RESEARCH ABSTRACT
ANIMAL SCIENCE

**Title:** An Integrated Evaluation of the Nutrient Uplift Provided by Xylanase in Finishing Diets – **NPB #13-158**

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**Scientific Abstract:**

Dietary xylanase supplementation can improve energy digestibility of pigs; however, the effect of xylanase supplementation to a diet already containing phytase has not been clearly delineated. Two experiments were conducted to evaluate the effect of xylanase supplementation in grow-finish diets with or without phytase supplementation on growth performance, apparent total tract digestibility (**ATTD**), and carcass characteristics in growing-finishing pigs.

In Exp.1, a total of 25 barrows (mean initial weight: 76.5 kg) were allotted to 5 treatments to evaluate the effect of xylanase supplementation in a balance trial as follows: **1**) positive control [**PC**]: a corn-SBM based diet with 15% each of corn germ meal, corn DDGS, and wheat middlings, **2**) negative control [**NC**]: metabolizable energy (**ME**) was reduced by 103 kcal/kg from the PC diet by replacement of fat with corn starch, **3**) NX1: NC + xylanase (8,000 BXU/kg diet), **4**) NX2: NC + xylanase (16,000 BXU/kg diet), and **5**) NX3: NC + xylanase (24,000 BXU/kg diet). All diets contained 250 FTU of phytase/kg diet. Pigs were adapted to diets for a minimum of 10 days followed by a 7-d adaptation period to the metabolism crates, and then a 5-d fecal and urine collection was performed for determining ATTD. There were no differences in ATTD of dry matter (**DM**), energy, protein, acid detergent fiber, and P. Energy retention in the PC treatment tended to be greater than NC and NX1 and NX2 treatments but similar with the NX3 treatment ($P = 0.09$). In the comparison of xylanase effects, the ATTD of hemicellulose increased linearly with increasing xylanase levels ($P < 0.05$); there were also numerical improvements in ATTD of neutral detergent fiber (**NDF**) at the 24,000 BXU/kg level. The uplift of energy release was 34.2 and 31.0 kcal/kg on a DE and ME basis, respectively.

In Exp. 2, a total of 45 crossbred pigs (mean initial weight: 26.4 kg) were allotted to 9 treatments (a 1 + 2 × 4 factorial arrangement) to evaluate the effect of both xylanase and phytase supplementation in diets for growing-finishing pigs as follows: **1**) PC: a corn-SBM based diet with 15% each of corn DDGS, and wheat

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middlings and 13% of corn germ meal, **2**) NC: ME was reduced by 103 kcal/kg from the PC diet by replacement of fat with corn starch in each phase, **3**) NC + phytase (500 FTU/kg diet), **4**) NC + phytase (1,000 FTU/kg diet), **5**) NC + phytase (2,000 FTU/kg diet), **6**) NC + xylanase (16,000 BXU/kg diet), **7**) NC + phytase (500 FTU/kg diet) + xylanase (24,000 BXU/kg diet), **8**) NC + phytase (1,000 FTU/kg diet) + xylanase (24,000 BXU/kg diet), **9**) NC + phytase (2,000 FTU/kg diet) + xylanase (24,000 BXU/kg diet). Body weight and feed consumption were recorded to calculate growth performance, and pigs were ultrasonically scanned at the end of the experimental period to measure carcass characteristics. Fecal collection was performed in the late-finishing period for 3 consecutive days to estimate ATTD. There were no differences with xylanase supplementation and no interactions between xylanase and phytase supplementation on growth performance, carcass characteristics and ATTD of energy or nutrients. However, ADG ($P < 0.01$, quadratic) and G:F ratio ($P < 0.05$, linear) for the total experimental period increased as phytase supplementation levels increased. Carcass characteristics, carcass lean percentage and lean gain increased ($P < 0.05$; linear) as phytase supplementation levels increased. The ATTD of DM, NDF, EE ($P < 0.05$), and hemicellulose increased ($P = 0.05$; quadratic) as phytase supplementation level increased resulting in the uplift of energy release of 44.1 kcal/kg. The ATTD of P increased as phytase supplementation levels increased ($P < 0.05$, linear and quadratic).

These results indicate that xylanase supplementation to the high fiber, corn-based diet improves some aspects of fiber digestibility and phytase supplementation improves growth performance, carcass leanness, and digestibility of fibrous components and P. Furthermore, the efficacy of xylanase supplementation may depend on dose, substrates, and feeding duration.

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