BW) feeding period. The SID Lys, Met, Thr, and Trp to ME ratios of lipid diets were constant. The SO increased ($P < 0.01$) peroxide value in all lipids. Both SO and RO increased ($P < 0.01$) thiobarbituric acid reactive substances in CN and CA and led to the production of 4-hydroxynonenal (HNE) in CN (194 and 594 mmol/kg, respectively), CA (105 and 221 mmol/kg, respectively) and TL (13 and 6 mmol/kg, respectively), while only SO resulted in production of HNE in PF (2 mmol/kg). Additional lipids to diets had increased ($P < 0.05$) ATTD of EE, and tended to improve ($P = 0.06$) ATTD of GE than the control diet. Feeding CN or CA increased ($P < 0.05$) ATTD of DM, GE, EE, N, and C compared with feeding TL, while feeding PF improved ($P < 0.05$) ATTD of GE and EE, and tended to increase ($P = 0.06$) ATTD of C compared with TL. Pigs fed CN had increased ($P = 0.05$) N retention rate than those fed TL. No oxidation level or interactions were found for DE and ME. Lipid source tended ($P = 0.08$) to affect DE but not ME content. DE values for CA (8846, 8682, and 8668 kcal/kg) and CN (8867, 8648, and 8725 kcal/kg) were about 450 kcal/kg higher than that of TL (8316, 8168, and 8296 kcal/kg), with PF being intermediate (8519, 8274, and 8511 kcal/kg) for OL, SO, and RO, respectively. Lipid source affected ATTD of DM, GE, EE, N, and C, N retention rate, and tended to influence DE value. Rapid and slow heating of lipids evaluated in this study increased lipid peroxidation products but did not affect nutrient digestibility and lipid DE and ME value.

Key Words: lipid source, oxidation level, energy, young pigs

268P Effect of alcohol-based energy source and animal-based specialty protein sources on nursery pig performance. W. Ying*[1], J. M. DeRouchey[1], M. D. Tokach[1], S. S. Dritz[1], R. D. Goodband[1], J. L. Nelssen[1], W. E. Schiefelbein[2], and R. L. Odgaard[2], [1]*Kansas State University, Manhattan,* [2]*XFE Products, Des Moines, IA.*

A total of 347 nursery pigs (PIC 1050, 5.0 kg BW) were used in a 44-d trial to determine the effect of an alcohol-based energy source (LE, XFE Liquid Energy, XFE Products, Des Moines, IA) and a poultry digest (AV-E, AV-E Digest;) on nursery pig growth. Pens of pigs were randomly allotted to 1 of 8 treatments with 9 pens/treatment. Treatments were in 3 phases (Table 1) and arranged as 2 × 3 factorial plus 2 controls with 2 protein source regimens (AV-E and spray-dried blood cells (SDBC) replacing animal plasma (SDAP) and PEP2+; dried porcine intestinal mucosa; TechMix, LLC, Stewart, MN; maintaining common SBM levels except in phase 3) and 3 energy sources (control, LE, and choice white grease; CWG). All diets were formulated to the same SID lys:ME ratio within phase. From d 0 to 9, feeding LE tended ($P < 0.08$) to improve ADG (134 vs. 116 g) compared with pigs fed diets without LE. No other differences in growth were observed. From d 9 to 23, pigs fed AV-E had greater ($P < 0.04$) ADG (340 vs. 312 g) than pigs fed PEP2+. Pigs fed CWG had greater ($P < 0.01$) G:F (0.70 vs. 0.66) than pigs fed LE. From d 23 to 44, ADG (541 vs. 508 g) and G:F (0.67 vs. 0.63) were improved ($P < 0.01$) by feeding CWG. Also, pigs fed CWG had better ($P < 0.01$) G:F (0.67 vs. 0.63) compared with pigs fed LE. Adding dietary AV-E did not affect growth in this phase. Overall (d 0 to 44), pigs fed CWG had increased ($P < 0.02$) ADG, G:F, and final BW over pigs not fed additional energy source and improved ($P < 0.01$) G:F compared with pigs fed LE. There was no difference in growth between protein sources. In conclusion, added CWG in nursery diets improved performance while LE did not. Also, AV-E was found to be an effective specialty protein source in phase 1 and 2 diets.

Table 1.

Trt	1	2	3	4	5	6	7	8	
d 0 to 9	Con	7.1%PEP2+	7.1% PEP2+, 3.75% SDAP	7.1% PEP2+, 3.75% SDAP, 3%LE	7.1% PEP2+, 3.75% SDAP, 3% CWG	12.5% AV-E, 2.5% SDBC	12.5% AV-E, 2.5% SDBC, 3%LE	12.5% AV-E, 2.5% SDBC, 3% CWG	
d 9 to 23	Con	Con	3.8%PEP2+	3.85% PEP2+, 3%LE	3.85% PEP2+, 3%CWG	7.5%AV-E	7.5% AV-E, 3%LE	7.5% AV-E, 3%CWG	
d 23 to 44	Con	Con	Con	3%LE	3%CWG	2.5%AV-E	2.5% AV-E, 3%LE	2.5% AV-E, 3%CWG	SEM
d 0 to 44									
ADG[a], g	377	371	356	383	383	377	373	400	15.8
G:F[ab]	0.64	0.65	0.65	0.67	0.69	0.66	0.65	0.70	0.01

[a]CWG effect, Trt 3 and 6 vs. 5 and 8, $P < 0.05$; [b]CWG vs. LE, Trt 4 and 7 vs. 5 and 8, $P < 0.05$.

Key Words: energy, protein, pig

269P Effect of β-mannanase and β-glucanase in diets containing corn-soybean meal-dried distillers grains with solubles on nursery pig performance. M. Gandarillas*[1,3], S. Yu[1], Z. Rambo[1], D. Kelly[1], B. Richert[1], and J. Ferrel[2], [1]*Purdue University, West Lafayette, IN,* [2]*ChemGen Corp., Gaithersburg, MD,* [3]*Pontificia Universidad Católica de Chile, Santiago, Chile.*

One hundred ninety-two pigs (initial BW = 6.30 ± 0.026 kg; 20 d of age) were utilized to evaluate the effect of enzymes, β-mannanase or in combination with β-glucanase, in corn-soybean meal-corn distillers dried grains with solubles (DDGS) diets on pig growth and feed efficiency during the nursery period. Pigs were allocated in a randomized complete block design of mixed gender pens, stratified by litter and initial BW to 4 treatments, with 6 pens/treatment and 8 pigs/pen. Dietary treatments were negative control (NC; 1.0% added fat); T2, as NC plus β-mannanase (0.04 MU/kg); T3, as T2 plus β-glucanase (0.03 MU/kg), Positive Control (PC; 4.0% added choice white grease). Pigs were fed 2 dietary phases, phase 1 (d 0 to 14) with 12.5% DDGS, phase 2 (d 14 to 28) with 25% DDGS. Individual BW and pen feed disappearance were recorded weekly. Phase 1 ADG increased ($P < 0.05$) for T3 over NC and T2 treatments with PC being intermediate. Phase 1 ADFI was greater for T3 over all other treatments ($P < 0.05$). Phase 2 ADG tended to increase ($P < 0.10$) for T3 over PC. During phase 2, PC had reduced ADFI ($P < 0.05$) compared with all other treatments (688, 686, 720, 642 g/d, respectively). Pigs fed PC diet had increased G:F ($P < 0.05$) compared with NC and T3 while T2 was intermediate during phase 2 (0.593, 0.616, 0.597, 0.631, respectively). Overall (d 0 to 28), inclusion of β-glucanase with β-mannanase in T3 improved ADG ($P < 0.05$; 340, 346, 369, 345 g/d, respectively) and ADFI ($P < 0.05$; 549, 537, 585, 527 g/d, respectively) over all treatments. Overall G:F was significantly improved in PC and T2 versus NC ($P < 0.05$) with T3 being intermediate (0.619, 0.646, 0.631, 0.657, respectively). Final BW increased for T3 over NC with T2 and PC being intermediate (15.80, 16.02, 16.59, 15.98 kg, respectively). While additional work is needed to precisely define the response surface in relation to dietary composition and ratio to β-mannanase, the improvements in ADG by supplementing β-glucanase to β-mannanase are promising.

Key Words: β-mannanase, β-glucanase, swine growth, enzymes