132 In vitro analysis to predict energy digestibility of cereals for grower pigs. R. T. Zijlstra*[1], M. N. Casano[1], J. H. Helm[2], L. Oatway[2], and E. Beltranena[3], [1]*University of Alberta*, *Edmonton, AB*, [2]*Field Crop Development Centre*, *Lacombe, AB*, [3]*Alberta Agriculture, Food and Rural Development*, *Edmonton, AB, Canada*.

Feed quality of barley for grower pigs has been shown to vary by over 25% for many of the feed quality characteristics of interest. For cereal grains, energy digestibility and DE content or other measures of energy value are considered most important for determination of economic value of individual samples; hence, analyses that determine or predict energy digestibility cost-effectively are of prime interest. Barley samples (n=57) with a range in chemical and physical characteristics (11.1 to 18.3% CP, 3.5 to 5.9% β-glucans, 54.6 to 66.4% starch, and 58.3 to 78.9 kg/hL test weight) were subjected to an in vitro analysis in quadruplicate. Briefly, the procedure involved subsequent digestions with pepsin (6 hr), pancreatin (18 hr), and cellulase (24 hr), and DM and GE analyses of the barley sample and residue. In vitro energy digestibility ranged from 80.6 to 91.5% and the relative error ranged from 0.1 to 1.9%; the in vitro DE content ranged from 3.65 to 4.23 Mcal/kg DM. For a subset of 16 barley samples, total-tract energy digestibility was measured in grower pigs in quadruplicate and ranged from 79.9 to 88.1% with a relative error ranging from 0.6 to 2.1%; the in vivo DE content ranged from 3.55 to 4.15 Mcal/kg DM. In vitro energy digestibility had a strong linear relationship with in vivo energy digestibility ($R^2 = 0.88$), unlike test weight ($R^2 = 0.51$). A calculation of curvilinear relationships did not improve the prediction, suggesting that neither substrate nor enzymes limited in vitro energy digestibility. In summary, in vitro energy digestibility was an accurate predictor of in vivo energy digestibility. In vitro energy digestibility can be successful as the core analytical procedure to calibrate rapid analytical equipment to predict in vivo energy digestibility and therefore DE content of barley for grower pigs.

Key Words: barley, energy digestibility, pig

133 Chemical characterization and digestible nutrient content of barley and oat starch ingredients derived via wet fractionation for grower pigs. I. R. Johnson, T. Vasanthan, F. Temelli, and R. T. Zijlstra*, *University of Alberta*, *Edmonton, AB, Canada*.

Wet fractionation of cereals may yield concentrated fiber fractions, such as β-glucans, from barley and oats that can be used for functional food applications. The major remaining fraction is starch-rich and has potential for feed or other applications. The nutritional value of barley and oat-derived starch ingredients are unknown for swine, and were compared to their parent grain, either hulless barley or oats, respectively. The hulless barley flour contained 69.9, 11.8, 1.7 and 5.9% (DM) starch, CP, EE, and NDF, respectively, and its starch fraction contained 90.0, 4.2, 0.8 and 0.6%, respectively. The hulless oat flour contained 63.6, 18.5, 5.5 and 6.1% starch, CP, EE, and NDF, respectively, and its starch fraction contained 74.3, 13.8, 5.6 and 0.9%, respectively. The four ingredients were each mixed in a ratio of 1:1 with a control diet into five diets containing 1% acid-insoluble ash as marker. Diets were fed to ileal-cannulated pigs; feces and ileal digesta were collected. Diet and test ingredient digestibility values were obtained using the indicator and difference methods, respectively. Ileal energy digestibility was lower for the barley than its starch (86.4 versus 91.4%; $P < 0.05$) and similar for the oats and its starch (89.0 and 90.2%). Total tract energy digestibility was 94.8 and 96.0% for the barley and its starch and 97.3 and 96.6% for the oats and its starch, respectively, resulting in a DE content of 4449, 4442, 4827 and 4744 kcal/kg DM, respectively. Standardized ileal digestibility for lysine was 97.1 and 97.9% for the barley and its starch and 99.9 and 97.8% for the oats and its starch, respectively. Combined, energy and AA digestibility of hulless barley and oats and their derived starch fractions were high. Wet fractionation of cereals to extract fiber fractions may therefore yield starch-enriched feedstuffs that have a digestible nutrient profile that will suit inclusion into diets for weaned pigs.

Key Words: barley, pig, starch

134 Influence of Nutridense® low phytate corn and added fat on grow-finish pig growth performance. S. K. Linneen*[1], R. O. Gottlob[1], S. S. Dritz[1], M. D. Tokach[1], J. M. DeRouchey[1], R. D. Goodband[1], J. L. Nelssen[1], and J. L. Snow[2], [1]*Kansas State University*, *Manhattan*, [2]*BASF Plant Science*, *Research Triangle Park, NC*.

Two experiments were conducted to determine the influence of NutriDense® Low Phytate corn in conjunction with increasing added fat on grow-finish pig performance. Both experiments were arranged as 2 × 3 factorials with main effects of either yellow dent (YD) or NutriDense® Low Phytate (NDLP) corn with either 0, 3, or 6% added fat. In Exp. 1, 1,162 gilts (44.6 kg) were used in a 28-d study. Diets were formulated to 2.80 g TID lysine:Mcal ME and a constant available P:energy ratio of 0.90 g/Mcal. Overall, there were no corn source × fat level interactions ($P > 0.79$) and no differences in ADG (872 vs 882 g/d; $P < 0.59$) or G:F (0.47 vs 0.46; $P < 0.48$) between pigs fed YD and NDLP corn. Average daily gain increased (854, 873, 904 g/d; linear, $P < 0.03$) and gain:feed improved (0.446, 0.467, 0.481; linear, $P < 0.01$) with increasing dietary fat. In Exp. 2, 1,128 gilts (81.6 kg) were used in a 28-d growth assay. Diets were formulated to 2.15 g TID lysine:Mcal ME and a constant available P:energy ratio of 0.75 g/Mcal. Overall, there was a tendency for a G:F corn source × fat level interaction ($P < 0.07$) because G/F was only improved when 6% fat was added to the diet for pigs fed yellow dent corn, while a linear improvement was found with increasing fat level for pigs fed NDLP corn. However, there were no differences in ADG (871 vs 857; $P < 0.50$) or G:F (0.33 vs 0.34; $P < 0.39$) between pigs fed YD and NDLP corn. Average daily gain increased (833, 846, 913 g/d; linear, $P < 0.01$) and G:F improved (0.319, 0.333, 0.358; linear, $P < 0.01$) with increasing dietary added fat. In conclusion, pigs fed NDLP corn, regardless of added fat level, responded similarly in growth performance to pigs fed YD corn. This combined with the environmental advantages of NDLP, make it a viable alternative to YD corn.

Key Words: pigs, fat, corn hybrids

135 Effect of low-phytate barley or phytase supplementation to a barley-soybean meal diet on phosphorus excretion by grower pigs. J. Htoo*[1], W. Sauer[1,2], M. Cervantes[2], Y. Zhang[1], J. Helm[3], and R. Zijlstra[1], [1]*University of Alberta*, *Edmonton, AB, Canada*, [2]*Universidad Autónoma de Baja California*, *Mexicali, México*, [3]*Field Crop Development Centre*, *Lacombe, AB, Canada*.

Low-phytate barley and phytase supplementation may improve P utilization. In Exp. 1, eight 25-kg barrows were assigned in a repeated