

of 94.4 kg with no differences between treatments ($P>0.10$). RAC increased overall average daily gain from 1.08 kg/d to 1.22 kg/d ($P<0.001$) and gain:feed from 0.32 to 0.36 ($P<0.001$); there was no RAC $\times$ gender interaction ($P>0.10$). Feed intake was unaffected by dietary treatment ($P>0.10$). RAC pigs reached market 3.6 days sooner than controls (26.5 vs. 30.1; $P<0.05$), again with no RAC $\times$ gender interaction ($P>0.10$). Irrespective of week marketed, RAC pigs grew faster than controls; however, the response to RAC was greater in magnitude when pigs were marketed within 4 weeks of treatment initiation. RAC reduced backfat thickness from 20.3 mm to 18.5 mm in barrows ($P<0.05$) but had no effect on gilts ($P>0.10$; 15.8 vs 15.6 mm for control and RAC respectively). RAC increased loin thickness from 68.3 to 70.8 mm ($P<0.05$); there was no RAC $\times$ gender interaction ($P>0.10$). RAC fed at 5 ppm resulted in expected increases in rate and efficiency of gain as well as in carcass composition. RAC was most effective in faster growing pigs, but also elicited a positive response in slower growing pigs as well.

Key Words: ractopamine, growth performance, carcass quality

151 Response to feeding 5 ppm ractopamine to finisher swine: Pork quality. Z. Pietrasik¹, P. Shand¹, D. Beaulieu^{*2}, P. Leterme², J. Merrill³, and J. Patience², ¹University of Saskatchewan, Saskatoon, SK Canada, ²Prairie Swine Centre Inc., Saskatoon, SK Canada, ³Elanco Animal Health, Guelph, ON Canada.

Ractopamine HCl (RAC) consistently shows benefits in growth performance and carcass composition. Its effects on pork quality are less clearly defined. An experiment was undertaken to evaluate the impact of feeding RAC for 28 days on pork quality, composition and sensory attributes. Eight pens of barrows and 8 pens of gilts received a control (CTL) diet (3.3 Mcal DE/kg; 0.63% TID lysine); an equal number of pens received the RAC diet (3.3 Mcal DE/kg; 0.83% TID lysine; 5 ppm RAC), providing 136 barrows and 132 gilts per treatment (initial weight 86.1 kg). Two pigs from each CTL and each RAC pen, closest to the mean weight for that pen that day, were selected on day 28 for detailed pork quality evaluation. Loins were harvested on the day following slaughter in a commercial packing plant and cut into one inch chops for measurement of drip loss, subjective color scores, proximate composition, sensory evaluation and Warner-Bratzler shear force (WBSF) analysis. To evaluate the effect of enhancement on WBSF and sensory characteristics, a portion of the loin was injected to 110% over the raw meat weight with brine (0.4% NaCl; 0.3% sodium tripolyphosphate). RAC had no effect on pH or on the CIE L* color score ($P>0.10$); both CIE a* and b* values were slightly reduced ($P<0.05$). RAC had no effect on Canadian, American or Japanese subjective color score systems, on purge losses or on cooking losses in either non-injected or moisture-enhanced loin samples ($P>0.10$). RAC increased the WBSF (64.9 vs. 72.8 N; $P<0.05$). There was no effect of RAC on juiciness, flavor desirability or overall acceptability in non-injected or moisture-enhanced loin chops ($P>0.10$). RAC reduced initial tenderness slightly, from 5.6 to 5.2 in non-injected loin chops and from 6.8 to 6.4 in moisture-enhanced loin chops ($P<0.05$). Overall, RAC had very limited effects on pork eating quality; tenderness was affected the most, while other sensory attributes were unaffected.

Key Words: ractopamine, taste panel, pork quality

152 Growth and carcass response to dietary fat for modern lean pigs. M. E. Johnston, R. D. Boyd*, and M. McGrath, *Hanor Company of Wisconsin LLC, Franklin, KY.*

To determine the response to dietary fat on growth and carcass of a modern lean genotype, TR4 $\times$ Camborough barrows and gilts (100 pens each, 23–26 pigs/pen) were blocked by weight and randomly allotted to treatments (initial BW 34.1 $\pm$ 2.3 kg, 50 pens/diet). Treatments consisted of corn-soy diets with 1.0, 2.5, 4.0, or 5.5% added fat. The lysine level was adjusted to a constant lysine:energy ratio. On d 84 all pigs were fed a common diet until marketed (0.90% SID lysine, 5 ppm Ractopamine). In the first 21 d, there was no ADG response ($P>.10$) for barrows (0.94 kg/d) or gilts (0.92 kg/d) due to fat level. There was a decrease ($P<.001$, linear) in ADFI with increasing fat. Gain:feed ratio improved ($P<.0001$, linear) for barrows (0.50 to 0.53) and gilts (0.49 to 0.52) as fat increased. From d 21–42, ADG improved ($P<.0001$, linear) with increasing fat level (barrows: 1.02 to 1.10 kg/d, gilts: 0.92 to 0.95 kg/d). Feed intake decreased ($P<.0001$) as fat level increased. Pigs had improved G:F ($P<.0001$, linear, 0.41, 0.44, 0.45, 0.47) with increasing dietary fat. From 73 to 95 kg BW (d 42–63) ADG and G:F were unaffected ($P>.50$) by fat level. Feed consumption continued to decrease ($P<.01$, linear) as fat level increased. From d 63 through 84, ADG for gilts was similar ($P=.49$) across all fat levels. Barrows had increased ADG ($P<.05$, 0.89 to 0.98 kg/d) and feed intake decreased ($P<.001$) as fat increased. Gilts G:F was not different but the barrows did show an improvement ($P<.01$, linear) in G:F (0.29 to 0.36) with increased levels of fat. From d 0 to 84, gain was improved ($P<.0001$, linear) for both genders when dietary fat was increased. Intake decreased ($P<.0001$, linear) and G:F improved ($P<.0001$, linear) by increasing dietary fat. These data indicate pig growth is improved by increasing the level of fat. However, after 73 kg BW gilts did not respond as well as barrows to increasing dietary fat. The value of increasing dietary fat seems to be limited to live performance as Ractopamine eliminated the adverse effect of increasing fat level on lean content of the carcass.

Key Words: pigs, growth, energy

153 Effects of choice white grease or soybean oil on growth performance and fat quality characteristics in finishing pigs. J. M. Benz*, M. D. Tokach, S. S. Dritz, J. L. Nelssen, J. M. DeRouchey, and R. D. Goodband, *Kansas State University, Manhattan.*

A total of 144 barrows and gilts (PIC) with an initial BW of 44 kg were used to evaluate the effects of dietary fat source and duration of feeding on growth performance and fat quality. Dietary treatments were a corn-soybean meal control diet with no added fat or a 2 $\times$ 4 factorial with 5% choice white grease (CWG) or soybean oil fed from d 0 to 26, 54, 68, or 82. All pigs were fed the control diet after feeding the 5% fat diets. At the end of the study (d 82), jowl samples were collected. Pigs fed soybean oil had increased ($P<0.01$) ADG and G:F compared with the control (1.06 and 0.38 vs 0.99 and 0.36, respectively), and tended to have increased ($P<0.08$) ADG and G:F compared with pigs fed CWG (1.03 and 0.38). Increasing feeding duration increased (quadratic, $P<0.01$) ADG for soybean oil (1.03, 1.03, 1.07, 1.08 kg) and G:F for soybean oil (0.38, 0.38, 40, 0.40). Increasing feeding duration for CWG had no effect on ADG (1.02,

1.03, 1.04, 1.04 kg), but increased (quadratic, $P < 0.01$) G:F (0.37, 0.38, 0.39, 0.38). Increasing feeding duration of CWG increased (quadratic, $P < 0.01$) dressing percentage (72.1, 73.3, 73.5, 73.3%) compared with pigs fed increasing feeding duration of soybean oil (71.8, 73.1, 72.4, 73.1%) or the control (72.3%). Gilts had increased ($P < 0.01$) IV compared with barrows (74.2 vs 72.9). Pigs fed soybean oil had increased ($P < 0.01$) iodine value (IV) and C 18:2 fatty acids compared with pigs fed CWG (78.9 and 19.5%, vs 70.2 and 12.5). Pigs fed CWG had increased ($P < 0.01$) IV and C 18:2 fatty acids compared with pigs fed the control (67.1 and 11.2%). Increasing feeding duration increased (quadratic, $P < 0.01$) IV for pigs fed soybean oil (73.6, 79.1, 80.9, and 82.0) and CWG (68.8, 70.3, 70.2, 71.5) compared with pigs fed the control. In summary, adding fat to the diet increased pig performance and IV of jowl fat. Feeding fat during any stage influenced jowl IV at market with duration of feeding having the greatest response with soybean oil.

Key Words: iodine value, dietary fat, pigs

154 Supplemental effect of dried extracted brown seaweed (*Ascophyllum nodosum*) on growth and immunity of finishing pigs. D. A. Monson*, J. R. Blanton Jr, M. J. Anderson, S. O. Rao, and S. W. Kim, *Texas Tech University, Lubbock*.

Eighty pigs at 89.4 ± 1.5 kg BW were selected and allotted to two treatments: CON or SW (diet containing dried extracted brown seaweed, *Ascophyllum nodosum*, at 0.5%). Each treatment had five replicate and there were three pigs per pen. The CON and SW diets were the same, only except for the supplements that replaced the same amount of corn (0.5% of the diet). The supplement for the CON was corn-starch, whereas it was dried extracted brown seaweed for the SW. Pigs were fed based on two phases until they reach the market weight (133.3 ± 2.0 kg). Pigs had ad libitum access to the assigned feed and water. Body weight of pigs and feed intake were measured for each phase. At the beginning and the end of the study, two pigs of each pen were selected randomly to take blood samples to measure the number of immune cells including white blood cells, red blood cells, neutrophil, basophil, eosinophil, hemoglobin, hemotocrit, and platelets. Growth of pigs, feed intake, and gain:feed did not differ between the treatments. When the numbers of immune cells were measured, all the values were within normal range of healthy pigs regardless of the treatment groups. Number of white blood cells from pigs in the CON (24.3×10^6 cell/mL) tended to be higher ($P = 0.052$) than the SW (21.9×10^6 cell/mL). Considering that a normal range of a healthy pig is between 11.0 and 22.0×10^6 cell/mL, pigs in the CON may have slightly higher white blood cell numbers whereas those from the pigs in SW were within a normal range of a healthy pig. Other cell numbers did not differ between the treatment. This may indicate that pigs receiving a diet with dried extracted brown seaweed may be more tolerant to typical immune challenges from farm than non-treated pigs.

Key Words: pigs, seaweed, growth

155 Effect of water suspendible natural vitamin E and SelenoSourceAF™ on finishing swine. T. E. Shipp¹, J. C. Sparks^{*1}, D. A. Hill¹, H. Yang¹, M. A. Engstrom², K. Larson², G. Gourley³, and D. C. Mahan⁴, ¹ADM Animal Nutrition, Quincy, IL, ²Diamond V Mills, Cedar Rapids, IA, ³Swine Graphics Enterprises, Webster City, IA, ⁴The Ohio State University, Columbus.

Pigs ($n=288$; BW=100 kg) were supplemented with natural source vitamin E (NSE) in the drinking water and/or selenium yeast (SSAF) in the diet the last 28 days prior to slaughter to evaluate effects on pork quality and sensory characteristics. A 2×2 factorial arrangement of treatments in a randomized complete block design was conducted with 12 replications. Dietary Se source (0.3 mg/kg sodium selenite or SSAF) and the addition of NSE to the drinking water (0 or 27.5 IU/l) were tested. All experimental diets contained 30 mg/kg dl- α -tocopheryl acetate and were formulated to meet or exceed NRC requirements. NSE was mixed in a stock solution and added via medicator to the drinking water daily. Pigs were allotted by sex and weight and two pigs were randomly selected per pen for further analysis and bled on the day of study termination. From the selected pigs, a loin was harvested and evaluated for quality and sensory characteristics. Each loin was core-sampled at the 10th rib. Core samples and corresponding serum samples were analyzed for total Se and vitamin E. Statistical analysis was performed using the GLM procedure of SAS, 2000. NSE increased serum vitamin E ($P > 0.01$) and improved F/G ($P = 0.02$), but did not affect ($P > 0.05$) ADG, % yield, muscling, fat thickness, or % lean. SSAF decreased fat thickness ($P = 0.05$), but did not increase loin Se ($P = 0.20$) or affect ($P > 0.05$) serum vitamin E, ADG, F/G, or other carcass measures. Most carcass sensory measures (% purge, reflectance/color scores, cooking losses, flavor, juiciness, tenderness, chewiness, and Instron scores) were unaffected ($P > 0.05$) by treatment. NSE lowered 24-hr loin pH ($P = 0.02$), which may have resulted in a trend ($P = 0.08$) for increased off-flavor (sour) scores. Japanese color bar scores ranged from 2.4-3.0, and were reduced ($P = 0.03$) by NSE and tended to increase ($P = 0.06$) when SSAF was fed. In conclusion, short-term supplementation with NSE (approximately an additional 240 IU/hd/d) and SSAF resulted in minor changes in performance, some increases in loin and/or serum nutrient content, and minor changes in carcass sensory characteristics.

Key Words: vitamin E, selenium, selenium yeast

156 Effects of weaning age on growth performance, nutrient digestibility and integrity of small intestine in pigs. K. H. Cho^{*1}, W. S. Ju², H. K. Oh², H. B. Choi², S. K. Jang², and Y. Y. Kim², ¹TS Corporation, Incheon, Korea, ²Seoul National University, Seoul, Korea.

This study was conducted to determine the effects of weaning age on growth performance, nutrient digestibility, and the integrity of the small intestine in pigs. A total of 108 pigs were allocated into 3 treatments with 6 replicates, 6 pigs per pen, based on weaning age and sex by a randomized complete block design. The treatments included weaning litters at 14(A), 21(B), and 28(C) days of age. When the ADFI was divided by metabolic body weight (BW^{0.75}), the results were 19, 29 and 28g in A, B, C, respectively. The intake of treatment B and C was not different during the first week after weaning. As weaning