RESEARCH ABSTRACT
ANIMAL SCIENCE

Title: Validation of Digestible and Metabolizable Energy Prediction Equations, and Determination of Net Energy of Corn DDGS Sources Varying in Fat and Fiber Content in Growing Pigs**,**
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Investigator: Brian J. Kerr, Ph.D

Institution: USDA-ARS-National Laboratory for Agricultural and the Environment, Ames, IA

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Scientific Abstract

Initially, 2 experiments were conducted with growing-finishing pigs to determine DE and ME (Exp. 1, 96.3 kg BW) and NE (Exp. 2, 45.4 kg BW) content of corn-distillers dried grains with solubles (C-DDGS) in an effort to develop or refine DE, ME, and NE prediction equations based on chemical composition. Composition of the 6 C-DDGS sources varied (ash, 4.71 to 5.63%; CP, 29.65 to 32.21%; ether extract, 6.99 to 13.34%; NDF, 38.27 to 39.58%; total dietary fiber, 31.12 to 32.81%; DM basis), with animal studies resulting in a DE range from 3,836 to 4,038 kcal/kg DM, ME from 3,716 to 3,893 kcal/kg DM, and NE from 2,012 to 2,243 kcal/kg DM. Regardless of the range in C-DDGS composition and the resultant DE, ME, or NE values, there was no C-DDGS chemical parameter measured (GE, CP, starch, total dietary fiber, NDF, ADF, hemicellulose, EE, or ash) that was significant at $P \leq 0.15$ to predict DE, ME, or NE content in the C-DDGS sources evaluated. Apparent total tract digestibilities of several nutritional components were also measured for comparative purposes, but were not included in the prediction model. On average, the C-DDGS utilized in these studies contained 3,931, 3,793, and 2,133 kcal of DE, ME, and NE/kg DM, respectively. The results from these first 2 experiments suggest that although C-DDGS composition can vary and subsequent DE, ME, and NE also vary, a wider range in ingredient composition and DE, ME, and NE values are necessary to generate prediction equations.

A field-scale study (Exp. 3) was conducted to determine if formulating diets containing corn, soybean meal, soybean oil, and C-DDGS on an equal NE basis would impact pig performance. Lastly, 2 additional studies were conducted to determine the DE and ME content of these same diets (Exp. 4) and the same C-DDGS sample (Exp. 5) to generate data to support results obtained from the field trial. In Exp. 3, 3 barns, each containing 48 pens and 20 pigs per pen (n = 2,880 pigs) were utilized. Diets were formulated to contain 0, 10, 20, and 30% C-DDGS, with dietary NE and standardized ileal digestible Lys being equal across all C-DDGS levels. The NE values (kcal/kg as-is) utilized in feed formulation were: corn, 2,557; soybean meal, 1,960; soybean oil, 7,544, and C-DDGS, 2,284; respectively. Diets were additionally formulated to meet or exceed the AA and mineral needs according to the NRC (1998) recommendations. There were no differences ($P \geq 0.10$) noted for pig ADG, ADFI, or G:F among pigs fed the different C-DDGS levels when evaluated on d-28 (36 replications per treatment) or on d-39 (24 replications per treatment due to scale calibration error). In addition, there was no effect of dietary treatment on dressing percent ($P \geq 0.10$) noted, suggesting that the estimates of NE, AA, and minerals utilized for feed formulation were relatively accurate. When the complete diets were fed to pigs in metabolism crates (Exp. 4), ATTD of DM, ether extract, NDF, and phosphorus, and dietary DE and

ME, increased with increasing C-DDGS levels ($P \leq 0.05$). In Exp. 5, the ME in the C-DDGS utilized in Exp. 3 and 4 was determined to be 3,682 kcal/kg DM, which was similar to the formulated value of 3,702 kcal ME/kg DM. Overall, the performance and dressing percent data suggest that the NE levels, as well as AA and mineral levels, utilized for corn, soybean meal, soybean oil, and C-DDGS were relatively accurate given that pig performance and dressing percent was unaffected by C-DDGS inclusion level. Differences in ATTD of dietary DM, ether extract, NDF, and phosphorus could be directly related to digestibility differences in these nutrients in C-DDGS compared to corn, soybean meal, and soybean oil. The data presented herein support the use of formulating diets on a NE basis, which is especially important in utilizing alternative feedstuffs in swine feed formulation.