Effects of particle size heterogeneity in milled maize and soybean meal on nutrient content and *in vitro* organic matter digestibility

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The mean particle size of ground grains has effects on pig growth performance and gastric health. However the variation heterogeneity in particle size distribution may result in different pig performances, even though the animal was fed the similar mean particle sized meals. The hypothesis about non-homogenous nutrient content distribution along with the particle size distribution might be one of the key reasons to explain this phenomenon. The objective of present study was to identify the nutrient content among individual size fractions of milled maize and soybean meal (SBM), and to relate it to the pig *in vitro* digestibility coefficients, thus gaining insight on how to improve grinding strategy. Maize and SBM were ground by hammer mill through a 2 and 6 mm screen size respectively, and sieved into 7 fractions, from < 0.075 to > 3.36 mm. The nutrient composition including dry matter, ash, crude fibre (CF), crude fat, crude protein (CP), starch and *in vitro* digestibility of organic matter (OM), CP (SBM) and starch (maize) were measured. The results show that the nutrient composition is significantly different (*P< 0.001)* among these fractional ground grains. A large difference in starch levels (754.2 vs 578.9 g/kg) in maize was observed; CP content of SBM increased when the sieve size gets larger. A significant difference (*P< 0.001)* in the *in vitro* digestibility of OM and CP was also observed among the various particle size fractions in both ingredients. However, the *in vitro* digestibility of starch did not differ significantly between each size fractions in maize. The regression models relating the nutrient composition and *in vitro* digestibility show that, the digestibility of OM was significantly, positively related to the starch level. Ash and starch content are positively related to the *in vitro* digestibility of starch in maize. As for the SBM, a significant negative correlation was observed between CP and CF, crude fat and OM digestibility; ASH and CF had a negative effect on the digestibility of CP, though crude fat showed a positive influence on the CP digestion. The relationships between the nutrient composition and pig *in vitro* digestion suggests the pig growth performance differences in practice may be explained by the nutrient content among different fractions. This indicates that the grinding strategies should also be considered when designing the feeding formula / manufacturing the feed.