571 Nutrient profile and digestibility of agro-industrial coproducts as determined using an in vitro model of swine. Utsav P. Tiwari*, Halina M. Zaleski, and Rajesh Jha, *University of Hawaii at Manoa, Honolulu, HI.*

Market availability and price of some conventional feedstuffs, such as corn, wheat, and soybean meal, are highly variable because of high demand for food, feed and fuel. Exploring alternative feedstuffs that can either completely or partially replace these feedstuffs is very important to ensure the sustainability of the swine industry. Use of these alternative feedstuffs in pig diets can be optimized by characterizing their nutrient profile and digestibility. To explore the nutritional value, 3 agro-industrial coproducts, barley brewers grain (BBG), okara and wheat millrun (WMR) were analyzed for basic nutrients, fiber and GE content. Digestibility of DM and GE was determined using an in vitro 3-step enzymatic assay using pepsin, pancreatin and viscozyme (which mimics the digestion occurring in the gastrointestinal tract of swine) with 4 replicates of each sample digested over 2 batches. All replicates were used to determine DM digestibility while 2 replicates from each batch of each feedstuff were used to determine GE digestibility. On a DM basis, nutrient profile were as follows. GE: 4073 (BBG), 4736 (WMR) and 4824 kcal/kg (okara); CP: 11.7 (BBG), 15.9 (WMR) and 22.7% (okara); NDF: 31.0 (okara), 35.0 and 42.0% (BBG); ADF: 19.7 (okara), 24.2 and 34.0% (BBG), and hemicellulose: 8.0 (BBG), 10.8 and 11.2% (okara). The DM digestibility of okara (74.1%) was higher ($P < 0.05$) than BBG (61.3%), WMR was in between (69.9%). Similarly, GE digestibility of okara (66.2%) was higher ($P < 0.05$) than BBG (43.0%), WMR was in between (53.1%). Okara is not merely a good source of protein and energy, but also had fairly high in vitro DM and GE digestibility in swine. In conclusion, some agro-industrial coproducts can be potential substitute for common ingredients used as energy sources in pig diets, especially for small farms where these coproducts are widely available.

Key Words: coproduct, in vitro digestibility, swine

572 Feeding liquid dairy derivatives (whey) to nursery pigs. Laura Eastwood, Mike R. Deibert, Dakota L. Wightman, and Denise Beaulieu*, *Prairie Swine Centre Inc., Saskatoon, SK, Canada.*

Two experiments were conducted to examine the feeding value of liquid whey for newly weaned pigs. The experiments used pigs weaned at 26 ± 2 d of age, housed 2 per pen. A water/whey mix was provided in buckets suspended above each pen allowing accurate measurement of intake. No additional water source was provided. Pig body weights, and liquid and feed intakes were calculated weekly. In Expt. 1, 72 pigs received 0, 8 or 16% sweet whey (vol/vol) in their drinking water (providing 0, 16.4 or 24.6 g solids/L). Pigs were acclimated for 7 d, followed by 14 d data collection, and fed a standard pre-grower diet. In Expt. 2, 160 pigs were assigned to 1 of 7 treatments (3 × 2 factorial + control). Treatments consisted of 0% whey (control; n = 20), and sweet (pH 5.8, 20.5% DM) or acid (pH 2.9, 29.9% DM) whey at levels providing 16.4, 24.6 and 32.8 g solids/L (8, 12 or 16% inclusion (vol/vol) in drinking water for sweet whey, and 5.5, 8.2 and 10.9% for acid whey; n = 10/whey level). Diets were adjusted to account for expected nutrient intakes from the whey, based on intakes from Expt. 1. Data for both experiments were analyzed as a randomized complete block with treatment as a fixed effect, and block and pen as random effects. Effects of whey level were determined using linear and quadratic polynomial contrasts and an orthogonal contrast was used in Expt. Two to test the effect of whey type. $P < 0.05$ was considered significant. In Expt. 1, liquid intake and the intake of DM and calories from the whey increased with increasing whey concentration ($P < 0.01$), Total caloric intake (2.64 Mcal DE/d), and piglet ADG (0.32 kg/d) were not affected by treatment. In Expt. 2, whey type (sweet vs. acid) had no effect on growth or nutrient intake. Liquid, nutrient and energy intake increased, and ADG and G:F ratios were improved with increasing whey regardless of whey type (linear $P < 0.05$). Diet ADFI was unaffected by type or amount of whey (0.50 kg/d). Pigs compensated for the nutrients in the whey by decreasing feed intake (Expt. 1) or consuming similar amounts of a less nutrient dense diet (Expt. 2). Depending on the price of the whey, cost savings could therefore be achieved.

Key Words: swine, nursery, whey

573 Growth performance, serum lipids, and intestinal volatile fatty acids contents in growing pigs fed flaxseed meal- and oat hulls-containing diets. Saymore P. Ndou*[1], Elijah Kiarie[1,2], and Charles M. Nyachoti[1], *[1]Department of Animal Science, University of Manitoba, Winnipeg, MB, Canada, [2]DuPont Industrial Biosciences-Danisco Animal Nutrition, Marlborough, UK.*

The objective of the study was to determine growth performance, serum lipids, and intestinal volatile fatty acids (VFA) concentrations in pigs fed flaxseed meal (FM)- and oat hulls (OH)-containing diets. Forty-eight Genesus [(Yorkshire-Landrace) × Duroc] barrows with initial BW of 25.0 ± 0.32 kg were penned in pairs. Pigs were allotted to 3 experimental diets: (corn-soybean meal-based diet (Control), 12% FM- and 10% OH-containing diets, in a completely randomized design, to give 8 replicates per treatment. Diets were formulated to be iso-energetic. However, incorporation of FM and OH increased the soluble fiber (sDF) and insoluble fiber (iDF) content of the diets, respectively. Feed intake and BW of pigs were measured weekly for 28 d. On d 28, blood samples were collected via jugular vein puncture for measuring concentration of serum lipids. Pigs were subsequently slaughtered for ileal, cecal and colonic digesta collection for VFA analysis. Pigs fed the control and OH-containing diet had greater final BW ($P < 0.01$), feed intake ($P = 0.01$) and weight gain ($P < 0.01$) than FM-containing diets-fed pigs. Feed efficiency was reduced by 15.6% in pigs fed FM-based diets compared with the control ($P = 0.01$). Total cholesterol was reduced ($P < 0.01$) more in pigs fed OH-containing diets (1.99 mmol/L) than in FM-containing diets (2.25 mmol/L), compared with the control (2.36 mmol/L). Pigs fed FM- and OH-containing diets had greater ($P < 0.01$) cecal pooled VFA concentration (135 and 126 mmol/L) than those fed the control diet (87.5 mmol/L). Dietary inclusion of FM and OH increased the cecal ($P < 0.01$) and colonic ($P < 0.01$) concentration of acetate by more than 100% and 20%, respectively. A similar trend was observed in the colon in which case pigs fed the FM- and OH-containing diets tended to have highest concentrations of valerate ($P = 0.09$) and pooled VFA ($P = 0.10$). In conclusion, iDF reduced serum cholesterol more than sDF and the former depressed growth performance by reducing feed intake. However, both sDF and iDF induced variable effects on VFA concentrations depending on intestinal segment.

Key Words: dietary fiber, growth performance, hindgut fermentation

574 Effects of feeding increasing inclusion of canola press-cake on diet nutrient digestibility and growth performance of weaned pigs. X. Zhou*[1], E. Beltranena[1,2], and R. T. Zijlstra[1], *[1]University of Alberta, Edmonton, AB, Canada, [2]Alberta Agriculture and Rural Development, Edmonton, AB, Canada.*

Canola press-cake (CPC) is a co-product from biodiesel production in small-scale processing plants that mechanically press oil from cleaned canola seed without seed conditioning or solvent extraction. The CPC contains 37% CP and 20% remaining oil; thus, CPC could be a source of AA and energy in pig diets. However, growth responses to increasing inclusion of CPC have not been evaluated in pigs. To evaluate the feeding value of CPC, 240 pigs (7.5 kg) starting 1 wk after weaning at 19 d of age were fed 5 wheat-based diets containing 0, 5, 10, 15, or 20% CPC to replace soybean meal in 2 phases (Phase 1 and 2). Diets were formulated to contain 2.45 and 2.41 Mcal NE/kg and 5.02 and 4.20 g standardized ileal digestible (SID) Lys/Mcal NE, respectively, and were fed for 2 wk for phase 1 (d 0–14) and 3 wk for phase 2 (d 15–35). Feed added and left and pig BW were measured weekly to calculate pen ADFI, ADG, and G:F. Freshly-voided feces were collected on d 12–13 and d 33–34 for phase 1 and 2, respectively, to determine diet apparent total-tract digestibility (ATTD) of DM, GE, and CP and diet DE using the index method. The diet NE value was predicted by Eq. 1–8 in NRC (2012). Data were analyzed using the MIXED procedure in SAS by orthogonal contrasts tested the linear or quadratic effects of CPC inclusion. Increasing dietary inclusion of CPC linearly reduced ($P < 0.05$) the ATTD of GE by 1.3% and CP by 2.3% and diet DE and NE values in phase 1 and 2. Increasing dietary inclusion of CPC did not affect overall (d 0–35) ADFI and ADG of pigs but linearly reduced ($P < 0.01$) ADFI for d 29–35, linearly increased ($P < 0.05$) ADG for d 15–21, and linearly reduced ($P < 0.05$) ADG for d 29–35. Increasing CPC inclusion linearly increased ($P < 0.05$) feed efficiency for d 15–21 and overall. In conclusion, feeding up to 20% of CPC reduced ATTD of nutrients but did not reduce overall growth performance of weaned pigs when diets were balanced for NE and SID Lys/NE ratio. The CPC may be used as an alternative feedstuff to soybean meal to reduce feed cost while maintaining performance.

Key Words: canola press-cake, performance, weaned pig

575 Apparent and true ileal and total-tract digestibility of fat in diets including canola press-cake or canola oil and endogenous fat loss in growing pigs. X. Zhou*[1], E. Beltranena[1,2], and R. T. Zijlstra[1], *[1]University of Alberta, Edmonton, AB, Canada, [2]Alberta Agriculture and Rural Development, Edmonton, AB, Canada.*

Residual oil in canola press-cake (CPC) and extracted oil (CO) are both sources of dietary fat for pigs. However, fat digestibility may be lower in cake as oil remains trapped in the crushed seed matrix. Dietary fat source may affect endogenous fat losses that must be determined to calculate true fat digestibility. To test these hypotheses, 9 ileal-cannulated pigs (25.4 kg BW) were fed 9 diets in a 9 × 8 Youden square. A basal diet of wheat and barley grains and canola meal was formulated. Eight test diets were prepared by mixing 10, 20, 30, and 40% CPC or 1.5, 3.0, 4.5, and 6.0% CO with basal diet, respectively, to match dietary fat content. Apparent total-tract digestibility (ATTD) and apparent ileal digestibility (AID) of acid-hydrolyzed ether extract (EE) were calculated for each diet using TiO2 as marker. True total-tract digestibility (TTTD) and true ileal digestibility (TID) of EE in CPC and CO and endogenous loss of EE were estimated by regressing apparent digested EE (g/kg of DM intake) against dietary EE intake (g/kg of DM). The ATTD and AID of EE in CPC diets were 61.5 and 78.9% and were lower ($P < 0.01$) than the 63.4 to 81.9% in CO diets, respectively. Apparent total-tract and ileal digested EE content in CPC and CO diets increased linearly ($P < 0.01$) with increasing EE intake. Endogenous loss of EE was greater ($P < 0.05$) for the total-tract (−23.4 g/kg of DM intake) than by the ileum (−9.4 g/kg of DM intake). Dietary fat source did not affect ($P > 0.05$) total-tract or ileal endogenous EE loss. The TTTD and TID of EE in CPC were 94.5 and 92.3% and were lower ($P < 0.01$) than 100 and 96.5% in CO, respectively. In conclusion, CPC had reduced ATTD, AID, TTTD, and TID of EE compared with CO. Dietary fat source did not affect endogenous losses of EE. The reduced fat digestibility of CPC compared with CO indicates that fat digestibility of CPC should be considered to predict its nutritional value accurately before diet formulation.

Key Words: canola oil, fat digestibility, pig

576 Nutrient profile and digestibility of macadamia nut cake as determined using an in vitro model of swine. Utsav P. Tiwari and Rajesh Jha*, *University of Hawaii at Manoa, Honolulu, HI.*

Highly variable price and market availability of some conventional feedstuffs, such as corn, wheat, soybean meal (SBM) make imperative to explore alternative feedstuffs to be used in swine diets. Macadamia nut cake (MNC), a coproduct from macadamia nut oil extraction process, is available and can serve as a potential feedstuff. However no or limited information of its nutrient profile and digestibility value limit its use in swine diets. To explore the nutritional value, MNC was analyzed for its basic nutrients, fibers, GE, AA and fatty acids content using standard methods. Digestibility of DM and GE of MNC was determined using an in vitro 3-step enzymatic assay using pepsin, pancreatin and viscozyme (which mimics the digestion occurring in the gastrointestinal tract of swine) with 4 replicates of sample digested over 2 batches. All replicates were used to determine DM digestibility while 2 replicates from each batch were used to determine GE digestibility. The MNC sample contained 93.1% DM. On DM basis, Ash, CP, crude fat, NDF, ADF, lignin and GE were found to be 3.7%, 25.5%, 11.9%, 35.8%, 28.0%, 16.0% and 5581 kcal/kg, respectively. In vitro DM and GE digestibility were found to be 76.7 and 71.4%, respectively. The concentration of Lys, the first limiting AA in swine, was found to be 0.7%. Linoleic and linolenic acid content were 2.5 and 0.2%, respectively. Gross energy content in MNC is comparable with that of corn and higher than SBM, due to high residual oil content, while protein content is twice as high as corn but lower than SBM. However, high fiber and presence of potential antinutritional factors like tannin and phytic acid need to be considered while using MNC in swine diets. In conclusion, MNC is not merely a good source of protein and energy but also had fairly high DM and GE digestibility when studied using an in vitro model of swine. Hence, it may serve as a potential alternative of some conventional sources of protein and energy in swine diets.

Key Words: in vitro digestibility, macadamia nut cake, swine

577 Effect of duck grease on growth performance, carcass characteristics, and meat quality in growing-finishing pigs. Jie Yu*, Li Zhu, Bing Yu, Jun He, Ping Zheng, Xiangbing Mao, Quyuan Wang, Zhiqing Huang, Junqiu Luo, and Daiwen Chen, *Animal Nutrition Institute, Sichuan Agricultural University, Chengdu, Sichuan, China.*

Duck grease (DG), a by-product of the duck industry, is abundant and inexpensive as a potential energy feed source because more than 60% of global ducks are produced in China. However, the nutritive value of DG in swine diet has not been assessed. In our previous study, the apparent digestible energy and metabolizable energy have been evaluated. The

present study addressed the effects of DG compared with soybean oil (SO) on growth performance, carcass characteristics and meat quality in a 82 d feeding program. A total of 72 growing barrows (31.62 ± 2.31 kg initial body weight) were randomly assigned into 2 dietary treatment groups in 6 replicates/pens utilizing a completely randomized design. The pigs were fed a corn-soybean meal based diet containing same amount (2% in growing diet, 1% in finishing diet) of SO or DG. One pig at average body weight in each pen was electrically stunned and slaughtered at the end of the feeding experiment, and carcass characteristics and pork quality were measured. Unpaired *t*-test was applied to evaluate the comparisons between 2 groups. Growth performance and carcass characteristics were not different ($P > 0.05$). Pigs fed DG improved the apparent total-tract digestibility of dry matter (DM; 82.19 vs. 86.46%, $P < 0.05$) and gross energy (GE; 81.22 vs. 84.17%, $P < 0.05$). Visual color, ultimate pH, marbling score, and driploss were not different between DG and SO treatment. The intramuscular fat (IMF) content (2.77 vs. 3.67%, $P < 0.05$) and muscle fiber density (1112.82 vs. 1389.97 fiber number /mm^2, $P < 0.05$) in longissimus dorsi (LM) were increased, while slice shear force was decreased in DG fed pigs (5.94 vs. 4.54 kg, $P < 0.05$). In conclusion, dietary DG improved pork quality without negatively influencing growth performance and carcass characteristics in growing-finishing pigs.

Key Words: duck grease, pork quality, growing-finishing pigs

578 Feeding layer hens with a new type of defatted green microalgae produced dose-dependent enrichments of eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in their egg yolk and tissues. Theodore Derksen, Meghan Manor, and Xin Gen Lei*, *Cornell University, Ithaca, NY.*

There is little EPA or DHA present in the yolks of eggs produced by hens fed corn-soybean meal-based diets. The purpose of this experiment was to enrich these n-3 fatty acids in the egg yolk by feeding hens with defatted green microalgae. A total of 50 White Leghorn hens (46-wk old, 1.70 ± 0.27 kg BW) were housed individually in cages, divided into 5 groups (n = 10), and fed a corn-soybean meal-based diet containing 0, 2.9, 5.8, 11.5, or 23% of a new type of defatted green microalgae (*Nannochloropsis oceanica,* Cellana, Kailua-Kona, HI) for 6 wk. Data were analyzed by one-way ANOVA with or without time-repeated measurements (SAS Version 9.1, SAS Institute, Inc., Cary, NC). The *P*-values for multiple regression analyses were adjusted using a Bonferroni correction procedure (significance at $P \leq 0.01$). The microalgae supplementation produced dose-dependent linear ($P < 0.01$) enrichments of EPA, DHA, and total n-3 fatty acids consistently in egg yolk ($R^2 > 0.9$) assayed biweekly and of DHA in Liver ($R^2 = 0.78$), breast ($R^2 = 0.82$), and thigh ($R^2 = 0.66$) assayed at wk 6. Concentrations of EPA + DHA in egg yolk, liver, breast muscle, and thigh muscle of hens fed 11.5 and 23% microalgae were 1.4–2.1, 0.6–1, 3.3–5.3, and 6–7-fold greater ($P < 0.001$) than those in the controls (0% microalgae), respectively. Supplemental microalgae showed no effect on body weight, egg production rate, or tibia dimensions, but produced linear increases ($P < 0.05$) in tibia bone strength ($R^2 = 0.71$), egg shell weight ($R^2 = 0.58$), and egg yolk redness ($R^2 = 0.71$) and linear decreases ($P < 0.05$) in ADFI ($R^2 = 0.88$), egg yolk lightness ($R^2 = 0.97$), and egg yolk yellowness ($R^2 = 0.80$). In conclusion, this new type of defatted green microalgae was very effective in elevating EPA and DHA in the egg yolk, liver, and muscle tissues of layer hens. Eggs produced by hens fed the 23% defatted green microalgae diet may serve as a major food source of EPA and DHA to meet human needs. Supported in part by USDA/DOE Biomass R&D Initiative Grant, a Hatch Grant of Cornell University, and a Hatch Grant Supplement from Cornell University for Undergraduate Research.

Key Words: egg, EPA/DHA, microalgae

579 Moderate levels of supplemental defatted green microalgae in broiler diets had no adverse effect on bone properties. Eleanore O'Neil, Stephanie Gatrell, Meghan Manor, and Xin Gen Lei*, *Cornell University, Ithaca, NY.*

Two experiments were conducted to determine if supplementing broiler diets with defatted green microalgae (*Nannochloropsis oceanica,* 0.69% phosphorus, Cellana, Kailua-Kona, HI) affected bone properties and phosphorous nutrition. Data were analyzed using one-way ANOVA and(or) linear regression procedure (SAS Version 9.1, SAS Institute, Inc., Cary, NC). In Experiment 1, day-old male Ross broiler chicks (total = 180) were fed a corn-soybean meal basal diet (BD) containing 0 (Control), 2, 4, 8, or 16% of the defatted microalgae for 6 wk. Chicks were housed in cages (6/cage) and each treatment consisted of 6 cages. Supplemental microalgae had no effect on tibial maximum load, maximum slope, extension at maximum load, energy to maximum load, or weight. However, tibial length of birds fed the 16% microalgae diet was 6.9% shorter (113 ± 0.3 mm vs. 105 ± 4.6 mm, $P < 0.05$) than that of those fed the control diet. This decrease was consistent with a 10.2% lower BW of birds fed the 16% microalgae compared with the control (2817 ± 70.6 vs. 2528 ± 75.8 g, $P < 0.01$). There were dose-dependent increases ($P < 0.01$) in soluble inorganic phosphorous retention, and decreases ($P < 0.05$) in soluble inorganic phosphorous excretion with elevated microalgal inclusions. Plasma inorganic phosphorous concentrations were not affected by the diet treatments. In Experiment 2, 3-wk old male Cobb chicks (total = 120) were fed the control, BD + 10% microalgae, BD +10% microalgae + high vitamin E (DL-α-tocopheryl acetate, 150 IU/kg), or BD + 10% microalgae + high selenium (selenium-enriched yeast, 0.5 mg Se/kg) for 3 wk. Chicks were housed in cages (5/cage) and each diet treatment consisted of 6 cages. Compared with the control (BD), the other 3 diets produced no differences in all the tibial measures (including length) as described in Experiment 1. In conclusion, feeding broiler chicks with the defatted green microalgal biomass up to 10% in their diets did not show any adverse effect on bone health, but seemed to improve dietary phosphorus retention. Supported in part by a USDA/DOE Biomass R&D Initiative Grant, a Hatch Grant of Cornell University, and a Morley Student Research Fund Award of Cornell University.

Key Words: broiler, microalgae, tibial strength

580 Low concentrations of supplemental defatted microalgae affect egg and tissue fatty acid composition differently in layers fed diets containing corn and flaxseed oils. Jonggun Kim and Xin Gen Lei*, *Cornell University, Ithaca, NY.*

Our laboratory previously showed that high concentrations of supplemental defatted microalgae (DMA, 10–15%) or flaxseed oil (FO,5%) altered fatty acid profiles of egg yolk and tissues of layers. This experiment was to determine if and how lower concentrations of these supplementations affected fatty acid composition of egg yolk, liver, adipose tissue, and plasma of layers. A total of 60 Shaver leghorn layer hens (individually caged, 20 wk old) were allotted into 6 groups (n = 10) and fed a corn soybean meal-basal diet containing 0, 3, or 5% DMA (*Nannochloropsis oceanica*, Cellana, Kailua-Kona, HI) and 0 (1.5% corn oil) or 1.5% FO (Dyets, Bethlehem, PA) for 6 wk. Data were analyzed by 2-way

(2 by 3 factorial) ANOVA with or without time-repeated measurements using PC-SAS (Version 9.1, SAS Institute, Inc., Cary, NC).Although BW, ADFI, egg production rate, egg weight, or egg albumen, yolk, and shell were not affected by any of the dietary treatments at various time points, egg yolk color was changed ($P < 0.05$) from 7 to 13 (Roche color fan) with increasing concentrations of DMA. There was no diet effect on plasma concentrations of triglyceride, cholesterol, or uric acid. While concentrations of n-3 fatty acids in egg yolk and plasma were elevated by FO up to 9-fold ($P < 0.05$) starting at wk 1 or 2, such improvements by DMA were only 39 to 83% ($P < 0.05$). Although DMA also improved ($P < 0.05$) n-6/n-3 fatty acid ratios in egg yolk and plasma from 13 to 23 to 7–13, this effect was seen only in hens fed diets without FO. In the presence of 1.5% FO, only 5% DMA produced 8–9% increase ($P < 0.05$) in n-3 fatty acid concentration of egg yolk at wk 2 and 3. Fatty acid profiles of liver and adipose tissue (collected at wk 6) displayed responses to supplemental DMA and FO similar to those of egg yolk or plasma. In conclusion, supplemental 2.5 or 5% DMA caused moderate enrichments of n-3 fatty acids and decreases of n6/n3 fatty acid ratios of egg yolk and tissues in hens fed diets containing corn oil. The DMA effects on these measures were very limited in hens fed diets containing FO. Supported in part by a USDA/DOE Biomass R&D Initiative Grant and a Hatch Grant of Cornell University.

Key Words: eggs, microalgae, n-3 fatty acid

581 Supplemental defatted green microalgae and phytase improve hemoglobin repletion in weanling pigs. Meghan L. Manor, Theordore J. Derksen, Rebecca L. Schwartz, Carol A. Roneker, and Xin Gen Lei*, *Cornell University, Ithaca, NY.*

Our previous studies demonstrated that supplementing 7.5% defatted microalgae in diets for weanling pigs improved their blood hemoglobin concentrations over the controls (11.0 ± 1.5 vs.13.0 ± 1.4 g/dL). This experiment was to determine if a lower concentration of microalgae alone or in combination with phytase produced similar improvements. A total of 30 weanling pigs (Hampshire × Yorkshire × Landrace cross-bred, 7.5 ± 0.4 kg BW, hematocrit: 27.5 ± 1.7%, and hemoglobin: 9.4 ± 0.6 g/dL) were allotted to 5 dietary treatment groups (n = 6/group). The 5 diets included (1) a corn-soybean meal basal diet (BD) without supplemental inorganic iron (negative control), (2) BD + 50 mg Fe/kg (as $FeSO_4$, positive control), (3) BD + 0.5% defatted green microalgae (*Nannochloropsis oceanica,* Cellana, Kailua-Kona, HI), (4) BD + 500 units/kg of phytase (OptiPhos, Huvepharma, Peachtree City, GA), and (5) BD + defatted microalgae + phytase. The trial lasted for 6 wk and growth performance and hematology of pigs were measured biweekly. Individually penned pigs were considered the experimental unit. All data were analyzed by one-way ANOVA with or without time-repeated measurements using PC-SAS (Version 9.1, SAS Institute, Inc., Cary, NC). Blood hemoglobin concentrations and hematocrit of pigs fed the negative control diet were lower ($P < 0.05$) than those fed the positive control diet at wk 4 and(or) 6, whereas pigs fed the 3 diets containing microalgae and(or) phytase had similar values to the positive control group for both measures at both time points. The experimental diets exerted effects on BW, ADG, ADFI, and gain/feed ratio similar to those on hemoglobin and hematocrit. However, the diets had no effect on plasma lipid or glucose profiles of pigs. In conclusion, supplementing 0.5% defatted green microalgae alone or with 500 units of phytase/kg was very effective in improving iron utilization for hemoglobin repletion in the weanling pigs. Supported in part by USDA/DOE Biomass R&D Initiative Grant, a Hatch Grant of Cornell University, and a Morley Student Research Fund Award of Cornell University.

Key Words: iron, microalgae, phytase