105 **The importance of implementing a by-product withdraw strategy prior to slaughter in finishing pigs: A review of strategies that mitigate the negative impact on carcass yield.** K. F. Coble*, J. M. DeRouchey, M. D. Tokach, S. S. Dritz, R. D. Goodband, J. C. Woodworth, *Kansas State University, Manhattan.*

Ingredients such as dried distillers grains with solubles (DDGS) and wheat middlings (midds) contain higher amounts of fiber and are lower in energy than their originating grain sources. Previous research has shown that feeding high-fiber diets to pigs throughout the finishing period has negative effects on carcass yield and HCW. Also, dietary therapies, such as ractopamine HCl, pelleting the diet, or increasing energy through fat addition prior to marketing, has not been successful to negate fiber's effect on carcass yield. Limited research suggests that removal of high-fiber ingredients approximately 20 to 30 d prior to slaughter can restore carcass yield. However, the optimal time period for withdrawing high-fiber ingredients prior to marketing has only recently been more closely researched. Two trials were conducted to determine the number of days prior to slaughter that high-fiber ingredients (30% DDGS and 19% midds; 19% NDF) should be removed from finishing pig diets to optimize growth performance, carcass characteristics, and digestive tract weights. First a university setting trial demonstrated that withdrawal strategy did not significantly influence growth performance, but carcass yield decreased ($P < 0.01$) in pigs fed the high-fiber diet compared with those fed the corn-soybean meal control (9.3% NDF) and increased (quadratic; $P < 0.03$) as days of withdrawal increased from 0 to 15 d. Pigs continuously fed the high-fiber diet had heavier ($P < 0.01$) full large intestine weight than pigs fed the control. A second study in a commercial setting demonstrated that pigs fed the high-fiber diet throughout had decreased ($P < 0.01$) HCW compared with those fed the control diet. Percentage yield was not significantly influenced by high-fiber diet withdrawal period; however, HCW increased linearly ($P < 0.05$) as withdrawal period increased up to 19 d. In summary, pigs fed high-fiber diets have decreased carcass yield but yield can be restored by switching pigs to a corn-soybean meal diet 15 to 19 d prior to marketing.

Key Words: fiber, finishing pigs, yield

106 **Evaluation of the precision and accuracy of equations to predict backfat iodine value in pork carcasses of pigs fed diets containing distillers dried grains with solubles (DDGS).** F. Wu[1,*], L. J. Johnston[2], P. E. Urriola[1], G. C. Shurson[3], *[1]Department of Animal Science, University of Minnesota, St. Paul, [2]West Central Research and Outreach Center, University of Minnesota, Morris.*

Iodine value (IV) is a common measurement of fat quality that determines the concentration of unsaturated fatty acids in pork carcass fat depots. Equations have been developed to predict backfat IV based on the amount and composition of dietary lipids fed to growing-finishing pigs. The objective of this study was to evaluate 8 published equations for predicting backfat IV of pigs using dietary fatty acid composition and intake of 8 diets fed in 2 similar experiments. Pigs (n = 432/experiment, initial BW = 23.9 ± 4.1 kg, 9 pigs/pen, 12 pens/treatment) were fed diets consisting of corn and soybean meal or corn-soybean meal diets containing 40% distillers dried grains with solubles (DDGS) from 7 different sources (ether extract content ranged from 5.6 to 16.0%) in a 4-phase feeding program. The IV product (IVP) of diets ranged from 24.0 to 82.1 g/100g. Pigs were harvested (BW = 114.6 ± 7.9 kg), and backfat at the midline of the last rib were sampled from 2 pigs in each pen (24 pigs/treatment), with BW closest to the pen mean. Backfat samples were analyzed for fatty acid composition, and IV was calculated from the AOAC (1998) equation and analyzed using Proc Mixed of SAS with pen as the experimental unit. Calculated backfat IV ranged from 57.7 to 82.3 g/100g. Precision (low prediction error; PE) and accuracy (deviation of predicted means from observed means; bias) were calculated for each equation using predicted backfat IV compared with calculated backfat IV of pigs fed the 8 dietary treatments. Backfat IV was predicted poorly using equations based on percentage of DDGS in the diet, but using equation: 52.4 + (0.315 × diet IVP) resulted in the best estimates for backfat IV due to the least PE and low bias.

Table 106.

Reference	Equation	PE	Bias
Benz et al., 2011			
Equation 1	35.458 + 14.324 × Diet 18:2n6, %	8.18	0.42
Equation 2	51.946 + 0.2715 × Diet IVP[1]	6.46	–5.07
Bergstrom et al., 2010	57.89 + 0.18 × Diet IVP	6.18	–4.24
Boyd et al.,1997	52.4 + 0.315 × Diet IVP	4.60	–2.18
Madsen et al., 1992	47.1 + 0.14 × IVP/d, kg	6.44	–4.98
Cromwell et al., 2011	64.5 + 0.432 × % DDGS in diet	8.26	7.10
Restrepo et al., 2013			
Equation 1	70.06 + 0.29 × % DDGS in diet	9.19	8.00
Equation 2	60.13 + 0.27 × Diet IVP	5.03	3.03

[1]IVP = dietary IV × % dietary lipids × 0.10.

Key Words: backfat iodine value, distillers dried grains with solubles, growing-finishing pigs, prediction equations

107 **Effect of standardized ileal digestible tryptophan:lysine ratio on growth performance of finishing pigs.** M. A. Goncalves[1,*], M. D. Tokach[1], S. S. Dritz[1], N. M. Bello[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.*

Four experiments were conducted to estimate the standardized ileal digestible (SID) Trp:Lys ratio requirement for finishing

pigs. Dietary treatments consisted of SID Trp:Lys ratios of 14.5, 16.5, 18.0, 19.5, 21.0, 22.5, and 24.5%. All experiments were 21 d in duration and used corn-soybean meal-based diets with 30% DDGS formulated to be deficient in Lys at the end of each experiment. A total of 1,166, 1,099, 1,132, and 975 gilts (PIC 337 × 1050, initially 29.9 ± 2.0, 55.5 ± 4.8, 71.2 ± 3.4, and 106.2 ± 3.1 kg BW ± SD) were used in Exp. 1 to 4, respectively. Within each experiment, pens of pigs were blocked by weight and assigned to 1 of the 7 dietary treatments in a randomized complete block design. Each experiment consisted of 6 pens/treatment with 20 to 28 pigs/pen. Data from all experiments were combined for analysis using general linear and nonlinear mixed models with random clustering effects of experiment and weight block within experiment and also with pen as the experimental unit. Competing models included quadratic polynomial (QP), broken-line linear (BLL), and broken-line quadratic (BLQ). Best fitting models were selected using Bayesian information criterion. Increasing Trp:Lys increased ADG and G:F in a quadratic manner ($P < 0.001$). For ADG, QP [Prediction equation: 189.5 + 6084 × (Trp:Lys) – 12878 × (Trp:Lys)^2] and BLQ [if SID Trp:Lys <22.9%, prediction equation: 900 – 15,000 × (0.229 – Trp:Lys)^2] had comparable fit and estimated SID Trp:Lys requirements at 23.6 (95% CI: 21.2 to 26.1%) and 22.9% (95% CI: 22.0 to 23.7%), respectively. For G:F, BLL [if SID Trp:Lys <16.9%, prediction equation: 0.4036 to 1.0 × (0.169 to Trp:Lys)] and BLQ [if SID Trp:Lys < 18.7%, prediction equation: 0.403 to 15.0 × (0.187 – Trp:Lys)^2] had comparable fit and estimated SID Trp:Lys requirements at 16.9 (95% CI: 16.0 to 17.9) and 18.7% (95% CI: 18.1 to 19.3%). Thus, the estimated mean requirements for SID Trp:Lys for 30 to 125 kg pigs ranged from 16.9% for G:F to 23.6% for maximum ADG. Furthermore, 95% of the maximum estimated ADG was obtained feeding 17.5% SID Trp:Lys and 98% of the maximum estimated ADG was obtained feeding 19.5% SID Trp:Lys.

Key Words: amino acids, finishing pigs, tryptophan

108 Effects of increasing crystalline amino acids in sorghum- or corn-based diets on finishing pig growth performance.

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A total of 288 pigs (PIC 327 × 1050; initially 45.9 kg) were used in a 90 d study to compare the effects of increasing crystalline AA in sorghum- and corn-bas ed diets on grow-finish pig growth performance. Treatments with 8 pigs per pen and 6 pens per treatment were arranged in a 2 × 3 factorial with main effects of grain source (sorghum vs. corn) and crystalline AA supplementation (low, medium, or high). Because replacing increasing amounts of soybean meal with crystalline AA changes the NE of the diet, all diets were formulated to the same standardized ileal digestible (SID) Lys:NE ratio. The Lys concentration in the diets was formulated at 95% of the pig's estimated requirement based on the NRC (2012) to ensure that the other AA, as a ratio to Lys, would not be underestimated. The grain sources and soybean meal were analyzed for AA profile and diets formulated from these concentrations. Suggested AA ratios to Lys as well as SID coefficients used were obtained from the NRC (2012). The low AA fortification contained L-lysine HCl and DL-methionine. The medium AA fortification contained L-lysine HCl, DL-methionine, and L-threonine, and the high AA fortification contained L-lysine HCl, DL-methionine, L-threonine, and L-valine to sorghum- or L-tryptophan to corn-based diets as Val was 5th limiting in sorghum-based diets and Trp 5th limiting in corn-based diets. Overall, no grain source × crystalline AA interactions were observed. Pigs fed corn-based diets tended to have greater ADG ($P < 0.072$) and had greater G:F ($P < 0.01$) than those fed sorghum-based diets. As crystalline AA concentrations increased, ADG tended to increase then decrease (quadratic; $P = 0.057$), and ADFI decreased (linear; $P = 0.019$). Pigs fed sorghum had decreased ($P < 0.01$) jowl iodine value (IV) in comparison with pigs fed corn. In conclusion, balancing to the 5th limiting AA using NRC (2012) suggested AA ratios in corn- or sorghum-based diets resulted in decreased ADG and G:F and pigs fed corn-based diets had greater G:F and IV than those fed sorghum.

Table 108.

Crystalline AA:	Grain source					
	Sorghum			Corn		
	Low	Medium	High	Low	Medium	High
d 0 to 90						
ADG, kg	0.90	0.91	0.87	0.92	0.93	0.90
ADFI, kg	2.66	2.63	2.55	2.62	2.63	2.54
G:F	0.340	0.347	0.342	0.350	0.353	0.353
Jowl IV	67.9	67.9	67.3	68.8	68.9	69.6

SEM was 0.013, 0.037, 0.003, and 0.59 for ADG, ADFI, G:F, and Jowl IV, respectively.

Key Words: corn, grow-finish pig, sorghum

109 Growing pigs' simulated amino acid requirements differs between actual factorial methods.

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The objective of this study was to compare actual factorial methods used to estimate phase-feeding growing pigs' lysine requirements with the method developed for precision feeding (PF) which provides individual pigs with daily tailored diets. Data from 36 high-performance pigs (25 kg initial BW, mean SE = 2.23) were used in a 28 d trial. Observed individual daily NE intake and BW gain were smoothed by linear regression and used to estimate individual and population standardized ileal digestible lysine (SIDLys) requirements. Body weight gain was assumed constant (regression slope) for every pig