201 Evaluation of an optimum fat level for late nursery pigs. B. W. Ratliff*[1], A. M. Gaines[1], P. Srichana[1], G. L. Allee[1], and J. L. Usry[2], [1]*University of Missouri*, [2]*Ajinomoto Heartland LLC*.

Three experiments were conducted at a commercial research site to evaluate the optimum fat level for late nursery pigs. In Exp. 1, a total of 739 pigs (TR-4 C22; 17.6 ± 0.21 kg) were used in a completely randomized block design with 7 replicate pens/treatment (20-22 pigs/pen). In Exp. 2, a total of 757 pigs (TR-4 C22; 13.1 ± 0.15 kg) were used in a completely randomized block design with 7 replicate pens/treatment (20-22 pigs/pen). Pigs used in Exp. 1 and 2 were allotted to one of five dietary treatments containing 0.0, 1.5, 3.0, 4.5 and 6.0% supplemental fat, respectively. Diets were formulated at a lysine:calorie ratio of 3.59 g true ileal digestible lysine/Mcal ME. In Exp. 3, a total of 1,700 pigs (TR-4 C22; 17.1 ± 0.16 kg) were used in a 2 5 factorial design with 8 replicate pens/treatment (20-22 pigs/pen). The main effects were lysine:calorie ratio (3.33 and 3.86 g true ileal digestible lysine/Mcal ME) and supplemental fat level (0.00, 1.5, 3.0, 4.5, and 6.0%). In Exp. 1, fat supplementation increased (linear, $P < 0.02$) ADG (739, 739, 753, 767, and 762 g/d), decreased (linear, $P < 0.01$) ADFI (1261, 1225, 1188, 1207 and 1188 g/d) and improved (linear, $P < 0.001$) G/F (0.588, 0.604, 0.636, 0.638, and 0.643). For Exp. 2, fat supplementation increased (linear, $P = 0.03$) ADG (612, 617, 635, 631, and 653 g/d) and improved (linear, $P < 0.001$) G/F (0.651, 0.674, 0.687, 0.700, and 0.711). In Exp. 3, there were no effect of lysine:calorie ratio ($P > 0.30$), or lysine:calorie ratio fat level interactions ($P > 0.49$). However, fat supplementation increased (linear, $P < 0.001$) ADG (685, 699, 694, 703, and 721 g/d) and improved (linear, $P < 0.001$) G/F (0.619, 0.640, 0.635, 0.652, and 0.666). These data indicate that increasing the energy density of late nursery pig diets results in linear improvements in growth performance. Based on linear regression analysis, for each one percentage unit increase in supplemental fat addition there are 0.81% and 1.42% improvements in ADG ($r^2 = 0.99$) and G/F ($r^2 = 0.98$), respectively.

Key Words: Pigs, Fat, Energy

202 Growth, body composition and nutrient deposition rates in weaned pigs fed diets with similar digestible but different estimated net energy content. T. F. Oresanya*[1,2], A. D. Beaulieu[1], and J. F. Patience[1], [1]*Prairie Swine Centre Inc.*, [2]*University of Saskatchewan*.

Net energy (NE) has theoretical advantages over DE and ME, accounting for metabolic utilization and partitioning of energy in body tissue. Empirical results supporting these benefits in practice are lacking. This experiment examined the growth, body composition and nutrient deposition in weaned pigs fed diets with similar DE but increasing NE content. A total of 256 weaned pigs (20±1 d; 6.8±1 kg; mean±SD) were blocked by sex and randomly allocated to pens of 4 pigs each (12 pens/trt) or an initial slaughter group (n=16; ISG). Diets with similar CP content (26.7%) but increasing fat (HiCP1, HiCP2, HiCP3) or declining CP but similar fat (MedCP, 23.1%; LoCP, 19.9%) were formulated to a similar DE (3.53 Mcal/kg) and lysine/DE content and ideal protein ratios. NE content increased from 2.24 to 2.40 Mcal/kg. At the end of 28 d growth period, 12 pigs/trt were sacrificed for carcass analysis. Empty body (EB) protein and lipid content and respective deposition rates (PD and LD) were determined. ADG was similar for HiCP1 and MedCP, and was lowest for HiCP3 ($P<0.005$); LoCP and HiCP2 yielded intermediate results. FCR was similar across trt ($P>0.05$). Carcass and EB protein content, and PD were similar for HiCP1, HiCP2 and MedCP but depressed in LoCP and HiCP3 ($P<0.05$). EB lipid content was highest on the LoCP diet, and similar for all other trts ($P<0.05$). Regression analysis revealed a breakpoint for ADG and PD at DEi = 3.14 and 3.18, and NEi = 2.02 and 2.03 Mcal/d, respectively ($P<0.001$; R2, 0.50). The breakpoint for LD occurred at higher energy intakes (DEi=3.35; NEi=2.09 Mcal/d). Contrary to widely held assumptions, these weaned pigs were able to consume sufficient energy to exceed PDmax, as additional energy was utilized for increased LD. The performance of weaned pigs was not accurately predicted by DE, but NE offered no improvement. Our knowledge of energy metabolism in the weaned pig clearly requires detailed review.

Key Words: Piglets, Digestible Energy, Net Energy

203 Effects of corn source and added fat level on performance of grow-finish pigs reared in a commercial facility. C. W. Hastad*[1], M. D. Tokach[1], J. L. Nelssen[1], S. S. Dritz[1], R. D. Goodband[1], J. M. DeRouchey[1], C. L. Jones[1], and C. M. Peter[2], [1]*Kansas State University*, [2]*BASF Corp*.

A total of 1,144 gilts (initially 50.1 kg) were used in a commercial research facility to evaluate the effects of corn source (NutriDense(tm), BASF or #2 Yellow Dent) and added fat (averaging 0, 3, and 6%) on pig performance and carcass traits. Energy levels were based such that the higher energy (5% greater ME than #2 yellow dent assumed) in NutriDense (ND) corn (with or without added fat) was calculated to be equal to that provided by yellow dent corn and added fat. In each phase, the first treatment diet contained yellow dent corn and no added fat, in the next dietary treatment, yellow dent corn was replaced with ND corn and then fat was added (2.7 to 3.2% based on phase) to the yellow dent corn diet to equal the energy content of the ND corn diet. This amount of added fat was then added to the ND-based diet. The last yellow dent corn-based diet used 5.2 to 6.2% (based on phase) added fat to equal the energy content of the second ND corn diet. This amount of fat was then added to the ND corn diet to complete the 2x3 factorial. For the overall study, pigs fed ND corn had greater ($P<0.04$) ADG compared to pigs fed yellow dent corn. There was a corn source by fat level interaction ($P<0.01$) for ADFI and feed efficiency (G/F). When fat was added to diets containing ND corn, F/G decreased linearly, whereas when fat was added to yellow dent corn the greatest improvement in feed efficiency was observed by adding the first 3% fat. Adding fat to diets also increased ($P<0.01$) final BW and carcass weight, and tended ($P<0.09$) to increase backfat thickness. Using the known energy values of yellow dent corn and fat, we calculated ND corn to have 5.3% more ME than yellow dent corn. These results are similar to our previous research in nursery pigs indicating ND corn has 5% more ME than yellow dent corn. In this commercial facility, ADG and G/F improved linearly as energy increased in the diet whether the energy was from a higher energy corn source or added fat.

Key Words: Corn, Fat, Pigs

204 Determination of the metabolizable energy concentration of corn samples for growing pigs. J. D. Schneider*, S. D. Carter, J. S. Park, and T. B. Morillo, *Oklahoma State University*.

An experiment using 100 barrows (avg BW = 26.1 kg) was conducted to determine the ME concentration of 10 corn samples. Pigs were housed individually in metabolic chambers and allotted randomly to 10 dietary treatments (10 pigs/trt) based on BW. Experimental diets (n = 10) were formulated to 1.0% total lysine and consisted of corn (90.48%), casein (5.04%), crystalline amino acids, and vitamin/mineral sources. The corn samples were ground to a common particle size prior to mixing the diets. Pigs had ad libitum access to water and an effort was made to equalize feed intake within replicate. Following a 7-d adjustment period to the diets, a 5-d total collection of feces and urine was performed. Data are reported on a DM basis. The GE of the corn samples averaged 4,359 kcal/kg (range of 4,322 to 4,436). The CP content averaged 8.44% (range 7.68 to 9.05). Daily GE intake averaged 5,852 ± 315 kcal and was not affected ($P > 0.10$) by dietary treatment. Fecal GE excretion (kcal/d) differed ($P < 0.05$) among treatments, but urine GE excretion (kcal/d) was similar ($P > 0.05$). The DE of the ten diets averaged 3,889 ± 22 kcal/kg (range 3,843 to 3,922), with differences ($P < 0.10$) noted among treatments. Similar to DE, ME (avg 3,853 ± 22 kcal/kg) of the ten diets varied ($P < 0.10$) among treatments. DE:GE and ME:GE (0.896 and 0.888, respectively) also varied ($P < 0.10$) among treatments. Subtraction of the ME provided by casein (230 kcal/kg) from the ME of the diets resulted in an average ME concentration for the ten corns of 4,004 ± 24 kcal/kg (3,573 ± 22 kcal/kg as-fed). There were numerous differences ($P < 0.10$) among corns in DE and ME content, and DE:GE and ME:GE ratios for the ten samples. Based on these results, the initial gross energy concentration of corn is not an accurate indicator of the metabolizable energy concentration due to the variation in ME:GE ratio.

Key Words: Pigs, Energy, Corn