

138 The effect of dietary energy density and lysine:calorie ratio on the growth performance of growing pigs and subsequent finishing performance. J. W. Smith, II\*, P. R. O'Quinn, M. D. Tokach, R. D. Goodband, and J. L. Nelssen, Kansas State University, Manhattan.

A total of 120 gilts (initially 29.6 kg) was used to evaluate the effects of increasing energy density and lysine:calorie ratio on growing pig growth performance and subsequent finishing performance. From 29.6 to 72.6 kg, pigs were fed increasing choice white grease (CWG; 0, 3, and 6%) at four lysine:calorie ratios (LCR; 2.75, 3.10, 3.45, and 3.80 g lysine:Mcal ME) in a 3 x 4 factorial. Pigs were blocked by weight and ancestry and allotted to one of twelve dietary treatments. Protein content of the experimental diets was achieved by adjusting the corn:soybean meal ratio. When mean block weight reached 72.6 kg, pigs were switched to common finisher diets until 107 kg. During the grower phase, increasing CWG and LCR improved ADG (linear,  $P < .05$  and  $.01$ , respectively). Increasing CWG decreased ADFI and improved G:F (linear,  $P < .01$ ). Increasing LCR increased ADFI (linear,  $P < .10$ ). From 72.6 to 90.7 kg, pigs previously fed increasing CWG and LCR from 29 to 70 kg had decreased ADG, ADFI, lysine intake, and ME intake (linear,  $P < .05$ ). Pigs previously fed increasing LCR had poorer G:F (linear,  $P < .01$ ). Increasing CWG or LCR fed during the grower phase did not affect ADG, ADFI, and G:F from 90.7 to 107 kg. From 29.6 to 107 kg, pigs fed increasing CWG during grower phase consumed less feed (linear,  $P < .05$ ) and tended (linear,  $P < .10$ ) to be more efficient. When pigs were slaughtered, CWG and LCR fed from 29.5 to 72.6 kg did not affect fat depth, loin depth, or carcass yield of pigs fed common diets during early and late finishing. These results indicate that feeding 3 CWG and a LCR of 3.45 g lysine:Mcal ME from 29.5 to 72.6 kg maximizes growth of crossbred gilts from 29 to 72 kg.

26.5 to 72.6 kg	Choice White Grease, g				Lysine:Mcal ME				CV
	0	3	6	2.75	3.10	3.45	3.80		
ADG, kg	.91	.94	.94	.90	.91	.96	.96	6.4	
ADFI, kg	2.23	2.15	2.07	2.11	2.09	2.22	2.19	7.5	
G:F	.41	.44	.46	.43	.43	.43	.44	5.0	

Key Words: Pig, Energy, Protein

139 Estimating the lysine requirements for growing and finishing halothane carrier sired pigs using growth performance, growth curves, and plasma urea nitrogen concentrations. J. W. Frank\*<sup>1</sup>, B. T. Richert<sup>1</sup>, K. R. Cera<sup>2</sup>, R. D. Boyd<sup>3</sup>, and A. P. Schinckel<sup>1</sup>, <sup>1</sup>Purdue University, West Lafayette, IN, <sup>2</sup>Countrymark CO-OP, Indianapolis, IN and <sup>3</sup>PIC USA, Franklin, KY.

One hundred twenty six barrows (B) and 72 gilts (G) were used to investigate the use of growth performance, growth curves, and plasma urea nitrogen concentrations (PUN) to estimate the lysine requirements of growing and finishing halothane carrier sired pigs (PIC 406 x C22). Treatments were arranged as a 2 x 3 factorial (two sexes and three dietary lysine sequences). Barrows (initial BW=31.2 kg) and G (initial BW=31.3 kg) were penned separately, 7 pigs/pen for B and 6 pigs/pen for G. Pigs and feeders were weighed weekly. Diets were formulated on a lysine basis while maintaining an ideal amino acid ratio and were phase fed from initial weight to 45.4 kg (P1), 45.4 to 68.0 kg (P2), 68.0 to 90.7 kg (P3), and 90.7 kg to market weight (P4). Barrow and G diet total lysine sequences were low (L)=1.12, 1.02, 0.8, and B=0.55, G=0.65%; medium (M)=1.26, 1.16, 0.9, and B=0.65, G=0.75%; and high (H)=1.41, 1.30, 1.0, and B=0.75, G=0.9% for the four growth phases, respectively. Four pigs per pen were bled at the start of the trial and 2 weeks after diet changes to determine PUN. Barrows had greater ADG and ADFI than G during P2, P3, and P4 ( $p < 0.05$  and  $p < 0.01$ , respectively). Pigs fed respective dietary lysine sequences exhibited similar ADG, ADFI, and feed efficiency. Gilts had less last rib backfat (14.8 vs 18.8 mm;  $p < 0.001$ ), less tenth rib backfat (18.1 vs 23.9 mm;  $p < 0.001$ ), larger loin eye areas (39.7 vs 37.4 cm<sup>2</sup>;  $p < 0.001$ ), and higher percent lean (53.5 vs. 50.4%;  $p < 0.001$ ) than B. Plasma urea nitrogen increased linearly ( $p < 0.001$ ) as lysine intake increased during all growth phases. During P2 and P3 B PUN were greater than G ( $p < 0.001$ ). These results suggest the total lysine intake requirements for halothane carrier sired pigs is not greater than 19 (P1), 24.5 (P2), 23 (P3), and 16.5 g/d (P4) for B and 20 (P1), 22 (P2), 20 (P3), and 16.5 g/d (P4) for G.

Key Words: Pigs, Lysine, Urea

140 Responses of barrows fed a corn-soybean meal diet or diets supplemented with crystalline amino acids either on an ideal protein basis or to a pattern similar to the corn-soybean meal diet at two feeding levels. S. Gomez\*, P. S. Miller, A. J. Lewis, and H.-Y. Chen, University of Nebraska, Lincoln.

An experiment was conducted using 36 barrows with high lean gain potential (initial BW 32.7 kg) to evaluate the performance, nutrient digestibilities, and plasma metabolites of pigs fed a corn-soybean meal diet (CONTROL) and diets supplemented with crystalline Lys, Thr, Trp, and Met either on an ideal protein basis (IDEAL) or on a pattern similar to the CONTROL diet (AACON). Patterns were based on true ileal digestibility values. Diets were offered on an ad libitum basis or by feeding 80% of the ad libitum intake (i.e., a 3 x 2 factorial arrangement of treatments). There were six pigs per treatment and pigs were fed three times daily for 27 d. The protein concentration was approximately 4% lower in the IDEAL and AACON diets than in the CONTROL diet (11.7 and 12.3 vs 15.9%, respectively). Pigs fed the CONTROL diet had greater ADG and ADG/ADFI ( $P < .01$ ) than pigs fed the IDEAL and AACON diets. The ADG decreased ( $P < .01$ ), but ADG/ADFI tended to increase ( $P < .10$ ) for pigs fed 80% of ad libitum. The apparent fecal digestibility of protein was greatest in pigs fed the CONTROL diet ( $P < .01$ ), and was greater ( $P < .01$ ) in pigs fed the AACON diet than in pigs fed the IDEAL diet. Plasma urea concentrations were lower in pigs fed the IDEAL and AACON diets than in pigs fed the CONTROL diet, regardless of feeding level. For pigs fed the CONTROL diet, the urea concentrations were lower when feed intake was 80% of ad libitum (diet x level,  $P < .01$ ). Plasma NEFA were greater ( $P < .01$ ) in pigs fed the AACON diet and in pigs that had ad libitum access to feed. In summary, pigs fed the IDEAL and the AACON diets gained less and had lower plasma urea concentrations than pigs fed the CONTROL diet. The data suggest that a deficiency of (an) essential amino acid(s), other than Thr, Trp, and Met, or a possible reduction in Lys availability (because of the lower protein digestibility) may have limited the growth potential of pigs fed the IDEAL and AACON diets.

Key Words: Barrows, Amino Acids, Performance

141 Responses of barrows fed a corn-soybean meal diet or a diet formulated on an ideal protein basis at three feeding levels. S. Gomez\*, P. S. Miller, A. J. Lewis, and H.-Y. Chen, University of Nebraska, Lincoln.

An experiment was conducted using 36 barrows with high lean gain potential (initial BW 31.5 kg) to evaluate the performance, nutrient digestibilities, and plasma metabolites of pigs fed a corn-soybean meal diet (CONTROL) or a diet formulated on an ideal protein basis (IDEAL; supplemented with crystalline Lys, Thr, Trp, and Met on a true ileal digestible basis). Diets were offered on an ad libitum basis or by feeding 90 or 80% of ad libitum intake (i.e., a 2 x 3 factorial arrangement of treatments). There were six pigs per treatment and pigs were fed three times daily. Phase 1 diets were offered for 25 d and Phase 2 diets were provided for the next 30 d. In the IDEAL diets, the protein concentration was approximately 4% lower than in the CONTROL diets (Phase 1, 16.2 vs 13.0%; Phase 2, 14.2 vs 10.2%). Pigs fed the CONTROL diet had greater ADG ( $P < .05$ ) and ADG/ADFI ( $P < .01$ ) than pigs fed the IDEAL diet. As the level of feed intake decreased, ADG decreased ( $P < .01$ ), but ADG/ADFI tended to improve ( $P < .10$ ) for pigs fed 90% of ad libitum. The apparent fecal digestibilities of DM and energy were greater ( $P < .01$ ) for pigs fed the IDEAL diet. Plasma urea concentrations were lower in pigs fed the IDEAL diet than in pigs fed the CONTROL diet, regardless of feeding level. For pigs fed the CONTROL diet, urea concentrations were lower when feed intake was 80% of ad libitum (diet x level,  $P < .01$ ). Plasma glucose concentrations were lower in pigs fed the CONTROL diet than in pigs fed the IDEAL diet ( $P < .01$ ) and were reduced with each reduction in the feeding level ( $P < .01$ ). In summary, pigs fed the IDEAL diet gained less than pigs fed the CONTROL diet, despite having higher nutrient digestibilities and lower plasma urea concentrations. Furthermore, reduced ADG was independent of feeding level. The data suggest that a deficiency of other essential amino acid(s) may have limited the growth potential of pigs fed the IDEAL diet or that the currently accepted pattern was not ideal for the pigs used in this research.

Key Words: Barrows, Ideal Protein, Performance