RESEARCH ABSTRACT
ANIMAL SCIENCE

Title: Development of "Nutritional Tools" to Estimate ME Content in Rendered Animal Protein By-products for Swine - Revised with Expanded Objectives, **NPB #12-132 and #14-245**

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Industry Summary:
An industry survey and an animal experiment were conducted to evaluate compositional variability and DE and ME in animal protein by-products, and to generate equations predicting DE and ME based on chemical analysis. Of the 220 samples received, the greatest concentration of CP was observed in blood meal (BM) and least in meat and bone meal (MBM), while the greatest concentration of ether extract (EE) was in meat meal and least in BM, and ash was greatest in MBM and least in BM. Calcium and P levels represented 36.1 and 16.3% of the ash content, respectively. For the balance experiment, a corn-soybean meal basal diet was used, with test diets formulated by mixing the basal diet with 20% of the animal protein by-product, except for BM which was tested at 10 and 20%. There were there were 10 groups of 24 gilts (final BW = 92.5 ± 7.4 kg. Within each group, gilts were randomly assigned to the test or the basal diet for a total of 16 replications per animal protein by-product or basal diet, except for DM which had 20 replications at each test level. The experiment was conducted as a completely randomized design. Gilts were placed in metabolism crates and offered 2.4 kg daily of their assigned diet for 13 d, with total collection of feces and urine during the last 4 d. The GE was determined in the diets, feces, and urine to calculate DE and ME for each ingredient by the difference procedure with the DE and ME of the basal diet ere used as covariates among groups of pigs. The DE of the animal protein by-products ranged from 5,367 to 2,567 kcal DE/kg of DM, and ME ranged from 4,783 to 2,340 kcal ME/kg DM. Using all the animal protein by-products, the best fit equations were as follows: DE, kcal/kg DM = -2,468 + (1.26 × GE, kcal/kg DM), with R^2 of 0.84, SE = 390, and $P < 0.01$; ME, kcal/kg DM = -2,331 + (1.15 × GE, kcal/kg DM), with R^2 of 0.86, SE = 327, and $P < 0.01$). The ATTD of Ca and P were also determined using the difference procedure, with the average ATTD of Ca and P for the animal protein by-products, excluding BM and FM, was 27.1 and 39.1%, respectively. These data indicate that DE and ME varied substantially among the animal protein by-products, and that various nutritional components can be used to accurately predict DE and ME for growing pigs. In addition, it appears that testing high levels of animal protein by-products may give low ATTD values of Ca and P, likely due to high levels of total Ca and P affecting digestibility.