

24 experiments and PIC 327 in 3 experiments. Ingredient loadings values used were based on NRC (2012) recommendations. Responses were analyzed separately for each experiment using general linear and nonlinear heterogeneous variance mixed models (Gonçalves et al., 2016). Each treatment within an experiment was considered an observation ( $n = 213$ ) and each experiment was used as random effect. Models that differed in their Bayesian information criterion values by at least 2 points were considered to have meaningful differences in their data fit (Raftery, 1996). The requirements presented are an average of the requirement for ADG and the F:G ratio. Requirements estimates for boars were based on relative differences from barrows published by Bertram et al. (2014) and the NRC (2012). There was no interaction between sire line or dam line and treatment ( $P > 0.10$ ). The SID Lys requirement and their SID Lys:calorie ratio equations are presented in Tables 273-01 and 273-02, respectively. The SID Lys requirements from this meta-analysis are 106, 103, and 132% of NRC (2012) recommendations for barrows, gilts, and boars after adjusting for feed intake, respectively. This is probably due to increased rate of growth and improved feed efficiency from modern PIC lines.

**Key Words:** growth, lysine, pig  
doi:10.2527/asasmw.2017.273

**274 Effects of various dietary *n-6:n-3* polyunsaturated fatty acid ratios on growth performance, carcass traits, blood lipid profiles, and meat quality in finishing pigs.** W. C. Liu\*, T. S. Li, J. Yin, H. M. Yun, I. H. Kim. *Department of Animal Resource and Science, Dankook University, Cheonan, The Republic of Korea.*

A total of 96 crossbred pigs ([Landrace × Yorkshire] × Duroc) with an average initial BW of  $51.50 \pm 1.56$  kg were used in this 10-wk feeding trial to evaluate the effects of different dietary *n-6:n-3* PUFA ratios in finishing pigs. Pigs were randomly allotted to 4 dietary treatments with 6 replications and 4 pigs per pen (2 barrows and 2 gilts). Pigs were fed a corn–soybean meal–based diet with various *n-6:n-3* ratios (1:1, 5:1, 10:1, and 15:1). Pigs were weighed at the beginning of the experiment and at the end of wk 5 and 10, and feed consumption was recorded to calculate ADG, ADFI, and G:F. At the end of the experiment, blood samples were taken from 2 pigs per pen via jugular venipuncture into vacuum tubes, and serum was recovered by centrifugation at  $2,000 \times g$  for 30 min at 4°C. The serum concentration of total cholesterol, high-density lipoprotein (HDL) cholesterol, low-density lipoprotein (LDL), and triglyceride was analyzed using an autoanalyzer (Automatic Biochemical Analyzer, RA-1000; Bayer Corp., Tarrytown, NY). After slaughter, backfat thickness and lean meat percentage were measured using a real-time ultrasound instrument (Piglot 105; SFK Technology, Herlev, Denmark). Then, a sample of the right loin was removed between the 10th and 11th ribs to determine meat quality, including meat color, sensory

**Table 273-01.** Standardized ileal digestible (SID) Lysine percentage requirement and ADFI of PIC pigs for a diet with 2,475 kcal NE/kg

	ADFI, kg	BW range, kg			
		25–50	50–75	75–100	100–135
Barrows	2.40	1.11	0.91	0.78	0.70
Gilts	2.22	1.16	0.94	0.80	0.75
Boars	1.88	1.39	1.16	1.00	0.90

**Table 273-02.** Standardized ileal digestible (SID) Lysine to NE ratio equations for PIC pigs

Gilts = $0.000056 \times (\text{BW, kg} \times 2.2046)^2 - 0.02844$ $\times (\text{BW, kg} \times 2.2046) + 6.6391$
Barrows = $0.000042 \times (\text{BW, kg} \times 2.2046)^2 - 0.02372$ $\times (\text{BW, kg} \times 2.2046) + 6.1452$
Boars = $0.000046 \times (\text{BW, kg} \times 2.2046)^2 - 0.02704$ $\times (\text{BW, kg} \times 2.2046) + 7.5417$

evaluation (color, marbling, and firmness scores), cooking loss, drip loss, pH, LM area, and water holding capacity. All data were analyzed using the GLM procedure of SAS (SAS Inst. Inc., Cary, NC). Differences among treatment means were determined using the Tukey's range test. Growth performance, carcass traits, and meat quality characteristics were not influenced ( $P > 0.10$ ) by dietary *n-6:n-3* ratios. The serum total cholesterol and LDL cholesterol contents of pigs fed the diet with an *n-6:n-3* PUFA ratio of 1:1 (1.75 and 1.01 mmol/L, respectively) were lower ( $P < 0.05$ ) than those of pigs fed the diets with ratios of 10:1 (2.11 and 1.39 mmol/L, respectively) and 15:1 (2.18 and 1.23 mmol/L, respectively). Furthermore, the serum triglyceride contents of pigs fed the diets with *n-6:n-3* PUFA ratios of 1:1 (0.58 mmol/L) and 5:1 (0.60 mmol/L) were lower ( $P < 0.05$ ) than those of pigs fed diets with ratios of 10:1 (0.96 mmol/L) and 15:1 (0.89 mmol/L). In conclusion, lowering the dietary *n-6:n-3* ratio to 1:1 to 5:1 is beneficial for lipid metabolism in finishing pigs without adverse effects on growth performance, carcass traits, and meat quality.

**Key Words:** blood lipid profiles, finishing pigs, *n-6:n-3* ratios  
doi:10.2527/asasmw.2017.274

**275 Effects of KemTRACE chromium level and feeding regimen on finishing pig growth performance and carcass characteristics.** J. T. Gebhardt<sup>1</sup>, H. S. Cemin<sup>1\*</sup>, J. C. Woodworth<sup>1</sup>, M. D. Tokach<sup>1</sup>, S. S. Dritz<sup>1</sup>, J. M. DeRouchey<sup>1</sup>, J. A. Loughmiller<sup>2</sup>, R. D. Goodband<sup>1</sup>, <sup>1</sup>Kansas State University, Manhattan, <sup>2</sup>Kemin Industries, Des Moines, IA.

A total of 1,206 pigs (PIC 337 × 1050; 48.9 kg initial BW) with 27 pigs per pen and 15 pens per treatment were used in an 84-d study to evaluate the effects of Cr supplementation (KemTRACE Chromium propionate, Kemin Industries Inc., Des Moines, IA) and feeding regimen on growth performance of finishing pigs housed under commercial conditions. Pigs

were placed in mixed-gender pens and blocked by BW in a randomized complete block design. Diets were corn–soy–distiller’s dried grains with solubles (DDGS) based and were fed in 4 phases. Treatments were 1) Control, no Cr in the grower or finisher phases; 2) 200 ppb of Cr fed in both grower and finisher phases; and 3) 200 ppb of Cr fed in the grower phase and 100 ppb fed in the finisher phase. The grower phase was from 49 to 92 kg and the finisher phase was from 92 to 124 kg. Data were analyzed using PROC GLIMMIX of SAS (SAS Inst. Inc., Cary, NC) and are presented as least squares means  $\pm$  SEM. There was no evidence ( $P \geq 0.197$ ) of a Cr supplementation effect in the grower period. In the finishing period, addition of Cr resulted in a quadratic increase ( $P = 0.023$ ) in ADG, with the greatest performance observed at 200 ppb Cr (0.92, 0.92, and  $0.94 \pm 0.010$  kg/d for the Control and 100 and 200 ppb added Cr, respectively), with no evidence of differences on ADFI or G:F. Overall, the addition of 200 ppb Cr in both grower and finisher phases tended to increase ( $P = 0.086$ ) ADG compared with the control (0.89, 0.90, and  $0.91 \pm 0.006$  kg/d for the control and 200/100 and 200/200 ppb added Cr, respectively). There was no evidence ( $P \geq 0.523$ ) of a Cr supplementation effect on overall ADFI and G:F. Backfat was lowest ( $P = 0.028$ ) for pigs fed 200 and then 100 ppb Cr and greatest for pigs fed 200 ppb Cr in the grower and finisher phases, with control pigs intermediate (18.4, 18.0, and  $18.7 \pm 0.23$  mm for the Control and 200/100 and 200/200 ppb added Cr, respectively). Percentage lean was greatest ( $P = 0.028$ ) for pigs supplemented with 200 and then 100 ppb Cr (55.1, 55.4, and  $55.0 \pm 0.16\%$  for the control and 200/100 and 200/200 ppb added Cr, respectively). Dressing percentage was lowest ( $P = 0.018$ ) for pigs fed 200 ppb Cr in both grower and finisher phases, with no difference between the other treatments (77.1, 77.1, and  $76.8 \pm 0.001\%$ , respectively). There was no evidence of differences ( $P > 0.10$ ) in HCW or loin depth. In summary, adding 200 ppb of Cr in both grower and finisher phases increased finishing ADG. Carcass characteristics were optimized with supplementation of 200 ppb Cr in the grower phase followed by 100 ppb Cr fed in the finisher phase.

**Key Words:** chromium propionate, duration, finishing pigs

doi:10.2527/asasmw.2017.275

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**276 Evaluation of standardized ileal digestible tryptophan:lysine ratio with and without ractopamine hydrochloride on growth performance and carcass characteristics of finishing pigs.**

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Previous research has reported that increasing the SID Trp:Lys ratio to 24.5% in finishing pigs fed ractopamine HCl (RAC) during summer months improved ADG by 70 and 37 g/d in comparison with ratios of 18 and 21%, respectively. The objective of this

experiment was to determine the effects of feeding higher SID Trp:Lys ratios with and without RAC on growth performance and carcass characteristics of finishing pigs during summer months. In August 2016 (mean outside temperature 23.03°C), a total of 1,101 pigs (PIC 1050  $\times$  327; 99.3 kg initial BW) were used in a 30-d trial. Pens of 26 or 27 pigs were randomly assigned to 6 dietary treatments arranged in a 2  $\times$  3 factorial with main effects of RAC (0 or 10 ppm) and SID Trp:Lys ratio (20, 24, and 28%) with 7 replications per treatment. Diets with and without RAC were formulated to 0.90 and 0.66% SID Lys, respectively. Overall (d 0 to 30), a RAC  $\times$  SID Trp:Lys ratio interaction was observed (linear,  $P < 0.05$ ), where increasing SID Trp:Lys ratios improved BW, ADG, and G:F when diets contained RAC but decreased these criteria when diets did not contain RAC. Similarly, RAC  $\times$  SID Trp:Lys ratio interactions were observed (linear,  $P < 0.05$ ) for carcass criteria with improvements in carcass ADG, carcass G:F, and HCW when pigs were fed increasing SID Trp:Lys ratios in diets containing RAC. A linear decrease ( $P < 0.05$ ) was observed in carcass ADG and carcass G:F in pigs fed higher SID Trp:Lys ratios when diets did not contain RAC. In summary, increasing SID Trp:Lys ratio above 20% improved growth and carcass performance when diets contained RAC, whereas pigs fed higher SID Trp:Lys ratio above 20% had reduced performance when diets did not contain RAC.

**Key Words:** finishing pigs, ractopamine hydrochloride, tryptophan  
doi:10.2527/asasmw.2017.276

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**277 Effects of dietary electrolyte balance and crude protein on growth performance and carcass characteristics of finishing pigs from 110 to 130 kilograms.**

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Economic and environmental factors have compelled nutritionists to develop low-protein, AA-fortified diets that deliver performance equivalent to traditional formulations. In some instances, low-protein, AA-fortified diets have led to poorer performance in finishing pigs than conventional diets. Along with low CP concentrations, with crystalline AA, there is proportional decrease in dietary electrolyte balance (dEB). To evaluate the effects of dEB and determine the optimum dietary CP level in finishing pigs, 2 experiments were conducted. In Exp. 1, 288 pigs (PIC 327  $\times$  1050; initially 110.4 kg) were used in a 20-d trial. Pens of 8 pigs were randomly assigned to 4 dietary treatments with 8 replications per treatment. Treatments were arranged in a 2  $\times$  2 factorial with main effects of CP (10 or 13%) and dEB (48 or 107 mEq/kg). Pigs fed 13% CP diets had greater ( $P = 0.001$ ) ADG (0.79 vs. 0.71 kg;  $P = 0.037$ ), final BW, and ( $P < 0.001$ ) G:F (0.279 vs. 0.253) compared with pigs fed the 10% CP diets. Marginal significance for a CP  $\times$  dEB interaction ( $P = 0.083$ ) was observed for ADFI because intake numerically decreased when dEB was increased for pigs fed 10% CP whereas