RESEARCHABSTRACT

ANIMAL SCIENCE — Nutritional Efficiency Consortium

Title: In vitro estimation and in vivo determination of metabolizable energy in corn co-products - **NPB - #08-107**

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Scientific Abstract: Twenty co-products from various ethanol plants were fed to finishing pigs to determine ME and to generate an equation to predict ME based upon each ingredient's chemical analysis. Additionally, a 3-step enzymatic assay was used to determine if in vitro OM digestibility would predict in vivo ME or improve the prediction estimate of ME for corn co-products. Co-products included: DDGS (7), HP-DDG (3), bran (2), germ (2), gluten meal and feed, dehulled degermed corn, dried solubles, starch, and corn oil. The in vitro OM digestibility for each co-product was determined in triplicate using procedures as described by Boisen and Fernandez (1997). For the in vivo study, the control diet was based on corn (97.1%), limestone, salt, vitamins, and trace minerals. All but two test diets were formulated by mixing the control diet with 30% of a co-product. Dried solubles and oil were included at 20% and 10%, respectively. Eight groups of 24 gilts (n=192, 112.7 final BW ± 7.9 kg) were randomly assigned to a test diet and each diet was fed to a total of 8 pigs. Gilts were placed in metabolism crates and fed an amount equivalent to 3% BW daily for 9 d followed by collecting feces and urine separately for 4 d. Ingredients were analyzed for GE, CP, moisture, crude fat, crude fiber, ash, total dietary fiber (TDF), NDF, and ADF. Gross energy was determined on the feed, feces, and urine to calculate ME for each ingredient. The in vitro OM digestibility ranged from 33.3 to 93.5% for corn bran and dried solubles, while ME ranged from 2,334 to 8,755 kcal/kg for corn gluten feed and corn oil, respectively. Although in vitro OM digestibility was correlated to in vivo ME ($r = 0.62$, $P < 0.01$), it did not improve the prediction of ME from ingredient analysis. Stepwise regression resulted in the equation: ME, kcal/kg = (0.949 × GE) – (32.238 × TDF) – (40.175 × ash) ($r^2 = 0.95$, SE = 306, $P < 0.01$). These results indicate that OM digestibility and ME vary substantially between corn co-products and the best predictors of ME are GE, TDF, and ash.

These research results were submitted in fulfillment of the Nutritional Efficiency Consortium research projects. Contributing organizations for 2008 include: Arizona Pork Council, DPI Global, Eli Lilly/Elanco, Iowa Corn Growers Association, Iowa Pork Producers Association, Illinois Corn Marketing Board, Illinois Pork Producers Association, Kansas Corn Commission, Kansas Pork Association, Lucta USA, Minnesota Pork Board, Missouri Pork Producers Association, Monsanto, Mississippi Pork Producers Association, Montana Pork Producers Council, National Corn Growers Association, North Carolina Pork Council, Inc., National Pork Board, Nebraska Corn Board, Nebraska Pork Producers Association, Inc., Ohio Pork Producers Council, Pioneer Hi-Bred International, Inc., Utah Pork Producers Association and the Wisconsin Pork Association.

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