RESEARCH ABSTRACT

ANIMAL SCIENCE

Title: Improving energy utilization in high by-product diets with copper – **NPB #14-070**

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Scientific Abstract:

A total of 757 pigs (PIC 337 × 1050; initially 60.8 lb BW) were used in a 117-d experiment to determine the effects of added Cu (TBCC; tribasic copper chloride, IntelliBond C; Micronutrients, Inc., Indianapolis, IN) and diet type on growth performance, carcass characteristics, energy digestibility, gut morphology, and mucosal mRNA expression of finishing pigs. Pens of pigs were allotted to 1 of 4 dietary treatments, balanced on average pen weight in a randomized-complete block design with 26 to 28 pigs per pen and 7 replications per treatment. Treatments were arranged as a 2 × 2 factorial with main effects of diet type, a corn-soybean meal-based diet (corn-soybean meal-based) or a high byproduct diet (byproduct) with 30% distillers dried grains with solubles (DDGS) and 15% bakery meal, and with or without added Cu (0 or 150 ppm added Cu).

There were no Cu × diet type interactions for growth performance. Overall, neither added Cu nor diet type influenced growth performance. However, caloric efficiency was improved (P = 0.001) for pigs fed the byproduct diet compared to the corn-soybean meal-based diet. Pigs fed the byproduct diet had decreased carcass yield (P = 0.007) and HCW F/G (P = 0.013), and tended to have decreased HCW (P = 0.067) and HCW ADG (P = 0.056) compared to pigs fed the corn-soybean meal-based diet.

A Cu × diet type interaction (P < 0.05) existed for DM and GE digestibility during the early finishing period as added Cu improved digestibility of DM and GE in the corn-soybean meal-based diet, but not in the byproduct diet. During the late finishing period, added Cu increased DM and GE digestibility (P = 0.060) while pigs fed the byproduct diet had decreased DM and GE digestibility (P = 0.001) compared to those fed the corn-soybean meal-based diet. For gut morphology, pigs fed added Cu had decreased crypt depth (P = 0.017) in the distal small intestine compared to those fed no added Cu. Furthermore, relative mRNA expression of intestinal fatty acid binding protein (iFABP) was decreased (P = 0.032) in pigs fed added Cu compared to those fed no added Cu.

In summary, adding 150 ppm added Cu or including 30% DDGS and 15% bakery meal into a corn-soybean meal-based diet did not influence growth performance. However, HCW ADG and HCW G/F was reduced in pigs fed the byproduct diet compared to those fed the corn-soybean meal-based diet. Only minor differences in gut morphology or mRNA expression were observed from pigs fed diets with high levels of Cu or byproducts compared to those fed a corn-soybean meal-based diet.