286 Evaluation of gender and lysine during the nursery period. G. M. Hill*, S. K. Baidoo, G. L. Cromwell, D. C. Mahan, J. L. Nelssen, and H. H. Stein, *NCCC-42 Committee on Swine Nutrition*.

Split-gender feeding in the grow-finish period was an innovative technology of the last decade. However, due to various weaning strategies, it has not been adequately evaluated in the nursery. The objectives of our research were to determine (1) if gilts and barrows responded similarly to increased protein (lysine) after weaning and (2) if the current NRC lysine estimated requirements are adequate. Six experiment stations (MI, MN, KY, OH, KS, SD) utilized 748 pigs (average 6.7 kg BW and 19.4 ± 1.1 d). The pigs were allotted to four treatments in 32 replications (five to seven pigs/pen) in a RCB design. Barrows and gilts were penned separately, and complex nursery diets were fed in three phases (d 1 to 7, 8 to 21, 22 to 35). Lysine was provided at NRC estimated requirements or at 0.20% higher (1.35 vs. 1.55%, 1.25 vs. 1.45%, 1.15 vs. 1.35% for the three phases, respectively). Pigs and feed were weighed initially and at the end of each phase. The results demonstrated that gender did not affect ADG, ADFI or GF in any phase or during the 35-d study (453 vs. 452 g/d; 674 vs. 674 g/d; 0.67 vs. 0.67 for barrows and gilts, respectively). The higher lysine concentration improved ADG in phase 3 (627 vs. 588 g; $P \leq 0.001$) and overall (464 vs. 440 g; $P \leq 0.001$) more than when pigs were fed the NRC lysine estimated requirements. Increased lysine in the diet increased ADFI in phase 2 ($P \leq 0.05$), but not in the other phases or for the overall 35-d period. Gain:feed was improved by feeding higher lysine concentrations in phase 2 (0.78 vs. 0.70; $P \leq 0.001$) and in the overall 35-d experiment (0.69 vs. 0.65; $P \leq 0.001$). There was no evidence of a gender x treatment interaction ($P = 0.33$) for any trait during any of the phases or overall. Our results demonstrate that increasing lysine concentrations in nursery diets results in improved pig performance of both genders, and there appears to be no benefit in split-gender feeding during the nursery phase.

Key Words: Lysine, Gender, Nursery Pigs

287 The methionine requirement varies between individual weaned pigs fed a corn-soybean diet. S. Moehn*[1], A. Shoveller[1], M. Rademacher[2], and R. Ball[1], [1]*University of Alberta, Edmonton, Alberta, Canada*, [2]*Degussa AG, Hanau, Germany*.

Lowering dietary protein contents and increasing the use of free L-lysine in swine diets will result in more frequent DL-methionine (MET) supplementation. Better knowledge of the distribution of MET requirements of weaned pigs would allow adjustment of MET contents, based on cost vs. gain to maximize herd profitability. Our objective was to determine the MET requirement of individual weaned pigs and its variability using the indicator amino acid oxidation method. The MET requirement was determined in six pigs entering the study at 7 kg. Each pig received six levels of DL-MET (Degussa, AG) in a random order. The isonitrogenous and isoenergetic diets contained 0.187, 0.250, 0.290, 0.320, 0.350 and 0.363% MET as analyzed. Cysteine (0.46%) and lysine (1.40%) were constant for all diets. Pigs were adapted for 6 d to the basal corn-soybean diet, offered at 95 g/kg$^{0.75}$ body weight. During 4-h oxidation studies, 156.7 kBq, (SE 3.0), of L-[1-14C]phenylalanine (PHE) was mixed with each of eight half-hourly meals and expired CO_2 was collected. Data were tested for co-variables using the mixed procedure of SAS. The breakpoint in PHE oxidation, representing the MET requirement, and its variability, was determined using two-phase linear regression. PHE oxidation decreased when MET contents were increased from 0.187 to 0.29%. PHE oxidation was not different ($P > 0.2$) for diets providing 0.320 to 0.363% MET. The mean MET requirement was determined as 0.34% of diet (SD = 0.03%). Therefore, MET concentrations of 0.34, 0.38 and 0.42% will cover the requirement of 50%, 66% and 95%, respectively, of the population. The dietary MET requirement of 0.34% varied between 0.30 and 0.38% for individual pigs and was normally distributed. The recommended MET concentration for pigs of this body weight and feed intake by the 1998 NRC is 0.32% of diet. To maximize profitability, MET should be supplemented to starter pig diets depending on the cost of synthetic MET and the fraction of pigs whose requirement is to be met.

Key Words: Pig, Methionine, Requirement

288 Biological effectiveness of commercial methionine sources in piglet diets based on an equimolar trial design. M. Locatelli*[1] and R. Hall[2], [1]*Degussa Corporation, Kennesaw, GA*, [2]*Consultant, Franklin, IN*.

DL-methionine (DL-Met) is a feed industry standard for methionine additions. Two trials were conducted at the Cooperative Research Farms Nursery Unit, Webster City, IA to assess the biological effectiveness of liquid MHA-FA relative to DL-Met in starter pigs. In each trial, 490 crossbred weanling pigs (Cranbrook Swine Genetics), averaging 18 d and 4.85 kg at weaning, were blocked by initial weight and sex and allotted randomly to 49 pens (10 pigs/pen) and seven dietary treatments in a randomized complete-block design. A basal corn-soy diet deficient in methionine (0.22% in Trial 1 and 0.23% in Trial 2, but adequate in all other nutrients and energy was added with equimolar levels of DL-Met (0.03, 0.06 and 0.09% for diets 2, 3 and 4) and liquid MHA-FA (0.0342, 0.0684 and 0.1026% for diets 5, 6 and 7) at each trial. All seven diets were fed to barrows and gilts during a combined Phase 2 and 3 nursery period (9-37 d post-weaning, 8-20 kg live weight) in both trials. Non-linear regression analysis was used for daily gain and gain:feed. In both trials, piglets responded significantly to the addition of liquid MHA-FA and DL-Met, meaning that effectiveness was tested in the sensitive range. In order to reach the same response in weight gain, liquid MHA-FA was only 75% and 70% as effective as DL-Met (on a weight by weight basis) in Trial 1 and 2, respectively. The efficiency of liquid MHA-FA compared with DL-Met on a weight by weight basis for gain:feed was found to be 73% and 80% in Trial 1 and 2, respectively. The relative efficacy of liquid MHA-FA was 75% on average for both trials, which is close to the recommendations reported by the "CVB Study" of approximately 68% for broilers and 72% for piglets.

Key Words: Pig, Methionine Source, Effectiveness

289 Effect of replacing fish meal with synthetic amino acids in diets for 8 to 15 kg pigs. B. W. Ratliff*[1], A. M. Gaines[1], G. L. Allee[1], and J. L. Usry[2], [1]*University of Missouri-Columbia, Columbia*, [2]*Ajinomoto Heartland LLC, Chicago, IL.*

At a commercial research site with pigs of high health status, three independent experiments were conducted to evaluate the effect of replacing fish meal with synthetic amino acids in diets for 8 to 15 kg pigs. In Exp. 1, a total of 690 pigs (TR-4 × C22; 8.7 ± 0.11 kg) were allotted to one of five dietary treatments with six replicate pens/treatment and 23 pigs/pen. Treatments included five levels of fish meal (6.0, 4.5, 3.0, 1.5, and 0.0%, respectively). Fish meal was replaced with L-lysine·HCl (0.275, 0.363, 0.450, 0.538, and 0.625%, respectively) and additional synthetic amino acids (i.e., L-threonine, DL-methionine, L-tryptophan, L-isoleucine, and L-valine) supplied as necessary. Growth performance data was collected for 10 d. In Exp. 2, a total of 276 pigs (TR-4 × C22; 8.1 ± 0.05 kg) were allotted to one of two dietary treatments with six replicate pens/treatment and 23 pigs pen. Treatments included two level of fish meal (6.0 vs. 0.0%) with fish meal being replaced with L-lysine·HCl (0.275 vs. 0.625%) and additional synthetic amino acids supplied as necessary. Growth performance data were collected for 10 d. In Exp. 3, a total of 276 pigs (TR-4 × C22; 10.5 ± 0.17 kg) were allotted to the same dietary treatments as in Exp. 2 with six replicate pens/treatment and 23 pigs/pen. Growth performance data was collected for 12 d. Diets used for all experiments were formulated at a 1.42% true ileal digestible lysine and contained 7.0% lactose. In Exp. 1, replacing fish meal with synthetic amino acids had no effect on ADG ($P > 0.90$), ADFI ($P > 0.35$) or G/F ($P > 0.14$). Similarly, in Exp. 2 and 3, replacing 6% fish meal with synthetic amino acids had no effect on ADG ($P > 0.48$), ADFI ($P > 0.10$) or G/F ($P > 0.53$). Collectively, these data would suggest that fish meal can be replaced with synthetic amino acids in diets for 8 to 15 kg pigs without affecting growth performance.

Key Words: Pigs, Amino Acids, Growth

290 Estimation of the true ileal digestible sulfur amino acid:lysine ratio for growing pigs weighing 28-49 kilograms. G. F. Yi*[1], A. M. Gaines[2], B. W. Ratliff[2], P. Srichana[2], G. L. Allee[2], C. D. Knight[1], and K. R. Perryman[1], [1]*Novus International, Inc.*, *St. Charles, MO*, [2]*University of Missouri*, *Columbia*.

The objective of this research was to evaluate the optimum true ileal digestible (TID) sulfur amino acid:lysine (SAA:LYS) ratio for growing barrows and gilts weighing 28 to 49 kg reared under commercial conditions. A total of 1,650 growing gilts (TR4 × C22; 30.6 ± 0.50 kg) and 1,648 growing barrows (TR4 × C22; 31.1 ± 0.60 kg) were allotted to one of five dietary treatments in a RCBD with fifteen replicate pens (22 pigs/pen) per treatment. Dietary treatments included five levels of TID SAA:LYS ratios (49.5, 54.5, 59.5, 64.5, and 69.5%, respectively). Diets were formulated at a 0.90% TID lysine (CP 14.5%) and contained 0.40% L-lysine·HCl. Dietary SAA content was increased by adding Alimet® feed supplement (88% L-methionine activity) with additional synthetic amino acids supplemented to meet minimum amino acid ratios. Growth performance data was collected for 17 d. For gilts, increasing the TID SAA:LYS ratio increased (linear, $P < 0.02$; quadratic, $P < 0.27$) ADG (895, 928, 919, 923, and 931 g/d) and improved (linear, $P < 0.001$; quadratic, $P < 0.01$) G:F (0.449, 0.460, 0.467, 0.465, and 0.466). For barrows, increasing the TID SAA:LYS ratio increased (linear, $P < 0.001$; quadratic, $P < 0.01$) ADG (907, 956, 960, 967, and 955 g/d) and improved (linear, $P < 0.001$; quadratic, $P < 0.001$) G:F (0.446, 0.464, 0.467, 0.469, and 0.465). The breakpoint of the broken-line regression model, the intercept of the broken-line and quadratic curve, and the 95% upper asymptote of the quadratic response indicated that the optimum TID SAA:LYS ratios for ADG were 60.0%, 62.0%, and 62.6% in gilts and 61.0%, 63.5%, and 61.3% in barrows, and for G:F were 57.3%, 60.5% and 62.9% in gilts and 60.7%, 63.0% and 62.0% in barrows respectively. (ALIMET® is a trademark of Novus International, Inc., and is registered in the United States and other countries.)

Key Words: Sulfur Amino Acids, Growth, Growing pigs

291 Effects of protein source on true ileal digestible (TID) isoleucine:lysine ratio in pigs from 58 to 76 kg. S. X. Fu*[1], R. W. Fent[1], P. Srichana[1], B. W. Ratliff[1], G. L. Gary[1], and J. L. Usry[2], [1]*University of Missouri-Columbia*, [2]*Ajinomoto Heartland, LLC*, *Chicago, IL*.

A total of 297 pigs were used to determine the effects of protein source on TID Ile:Lys ratio for pigs from 58 to 76 kg. Pigs were blocked by weight and sex and allotted to one of eleven dietary treatments with seven replicates per treatment (five replicates of three pigs/pen and two replicates of six pigs/pen). Treatment 1 was a corn-SBM control diet containing 0.25% L-Lys HCl. Treatments 2 to 11 were a 2 x 5 factorial arrangement. The factors included: two protein sources [8.5% SBM plus synthetic amino acids (AA) or 7.15% red blood cells (RBC)] and five levels of TID Ile:Lys ratio (47, 53, 59, 65, and 71%). All diets were isocaloric and contained 0.80% TID Lys. Pigs fed corn-SBM+AA diets with Ile:Lys ratio of 53, 59 and 65% and pigs fed corn-RBC diet with an Ile:Lys ratio of 59% had similar performance as control pigs. Interactive effects ($P < 0.01$) on ADG, ADFI and G:F were observed between protein source and TID Ile:Lys ratio. In corn-SBM+AA diets, as TID Ile:Lys ratio increased, quadratic responses were observed for ADG (1.038, 1.104, 1.111, 1.078 and 1.022 kg/d, respectively; $P = 0.04$) and ADFI (2.798, 2.868, 2.879, 2.798 and 2.670 kg/d, respectively; $P = 0.03$) with no response in G:F (0.370, 0.385, 0.387, 0.387 and 0.384, respectively; $P = 0.59$). Increasing Ile:Lys ratio improved performance of pigs fed corn-RBC diets in terms of ADG (0.633, 0.828, 1.071, 1.037 and 1.035 kg/d, respectively; linear and quadratic $P < 0.001$), ADFI (2.124, 2.234, 2.773, 2.655 and 2.619 kg/d, respectively; linear and quadratic, $P < 0.001$) and G:F (0.300, 0.369, 0.387, 0.391 and 0.395 kg/d, respectively; linear, $P < 0.001$and quadratic, $P = 0.02$). Using quadratic model (95% of maximum), TID Ile:Lys ratio was estimated to be 55.2% (ADG) for pigs fed corn-SBM diets and 62.0% (ADG and G:F) for pigs fed corn-RBC diets. In conclusion, TID Ile:Lys ratio of pigs was affected by dietary protein source; pigs fed corn-RBC diets require a higher TID Ile:Lys ratio to maximize growth performance than pigs fed corn-SBM diets.

Key Words: Isoleucine, Blood Cells, Pigs

292 Effect of L-Lysine·HCl supplementation in 52 to 104 kg pigs reared under commercial conditions. P. Srichana*[1], A. M. Gaines[1], B. W. Ratliff[1], G. L. Allee[1], and J. L. Usry[2], [1]*University of Missouri*, *Columbia*, [2]*Ajinimoto Heartland LLC*, *Chicago, IL*.

Two experiments were conducted at a commercial research site to evaluate the effect of L-lysine·HCl supplementation in early and late finishing pig diets. In Exp. 1, a total of 1,680 pigs (TR-4 × C22; 52.13 ± 0.26 kg) were used in a randomized complete block design with 16 replicate pens/treatment and 21 pigs/pen. Dietary treatments included five levels of L-lysine·HCl that corresponded to concentrations of 0.00, 0.10 0.20, 0.30, and 0.40%, respectively. Experimental diets were corn-soybean meal-based with 5% choice white grease formulated at a 0.87% true ileal digestible (TID) lysine (2.43 g TID lysine/Mcal ME). Growth performance data was collected for 21 d. In Exp. 2, a total of 1,680 pigs (TR-4 × C22; 78.02 ± 0.29 kg) were used in a randomized complete block design with 16 replicate pens/treatment. Dietary treatments included five levels of L-lysine·HCl that corresponded to concentrations of 0.00, 0.10, 0.20, 0.30, and 0.40%, respectively. Experimental diets were corn-soybean meal-based with 5% choice white grease formulated at a 0.75% TID lysine (2.11 g TID lysine/Mcal ME). Growth performance data was collected for 25 d. For Exp. 1, increasing the L-lysine·HCl inclusion resulted in a decrease (linear, $P < 0.01$) in ADG (1,098, 1,080, 1,089, 1,084, and 1,061 g/day, respectively), which was attributed to a lower ADG in pigs fed 0.40% L-lysine·HCl. Furthermore, increasing the inclusion of L-lysine·HCl lowered (linear, $P < 0.01$; quadratic, $P < 0.05$) G/F (0.413, 0.411, 0.412, 0.409, and 0.400, respectively). For Exp. 2, increasing the L-lysine·HCl inclusion resulted in a decrease (linear, $P < 0.01$; quadratic, $P < 0.01$) in ADG (1,048, 1,052, 1,066, 1,030, and 1,002 g/day, respectively) and lowered (linear, $P < 0.01$; quadratic $P < 0.001$) G/F (0.331, 0.334, 0.335, 0.331, and 0.320, respectively). There were no differences ($P = 0.16$) in ADFI. These experiments demonstrate that growth performance of early (52-78 kg) and late (78-104 kg) finishing pigs is not compromised when diets contain 0.30 and 0.20% L-lysine·HCl, respectively.

Key Words: Pigs, L-Lysine HCl, Growth

293 Response of boar and gilt pigs in the weight range 60 to 100 kg to lysine concentration in the diet. M. K. O'Connell[1,2], P. B. Lynch*[1], J. V. O'Doherty[2], and P. G. Lawlor[1], [1]*Moorepark Research Centre*, *Fermoy, Co. Cork, Ireland*, [2]*University College*, *Belfield, Dublin, Ireland*.

Two trials were conducted to determine the optimum dietary lysine concentration for maximum growth rate (ADG) or minimum feed conversion ratio (FCR) of boars and gilts from 60 to 90 kg and 80 to 100 kg. Ninety same-sex pairs and six treatments (dietary lysine concentrations) were used in Exp. 1 (60 to 90 kg), and 144 pairs and eight treatments in Exp. 2 (80 to 100 kg) in a randomised block design. Isoenergetic diets (13.8 MJ DE/kg) were based on barley, wheat, soyabean meal, vitamins, minerals and amino acids. Dietary lysine concentrations were: 7.9, 8.8, 9.7, 10.7, 11.7 and 12.5 g/kg in Exp. 1 and 7.0, 7.9, 8.8, 9.7, 10.7, 11.7, 12.5 and 13.5 g/kg in Exp. 2. Ratios of the main amino acids to lysine were held constant. In Exp. 1, ADG increased (quadratic, $P < 0.01$) and FCR improved (quadratic, $P < 0.001$) with increased lysine levels. Although boars grew faster ($P < 0.001$) and more efficiently ($P < 0.001$) than gilts, maximum ADG was predicted at 10.8 g lysine/kg and minimum FCR at 10.9 g lysine/kg for both. In Exp. 2 (80 to 100 kg), a treatment x sex interaction for ADG ($P < 0.01$) and FCR ($P < 0.05$) indicated that boars grew faster and had better FCR than gilts, and the difference between sexes was greater at higher lysine levels. Maximum ADG was predicted at 11.8 and 9.9 g lysine/kg and minimum FCR at 11.9 and 10.0 g lysine/kg for boars and gilts, respectively. In both experiments, daily lysine intake (DLYIN) increased ($P < 0.001$) with increasing dietary concentrations and maximum ADG was predicted at DLYIN of 26.0 and 26.3 g/d for Exp. 1 and 2, respectively. Lysine conversion ratio (LCR) was better for boars than gilts in Exp. 1 and there was a treatment x sex interaction for LCR in Exp. 2 ($P < 0.01$), where the difference between the sexes was greater at higher concentrations. In conclusion, boars grew faster and more efficiently, with interactions indicating a greater sex difference in performance at higher lysine levels.

Key Words: Lysine, Boar, Gilt

294 Influence of diet protein level and season on growth performance of finishing pigs. R. Myer*, J. Brendemuhl, and R. Bucklin, *University of Florida*, *Gainesville*.

A two year study was conducted to evaluate the effects of diet type (low protein diet supplemented with crystalline AA vs. higher protein, non AA supplemented control diet) and season/rearing environment (hot humid summer vs. cool fall/winter) on growth performance and carcass lean content of finishing pigs (52 to 110 kg). For each year, two trials, each with 84 pigs, were conducted - one during the summer and the other during the late fall/winter in north Florida (29.5° N lat.). Outside daily high and low temperatures (C) and RH (%), respectively, averaged 26, 21 and 81; 26, 20 and 83; 14, 7, and 80; and 10, 3 and 77 for yr 1 and 2 summer, and yr 1 and 2 winter, respectively. Diets were corn and soybean meal based (3.3 Mcal ME/kg). The low protein (LP) diets were four percentage units lower in CP than the corresponding control diets; crystalline Lys, Thr, Trp and met were added to the LP diets to meet the pigs' requirements. For each trial, split sex finisher I, from 52 to 82 kg, and finisher II, 82 to 110 kg, diets were fed. Each dietary treatment was fed to six pens of seven pigs for each trial. Pigs were housed in an open sided building in pens with slotted concrete floors and water sprinklers were used during warm weather (> 25°C). Floor space was 0.7m^2 per pig. Pigs reared during the summer grew 9% slower than pigs reared during the fall/winter (0.88 vs. 0.97 kg/d; P < 0.001); ADF and G/F were also affected by season (P < 0.001). Pigs fed the LP + AA diets averaged 3% lower ADG than pigs fed the control diets (0.91 vs. 0.94 kg; P < 0.01); ADF and G/F were not affected (P > 0.10). The decrease in ADG was more pronounced during the summer vs. fall/winter (6% vs. 1%; season x diet; P = 0.05). The decrease noted occurred only during finisher II (0.91 vs. 0.84 kg/d; P < 0.001). Carcass lean (ultrasound) was not affected by diet or season (mean = 51% fat free). The feeding of a LP + AA diet type used appears not to be of particular benefit on improving finishing pig growth performance under hot and humid conditions.

Key Words: Pigs, Protein, Heat Stress

295 Nutrition induced variation in body composition, compensatory growth, cortisol and leptin in growing pigs. H. R. Martínez* and C. F. M. de Lange, *The University of Guelph*, *Guelph, Ontario, Canada*.

In this experiment, we assessed the effect of amino acid (AA) intake restriction in entire male Yorkshire pigs between 15 and 38 kg BW (restriction phase) on growth rate, body composition, and plasma levels of blood urea nitrogen (BUN), cortisol (Co) and leptin (Li) during the subsequent re-alimentation phase. During the restriction phase, 36 pigs were allotted to one of two dietary AA levels (control and -40%AA). Thereafter, all pigs were fed common diets that did not limit whole body protein deposition (Pd). Throughout the experiment, pigs were fed restricted at 90% of voluntary daily DE intake according to the 1998 NRC. At the end of the restriction phase, pigs on control had higher ADG (784 vs. 650 g/d; SE, 11), loin area (LA), loin depth (LD), BUN and Co (19.2 vs. 8.2 ug/dL; SE, 0.81) and lower back fat thickness (BF; 6.56 vs. 7.56 mm; SE, 0.27) and Li (1.8 vs. 2.7 ng/mL; SE, 0.19) than pigs on -40%AA (P < 0.05). During the re-alimentation phase, pigs showed full compensatory growth (CG; control vs. -40%AA), in terms of ADG (1077 vs. 1170 g/d; SE, 16), Pd (163 vs. 179 g/d; SE, 2.7; P < 0.05), whole body lipid deposition (Ld; 228 vs. 210; SE, 10.3) Ld/Pd (1.42 vs. 1.18; SE, 0.07; P < 0.05) and body composition at 110 kg BW (body lipid mass/body protein mass; LB/PB; 1.15 vs. 1.14; SE, 0.04; P > 0.10). There were no effects of previous AA intake restriction on Li and BUN at 45, 53 and 68 kg BW (P > 0.10). Carcass characteristics at 110 kg BW were not influenced by previous AA intake restriction (P > 0.10): BF (17.0 vs. 18.2 mm; SE, 1.4), LA (46.3 vs. 45.6 cm^2; SE, 1.14) and loin colour. Circulating Li levels allow for involvement of the brain in control of body composition (LB/PB). Plasma BUN level is not a sensitive indicator for compensatory Pd. Plasma Co levels may act as indicator of amino acid induced restriction in Pd in growing pigs. CG was observed during the energy dependent phase of Pd and is driven by a target body composition (LB/PB), possibly mediated via plasma leptin levels.

Key Words: Body Composition, Leptin, Cortisol

296 Impact of time of feeding of lysine-deficient diets and dietary protein level on the intramuscular fat content of pork. E. Castaneda*[1,2], M. Ellis[1], and F. McKeith[1], [1]*University of Illinois*, *Urbana-Champaign*, [2]*Consejo Nacional de Ciencia y Tecnologia*, *Mexico, Distrito Federal. Mexico*.

This study was carried out as a completely randomized design with a 3 × 4 factorial arrangement of treatments: 1) time of feeding (9, 6, and 3 wk prior to harvest); 2) dietary protein-lysine levels [a) Control (100% CP, 100% Lys; CP and Lys at requirement); b) 78% CP, 78% Lys; c) 56% CP, 56% Lys; and d) 100% CP, 56% Lys]. A total of 144 gilts were housed in groups of four and fed a two-phase program: Finisher I [70-90 kg BW for 21 d; CP = 14.5, 11.3, 8.1, and 14.5%, and true digestible lysine (TDL) = 0.70, 0.54, 0.39, and 0.39% for Diet 1, 2, 3, and 4, respectively (resp.)], and Finisher II (91-125 kg BW for 42 d; CP = 13.5, 10.5, 7.5, and 13.5%, and TDL = 0.57, 0.44, 0.32, and 0.32%, resp.). Increased feeding time reduced (P < 0.05) ADG (1.01, 0.94 and 0.87 kg/d, for 3, 6, and 9 wk, resp.; SEM = 0.028), ADFI (3.06, 2.84 and 2.53 kg/d, resp.; SEM = 0.106), and weight of carcass fat-free lean (51.3, 48.6, and 46.5 kg, resp.; SEM = 1.30), but increased semimembranosus intramuscular fat (IMF; 2.38, 2.67, and 3.06%, resp; SEM = 0.536). Diet had an effect (P < 0.05) on overall ADG (1.12, 1.06, 0.78, and 0.81 kg/d for Diets 1, 2, 3, and 4, resp.; SEM = 0.028), ADFI (2.88, 3.04, 2.68, and 2.64 kg/d, resp.; SEM = 0.115), G:F (0.39, 0.35, 0.29, and 0.31, resp.; SEM = 0.010), carcass fat-free lean (53.0, 50.8, 45.5, and 45.9 kg, resp.; SEM = 1.35), and semimembranosus IMF (2.31, 2.56, 2.74, and 3.20%, resp; SEM = 0.541). There was a feeding time by diet (P < 0.05) interaction for longissimus IMF. For the control diet, IMF was greater (P < 0.05) for the 6- than the 3-wk treatments (2.58, 3.24, and 3.19% for 3-, 6-, and 9-wk treatments, resp.; SEM = 0.273); for diet 2 (3.21, 3.57, and 4.49%, resp.; SEM = 0.274) and diet 4 (3.37, 4.44, 5.72, resp.; SEM = 0.270), IMF increased with feeding time; for diet 3, IMF was lower for the 6-wk than for the 3- and 9-wk treatments (3.74, 2.86, and 3.37%, resp.; SEM = 0.280). These results suggest that dietary protein and lysine level influence the IMF content of pork.

Key Words: Pigs, Protein, Intramuscular Fat

297 The effect of feeding frequency on energy and amino acid digestibility by growing pigs. A. Pahm*, F. Chastanet, C. Pedersen, and H. H. Stein, *South Dakota State University*, *Brookings*.

An experiment was conducted to determine if the feeding frequency affects the digestibility of energy and AA by growing pigs. Six growing barrows (initial BW: 40.1 kg ± 2.3 kg) had T-cannulas installed in the distal ileum and were randomly allotted to one of three dietary treatments in a repeated 3 X 3 Latin square design with three animals and three periods. Each period lasted 7 d and all pigs were fed the same corn-soybean meal based diet (18% CP) throughout the experiment. Pigs allotted to Treatments 1 and 2 were provided the diet at a level of three times the energy requirement for maintenance. The feed to pigs on Treatment 1 was provided in one daily meal while the feed to pigs on Treatment 2 was divided into two equal daily meals. Pigs on Treatment 3 were allowed to consume the diet on an ad libitum basis. Fecal samples were collected on d-5 and ileal samples on d-6 and d-7 of each period. The apparent ileal digestibility coefficients (AID) of DM, CP, AA, and energy and the apparent total tract digestibility coefficients (ATTD) of DM and energy were calculated. No differences among treatments were observed for the AID of DM, energy, CP, or any of the AA. In contrast, the ATTD of DM and energy were lower ($P \leq 0.002$) for pigs that were allowed to consume their feed on an ad libitum basis compared to pigs on the other two treatments (85.1 vs. 87.3 and 88.9% for DM and 83.3 vs. 86.0 and 87.7% for energy). The DE concentration of the diet was calculated as 3,436 kcal per kg for the pigs given free access to feed. This value was lower ($P \leq 0.001$) than the values calculated for the pigs fed once or twice daily (3,544 and 3,617 kcal per kg, respectively). In conclusion, results of this experiment suggest that the AID for DM, energy, CP, and AA are not influenced by the frequency of feeding, but the ATTD for DM and energy is lower if pigs are fed on an ad libitum basis than if they are fed a restricted amount of feed in one or two daily meals.

Key Words: Digestibility, Feeding Frequency, Pigs