Title: Effects of reducing the particle size of corn on the concentration of digestible and metabolizable energy and on the digestibility of energy, phosphorus, and amino acids by growing pigs
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The objective of this research was to measure the effects of different particle sizes of corn on energy and nutrient digestibility and to test the hypothesis that diets containing corn with reduced particle size can be formulated with less fat than diets containing corn ground to a greater particle size. Two digestibility experiments were conducted to determine effects of corn particle size on digestibility of energy, amino acids, and phosphorus in corn. Results of these experiments indicated that whereas the digestibility of amino acids and phosphorus is not influenced by the particle size of corn, the digestibility of energy is linearly increased if the particle size of corn is reduced from 865 to 339 microns. As a consequence of the greater digestibility of energy in corn ground to the smaller particle size, the concentration of metabolizable energy in corn ground to 339 microns is approximately 3.6% greater than if corn is ground to 865 microns (3,964 vs. 3,868 kcal ME per kg DM). Because of this increase in ME, it is possible to reduce the amount of added fat in diets containing corn ground to a smaller particle size compared with diets containing corn ground to a greater particle size without changing the ME of the diet. Therefore, in the third experiment, diets that contained corn ground to 865, 677, 485, or 339 microns were formulated and fed to pigs from approximately 32 to 130 kg in a 3-phase feeding strategy. Within each phase, all diets were formulated to contain equal quantities of ME per kg, but diets formulated with the corn ground to 865 microns contained 1.60, 1.74, and 1.87% more soybean oil than diets containing corn ground to 339 microns for phase 1, phase 2, and phase 3, respectively. Results of this experiment indicated that final body weight, ADG, ADFI, G:F ratio, hot carcass weight, and dressing percentage were not different among pigs fed experimental diets. This observation confirms that the ME of corn ground to smaller particle size is indeed greater than if corn is ground to a greater particle size. The practical consequence of this is that less fat is needed in diets containing corn ground to a smaller particle size compared with diets containing corn ground to a greater particle size. Diets containing corn ground to the smaller particle size are, therefore, less expensive to produce than diets containing corn ground to a greater particle size, and the savings in feed cost will not have any impacts on pig growth performance or carcass composition. The net result, therefore, will be an increase in profits from pigs fed diets containing corn ground to a smaller particle size. Pork producers can take advantage of the results from this research by grinding corn to a reduced particle size.

Key Findings:

- Grinding corn to a smaller particle size increases the ME content of corn
- Feed with a reduced particle size requires inclusion of less fat to achieve the same ME content as more coarsely ground corn.
- Pigs fed corn ground to a smaller particle size performed similarly compared to pigs fed diets ground to a larger particle size but with added fat.