Impact of DDGS particle size on nutrient digestibility, DE and ME content, and flowability in diets for growing pigs

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A study was conducted to evaluate the effects of particle size of corn distillers grains with solubles (DDGS) on DE and ME content, and DM, GE, N, and P digestibility and flowability of diets for growing pigs. One DDGS source with mean particle size of 818 μm (CDG) was further processed in separate batches to achieve a mean particle size of 595 μm (MDG) and 308 μm (FDG). The control diet consisted of corn (96.8%) with supplemental minerals and vitamins, and 3 diets containing 30% CDG, MDG, or FDG as a replacement for corn were evaluated. Thirty six growing pigs were assigned to 1 of 4 treatments in a RCB design based on their initial BW (40 ± 1.13 kg), and fed a daily amount of their respective diets equivalent to 3% BW for a 9 d adaptation period followed by a 4 d total collection of feces and urine Feed, feces, and urine samples were analyzed for DM, GE, N, and P, to calculate diet nutrient digestibility, and DE and ME content of corn and CDG, MDG, and FDG. Diet drained and poured angles of repose were measured using a modified Hele-Shaw cell to evaluate flowability. Dry matter digestibility was higher ($P < 0.01$) in corn than DDGS, and was improved for FDG compared to CDG ($P < 0.05$). The DE and ME content of FDG (3,709 and 3,577 kcal/kg, respectively) was higher ($P < 0.05$) than CDG (3,487 and 3,345 kcal/kg, respectively), with MDG being intermediate (3,681 and 3,507 kcal/kg, respectively). No differences were observed for N and P digestibility among 3 DDGS particle size diets. No differences were observed for percentage of N retained between the corn and DDGS diets but feeding the DDGS diets resulted in higher daily P retention ($P < 0.0002$) than the corn diet. Adding FDG to the diet reduced ($P < 0.05$) diet flowability, as a result of a higher drained angle of repose, compared with MDG and CDG. These results suggested that for each 25 micron decrease in DDGS particle size from 818 μm to 308μm, ME contribution from DDGS to the diet is 13.6 kcal/kg DM, but diet flowability will be reduced.

Keywords: DDGS, particle size, energy, flowability