**Nutrient profile and in vitro vs. in vivo energy digestibility of wheat co-products from flour milling in growing pigs.**

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Wheat flour milling generates co-products (WFM) such as wheat shorts, millrun, middlings, and bran that are classified based on fiber content. These WFM can serve as alternative feedstocks for conventional energy sources in swine diets to reduce feed cost, a major challenge of swine industry; however, information is scarce about their digestible nutrient content that limits their use in swine diets. Nutrients of 9 WFM (2 shorts, Shorts A and B; 5 millrun, Millrun A, B, C, D, and E; Middlings; and Bran) were profiled. In vitro energy digestibility was determined using 3-step assay. In a 30-d digestibility study (a 10-d acclimation to a standard pre-grower diet, followed by 2 consecutive 10-d experimental periods), 20 growing pigs (BW, 37.5 kg) were fed at 3 × maintenance requirement with 1 of 10 diets (9 WFM added at 40% to corn; and corn as control). Feces were collected by grab sampling and apparent total tract digestibility (ATTD) of WFM was calculated using the indicator method. The CP content of WFM ranged from 15.9 (Bran) to 27.8% (Shorts A) and crude fiber from 5.2 (Shorts B) to 12.0% (Bran). Diet DE content was highest (P < 0.05) for Shorts B and lowest for Bran (3.56 vs. 3.21 Mcal/kg DM), corn had 3.46 Mcal DE/kg. The ATTD of WFM diets ranged from 74.4 in Bran to 82.5 in Shorts A, and was 82.9% in the corn diet. In vivo energy digestibility was highest (P < 0.01) in Short (81.9) and lowest in Bran (62.6%). In vitro energy digestibility was highest (P < 0.05) in Short B (69.1) and Middlings (68.0) and lowest in Millrun B (51.6%). In vitro energy digestibility was strongly related (R2 = 0.80) with ATTD of energy of the WFM. Among nutrients, NDF was the best predictor for in vitro (R2 = 0.74) and in vivo DE (R2 = 0.81). In conclusion, nutrient profiles and digestibility of WFM vary widely but some WFM (Short A and B; Millrun A, B and D; and Middlings) have a DE content comparable to corn. Thus, type and composition of wheat co-products should be considered for swine feed formulation. Finally, the existing in vitro technique predicts ATTD of energy in WFM accurately.

**Key Words:** energy, pig, wheat co-product

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**Digestible and metabolizable energy concentration in canola meal, 00-rapeseed meal, and 00-rapeseed expellers fed to growing pigs.**

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This experiment was conducted to measure DE and ME in canola meal, 00-rapeseed meal, and 00-rapeseed expellers fed to growing pigs. Twenty 3 barrows (initial BW: 27.7 ± 2.92 kg) were allotted to an 8 × 23 Youden square design with 8 periods and 23 animals. Twenty-three diets were prepared. One diet was a corn based basal diet; 6 diets were based on corn and each of 6 samples of canola meal from solvent-extraction crushing plants in North America (average of 4,218 kcal GE/kg, 38.0% CP, and 3.87% crude fat); 11 diets were based on corn and each of 11 samples of 00-rapeseed meal from solvent-extraction crushing plants in Europe (average of 4,210 kcal GE/kg, 36.2% CP, and 3.87% crude fat); and 5 diets were based on corn and each of 5 samples of 00-rapeseed expellers from mechanical-press crushing plants in Europe (average of 4,721 kcal GE/kg, 35.6% CP, and 11.5% crude fat). Pigs were fed at 3 times their estimated energy requirement for maintenance, and were placed in metabolism cages that allowed for the total, but separate, collection of feces and urine. The concentration of DE and ME in corn was calculated from the basal diet and the contribution of DE and ME from corn to the remaining diets was then calculated, and the DE and ME of each source of canola meal, 00-rapeseed meal, and 00-rapeseed expellers were calculated by difference. Results of the experiment indicate that the apparent total tract digestibility in 00-rapeseed expellers (78.32%) was greater (P < 0.01) than in 00-rapeseed meal (70.63%), but no difference between 00-rapeseed meal and canola meal (69.82%) was observed. The concentration of DE and ME in canola meal (3,378 and 3,127 kcal/kg DM) were not different from DE and ME in 00-rapeseed meal (3,461 and 3,168 kcal/kg DM), but 00-rapeseed expellers had greater (P < 0.01) DE and ME (4,005 and 3,691 kcal/kg DM) than 00-rapeseed meal. In conclusion, the concentration of DE and ME is not different between canola meal and 00-rapeseed meal, but 00-rapeseed expellers contain more DE and ME than 00-rapeseed meal.

**Key Words:** canola meal, rapeseed product, pig
Diet formulation on the basis of apparent phosphorus (P) digestibility values can vary within a single feed ingredient that leads to P overfeeding and excessive P excretion in pigs. The determination of true digestibility values in feed ingredients helps to address this issue. The objectives of this study were to determine the apparent (ATTD) and true (TTTD) total tract digestibility of P in canola meals (CM) from Brassica napus black and Brassica juncea yellow fed to growing pigs using the regression analysis technique. Forty-eight barrows (initial BW = 19.9 ± 0.22 kg mean ± SD) housed individually in metabolic crates were allotted to 8 dietary treatments in a completely randomized design to give 6 observations per treatment. Eight isocaloric cornstarch-based diets (4 diets per cultivar) were formulated to contain 0.8, 1.6, 2.4 and 3.3 g/kg DM from either B. napus black or B. juncea yellow. Canola meal (B. napus black or B. juncea yellow) was the sole source of P and limestone was added to maintain Ca:total P ratio of 1.2:1. The daily quantity of feed provided per pig was calculated as 2.6 times the maintenance energy requirement of the pigs and divided into 2 equal meals at 0800 and 1600 h. Pigs were adapted to dietary treatments for 9 d followed by the total collection of feces for 5 d. The ATTD values of P increased from 17.9 to 29.4% for B. napus black and from 16.6 to 27.2% for B. juncea yellow as the dietary P content increased from 0.8 to 3.3 g/kg DM. The endogenous fecal outputs of P were not different between the CM cultivars and averaged 0.667 g/kg DMI. There was no difference (P > 0.05) in TTTD of P (33.3 vs. 31.9%) in B. napus black and B. juncea yellow when determined with the regression method. In this study, estimates of endogenous P loss were higher than previous studies which can be due to various factors including diet type, age or metabolic state of animal.

Key Words: digestibility, endogenous loss, phosphorus