Xylanase Effects on Apparent Total Tract Digestibility of Energy and Dry Matter with or without DDGS at Three Time Points Over Six Weeks in Growing Pigs

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Summary and Implications

The objective of this study was to evaluate the impact of xylanase supplementation on the digestibility of dietary energy (DE) with or without DDGS over three time points in growing pigs. The results showed xylanase supplementation had no effect on dry matter (DM) digestibility or DE after 8 days, had mixed effects on DM digestibility and DE depending on diet composition after 18 days, and improved DM digestibility and DE after 38 days. These results indicate that there may be an adaptation period necessary for a response to xylanase. Further laboratory analysis will provide insight into the mode of action of xylanase.

Introduction

The pork industry is currently presented with the challenge of maintaining pig performance while using corn byproducts, which are generally lower in energy and higher in fiber. Xylanase breaks down arabinoxylans, a component of plant fiber, into arabinose and xylose. It is assumed that the breakdown of this fiber improves dietary energy values. However, previous trials using xylanase from the nursery through the growing phase have produced inconsistent results. This experiment was developed to improve understanding of the mode of action of xylanase when used in diets based on corn fiber.

Materials and Methods

Two groups of sixteen individually housed gilts (37.3 ± 0.33 kg) were randomly allotted to one of four dietary treatments (n=8) arranged as a 2 x 2 factorial with xylanase added at 0% vs 0.4% and reduced oil DDGS included at 0% vs 30% of the diet. Pigs remained on the same treatment throughout the 42-day trial. Pigs were fed 90% of estimated ad libitum intake, re-calculated after each collection (d12 and d22). All animals had ad libitum access to water. Chromic oxide was added to the diets (0.4%) as an indigestible marker. Dietary treatments started on d0 and fecal samples were collected via grab sampling at three different time points: d8 – 9 (T1), d18 – 19 (T2), and d38 – 39 (T3), corresponding to body weights of 46.0 ± 0.4, 54.1 ± 0.4, and 70.3 ± 0.5 kg, respectively. Data were analyzed using the PROC MIXED procedure of SAS with the pig as the experimental unit, inclusion of xylanase and DDGS as fixed effects, and group as a random effect.

Results and Discussion

At all three time points, DDGS decreased DM digestibility from 79.9 to 75.0%, 83.5 to 74.0%, and 84.9 to 78.5% for T1, T2, and T3 respectively ($P \leq 0.049$). Xylanase inclusion did not significantly impact DM digestibility (77.4%) or digestible energy (DE) value (3.28 Mcal/kg) of the diet at the first time point ($P = 0.9047$). There was an interaction between enzyme inclusion and DDGS inclusion at the second time point, with xylanase inclusion decreasing DM digestibility from 76.9 to 71.0% and DE values from 3.37 to 3.09 mcal/kg in 30% DDGS diets, and increasing DM digestibility from 81.7 to 85.2% and DE values from 3.38 to 3.54 mcal/kg in diets with no DDGS (DM: $P = 0.047$) (DE: $P = 0.044$).

At the third time point, xylanase inclusion increased DM digestibility from 80.0% to 83.4% ($P = 0.017$) and increased dietary DE from 3.42 mcal/kg to 3.57 mcal/kg ($P = 0.013$). In conclusion, xylanase did not affect dry matter or energy digestibility in the first time period, had mixed effects on DM digestibility and DE depending on the inclusion of DDGS in the second time period, and improved DM digestibility and DE in the third time period. The improvement in period 3 was equal to 4.25%. The time by body-weight and diet effects provide further understanding of the mode of action of xylanase.

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