

## ANIMAL SCIENCE

**Title:** Applying Enzyme Technology to Optimize the Utilization of Fibrous Feed Ingredients in Swine Diets – Applied Feeding Studies – **NPB #14-001**

**Investigator:** Eric van Heugten

**Institution:** North Carolina State University

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### Scientific Abstract:

Fiber degradation may be maximized by the combined usage of enzymes and microbial inoculants. In the first study, the effects of a combination of a protease with a direct fed microbial on pig performance, gastro-intestinal tract weights, and ileal and cecal pH was determined. A total of 72 pigs (initial BW of 25 kg) were blocked by initial weight and randomly assigned within blocks to 18 pens (6 pens per treatment; 2 barrows and 2 gilts per pen). Diets (dry, corn-soybean meal-DDGS based) were fed in a 2-phase feeding program with 2 weeks for each phase. Treatments consisted of a control (not supplemented), a diet supplemented with xylanase and  $\beta$ -glucanase, or a combination of protease and a direct fed microbial. There were no statistical differences for body weight gain, feed intake, feed efficiency, empty gastro-intestinal weights, or cecal and ileal digesta pH, although pigs fed the protease with direct-fed microbial had a numerical improvement of 6.5% in feed efficiency compared to control-fed pigs. In the second experiment, we hypothesized that steeping high fiber ingredients like DDGS with carbohydrases may improve their feeding value. We investigated growth performance of growing pigs fed diets containing DDGS treated with a blend of  $\beta$ -glucanase and xylanase (XB) with or without extended steeping. Treatments were: 1) corn - soybean meal based diet with 30% DDGS fed in dry form (C), 2) C + XB without steeping, fed in liquid form (XBNS), and 3) C + XB with the DDGS steeped with XB (16% DM) for 3 to 10 d at 40°C (XBS). The target activities for XB were 1,050 and 5,500 U/g of DDGS for  $\beta$ -glucanase and xylanase, respectively. A total of 144 pigs (25 kg BW) were assigned to pens (3 barrows and 3 gilts) based on initial weight and allocated to the three treatments in a 2-phase feeding program (3-wk/phase). Diets were delivered by computer controlled liquid feeding system at a feed to water ratio of 1:4, four times per day. Pigs had free access to water. The average pH of steeped DDGS on d 0, 3, 6, 7, and 10 was 4.42, 3.65, 3.86, 3.89 and 3.92, respectively. The pH of diets at feeding time was lower ( $P < 0.01$ ) for XBS (4.7) compared to C and XBNS (5.5). Lactic acid concentrations of the fermented liquid diet increased and then decreased, whereas acetic acid concentrations increased as fermentation progressed. Pigs fed XBNS had higher ( $P = 0.02$ ) ADG than C in phase 1 and in phase 2. Overall ADG was higher ( $P < 0.05$ ) for XBNS than XBS, whilst pigs receiving C were similar to XBS pigs. There were no effects ( $P > 0.05$ ) on ADFI throughout the experiment. However, pigs fed XBS had numerically lower ADFI in phase 1 (-4.0%) and phase 2 (-5.2%) relative to XBNS pigs. Pigs receiving XBNS (1.68) and XBS (1.69) had better feed:gain ( $P = 0.001$ ) than C (1.78) during phase 1. Treatments did not influence ( $P > 0.05$ ) empty gastrointestinal weight. In conclusion, treating DDGS with XB with or without steeping resulted in improved feed efficiency for the first three weeks suggesting degradation by XB of dietary fibrous components that may limit nutrients utilization in younger pigs. Supplementation with XB improved ADG when DDGS were not steeped, however, steeping appeared to reduce feed intake, resulting in poorer ADG, which may have been related to sub-optimal fermentation of the steeped DDGS.

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For more information contact:

National Pork Board • PO Box 9114 • Des Moines, IA 50306 USA • 800-456-7675 • Fax: 515-223-2646 • [pork.org](http://pork.org)

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