, 900, 917, 912, 897 ± 18 g/d), feed efficiency (0.32, 0.32, 0.35, 0.36, 0.36, 0.36 ± 0.005), IOMFC ($11.32, 11.24, 13.18, 13.41, 13.20, 12.56 ± .36), feed cost per kg of gain($.381, .388, .359, .361, .365, .382 ± .006), and reduced (linear, P< 0.01) backfat. In trial 4 (100 to 120 kg), increasing lysine:calorie ratio (1.40, 1.60, 1.80, 2.00, 2.20, and 2.40) improved (linear, P< 0.02) ADG (722, 725, 767, 837, 880, 879 ± 19 g/d), feed efficiency (0.30, 0.30, 0.33, 0.35, 0.36, 0.36 ± 0.007), IOMFC ($105.66, 106.19, 107.46, 108.87, 109.64, 109.64 ± 1.57), feed cost per kg of gain ($0.40, 0.40, 0.38, 0.36, 0.36, 0.37 ± .008), and (quadratic, P< 0.04) lean percentage (54.7, 55.1, 54.6, 55.1, 55.3, 55.5 ± .15%). The equation (lysine:calorie ratio = -0.0164 × BW, kg + 4.004) describes the lysine:calorie ratio that met biological requirements and optimized IOMFC from 35 to 120 kg.

Key Words: Lysine, Pigs, Economics

192 Evaluation of the lysine requirements for barrows fed ractopamine HCl (Paylean®) under conditions of heat stress. D. C. Kendall*, J. W. Frank, A. M. Gaines, G. F. Yi, and G. L. Allee, *University of Missouri, Columbia*.

Two experiments were conducted to evaluate the lysine requirement of barrows fed ractopamine HCl (Paylean®, RAC) under heat-stress conditions. Exp. 1 was conducted in the Brody environmental chambers at the University of Missouri. Seventy-two barrows (TR-4 x PIC C-22) were subjected to a controlled cycling heat stress (cycling from 27 C at 2400 h to 35 C maintained from 1100 to 1900 h; HS) and fed corn-soy meal diets containing 10 ppm RAC and 3.51 Mcal ME/kg. Pigs were fed one of three dietary Lys levels (0.70, 0.95, or 1.20% total Lys) for 20 days to 6 replicate pens of 3 pigs/pen. An additional treatment consisted of pigs housed at thermoneutral conditions (21 C; TN) and fed a diet containing 10 ppm RAC and 1.20% total Lys. There was a linear improvement in ADG (P < 0.05) and feed efficiency (P < 0.05) with increasing Lys level (593, 633, and 782 g/d, respectively; 0.178, 0.218, and 0.255, respectively). Pigs fed the 1.20% total Lys diet in the TN environment had higher ADG (P < 0.01), ADFI (P < 0.01) and tended to be more efficient (0.371 vs 0.340, P < 0.07) than pigs fed 1.20% total Lys in HS. In Exp. 2, 210 barrows (TR-4 x PIC C-22) were housed in a cycling heat stress environment (28 to 34 C) and fed corn-soy meal diets containing 10 ppm RAC and 3.47 Mcal ME/kg. Pigs were fed one of four dietary Lys levels (0.90, 1.10, 1.30, or 1.50% total Lys) for 25 d to 6 replicate pens of 7 pigs/pen. A fifth treatment consisted of the 0.90% total Lys diet without RAC. There were no differences in ADG or loin eye area accretion among the RAC fed treatments; however, ADFI (P < 0.01) and tenth rib backfat accretion (P < 0.05) decreased linearly with increasing Lys level. Therefore, feed efficiency linearly (P < 0.01) and quadratically (P < 0.05) improved with increasing Lys level (0.399, 0.414, 0.441, and 0.421, respectively). Pigs fed diets with 10 ppm RAC and 0.90% total Lys had greater ADG (P < 0.02), feed efficiency (P < 0.001), and loin eye area accretion (P < 0.03) than non-RAC fed pigs. These experiments demonstrate that feeding Paylean® improves the growth performance of heat-stressed pigs and that the lysine requirement of barrows fed Paylean® may be as high as 1.30% total lysine under heat-stress conditions.

Key Words: Pigs, Ractopamine, Lysine

193 The effects of environmental housing conditions on two ractopamine use programs in finishing pigs. S. A. Trapp*, B. E. Hill, S. L. Hankins, A. P. Schinckel, and B. T. Richert, *Purdue University, West Lafayette, IN*.

Littermate barrows (93) and gilts (96) were used in a 6-wk study evaluating the effect of environmental housing conditions on two ractopamine use programs for late finishing pigs. All pigs were weaned into an SEW nursery. Following the nursery period, they were sorted into two environments: an all-in-all-out grow/finish facility with high bio-security measures in place (AIAO) or into a continuous flow system for the grow/finish phase (CF). At an average initial BW = 72.1 kg, pigs were allotted by weight, sex and ancestry to one of three ractopamine (RAC) treatments (trt): 1) control, no RAC; 2) 5 ppm RAC wks 0-3, 10 ppm RAC wks 4-6; 3) 10 ppm RAC wks 0-6. Barrows were fed a 1.05% Lys diet wks 0-3 and a 1.00% Lys diet wks 4-6; gilts were fed a 1.15% Lys diet wks 0-3 and a 1.10% Lys diet wks 4-6. Pigs fed RAC had increased ADG (1022 vs 867 g/d; P < 0.05) and increased G:F (0.416 vs 0.359; P < 0.05) compared to the control trt during wk 0-3. Overall, pigs fed RAC had increased ADG (958 vs 872 g/d, P < 0.05) and increased G:F (0.378 vs 0.338, P < 0.05) compared to the control trt. Additionally, pigs fed trt 2 had greater ADG (990 vs 926 g/d, P < 0.05) than trt 3 during wk 0-6. Pigs fed trt 2 also had increased final BW (109.0, 114.0, 110.8 kg; trt 1-3 respectively, P < 0.05) than the control trt. Real-time ultrasound data indicate that pigs fed RAC had increased loin eye area (LEA) (42.8, 45.8, 46.0 cm^2; trt 1-3 respectively, P < 0.05) and decreased 10^{th} rib backfat (20.4, 18.5, 18.4 mm; trt 1-3 respectively, P < 0.05). No significant differences between housing systems or interactions between grow/finish environments and treatments were found for overall ADG, ADFI, G:F, or carcass characteristics (P > 0.05). However, pigs in the CF environment were 11 d older at the start of the experimental BW. Both RAC use programs had increased pig growth rate and feed efficiency with nearly identical LEA and backfat depths over the control. Additionally, the step-up RAC trt had greater final BW and ADG than the constant RAC trt, while utilizing less RAC in the late finishing period.

Key Words: Ractopamine, Pigs, Environment

194 Interactive effects between dietary L-carnitine and ractopamine HCl (Paylean®) on finishing pig growth performance. B. W. James*[1], M. D. Tokach[1], R. D. Goodband[1], J. L. Nelssen[1], S. S. Dritz[1], K. Q. Owen[2], and J. C. Woodworth[2], [1]*Kansas State University, Manhattan,* [2]*Lonza, Inc., Fair Lawn, NJ*.

A total of 2,152 pigs were used in four experiments to determine the interactive effects of dietary carnitine and ractopamine HCl (Paylean®, RAC). All trials were arranged as factorials with main effects of carnitine (0, 25, or 50 ppm in Exp. 1 and 2 and 0 or 50 ppm in Exp. 3 and 4) and RAC (0, 5, or 10 ppm in Exp. 1 and 0 or 10 ppm in Exp. 2, 3, and 4). Dietary carnitine was fed from 38 kg to market (Exp. 1 and 3) or for the last 3 or 4 wk before market (Exp. 4 and 2, respectively). Ractopamine was fed prior to market for 4 wk in Exp. 1, 2, and 3, and 3 wk in Exp. 4. Experiments 1 and 2 were conducted in university research facilities and Exp. 3 and 4 in commercial research barns. All diets were formulated to 1.0% Lys during the last phase of each experiment. In all experiments, pigs fed RAC had increased (P < 0.05) ADG and feed efficiency (G:F) compared to pigs not fed RAC. Feeding carnitine prior to the RAC feeding period did not affect (P > 0.25) pig performance. In Exp. 1 and 2, carnitine did not affect (P > 0.46) ADG during the 4 wk prior to market; however, G:F tended (quadratic; P < 0.07) to improve with increasing carnitine in Exp. 2. In Exp. 3, a carnitine × RAC interaction was observed (P < 0.04) for ADG and G:F. Both carnitine and RAC improved performance, but not additively. In Exp. 4, pigs fed carnitine had increased (P < 0.04) ADG (0.88 vs 0.84 kg) and G:F