

**Title:** Improving nutrient utilization and biological and financial performance through the use of super-dosing of phytase in grow-finish diets – NPB #13-167 revised

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### Scientific Abstract:

Two experiments were conducted to determine the effect of super-dosing phytase in pig diets on the digestibility of nutrients and growth performance of grow-finish pigs. In the first experiment, 32 growing gilts were fitted with a T-cannula at the distal ileum and randomly allotted to one of 4 dietary treatments at an average initial body weight of  $39.7 \pm 0.7$  kg. In the second experiment (exp. 2), 2200 pigs with an average initial body weight of  $36.6 \pm 1.04$  kg, were split by sex and randomly allotted to 5 dietary treatments. Diets in exp. 1 consisted of a basal diet containing 250 FTU/kg of Quantum Blue 5000G phytase (QB5G) for a release of 0.08% STTD P, and 3 additional levels of phytase: 1000, 1750, 2500 FTU/kg. In exp. 2 there were 5 dietary treatments: a positive control (PC) with added 1.12% SID lysine, 3% added fat, and 250 FTU/kg QB5G; a negative control (NC) with added 1.00% SID lysine, 2.25% added fat, and 250 FTU/kg QB5G phytase. The remaining 3 diets were the NC with a total of 1000, 1750, and 2500 FTU/kg of QB5G phytase for treatments 3, 4, and 5, respectively. In exp. 1, pigs were fed at 3.2 times maintenance and water was provided *ad libitum*. Feces, urine, and ileal digesta were collected at 40, 60 and 80 kg, respectively. In exp. 2 pigs were weighed and feed weigh backs were determined at day 0, day 14, then every 21 days until market. Feed and water were provided *ad libitum*, and carcass data and pig value was recorded at the finish of the trail. Data were analyzed using the PROC MIXED procedure of SAS (9.4) with treatment and collection weight in exp. 1, and treatment and phase in exp. 2 being fixed effects, and weight block as a random effect in both. In exp. 1 there was a statistically significant effect of the interaction between treatment and weight on the AID of DM and GE. For the AID of DM, pigs on the treatment containing 1000 FTU/kg of phytase at 40 kg had lower AID of DM than pigs on the control diet, and the treatments 1750 and 2500 FTU/kg of phytase at 60 kg, and the control diet and treatments containing 1000 FTU/kg and 1750 FTU/kg of phytase in pigs at 80 kg. For the AID of GE, 40 kg pigs on the 1000 FTU/kg treatment had lower AID of GE than pigs on the control diet at 60 kg, and pigs on the control diet and treatments containing 1000 FTU/kg and 1750 FTU/kg at 80 kg. Phytase level did have an impact on total nitrogen retention, with the treatment containing 1000 FTU/kg retaining greater nitrogen than the treatment containing 1750 FTU/kg of phytase. In exp. 2, there were no differences among different super-dosing phytase levels for any growth performance or carcass parameters; however there was a statistically significant difference between the PC and the NC treatments with pigs on the PC treatment performing better than those on the NC treatment. This is in addition to differences seen between the sexes, with barrows having a higher ADFI and ADG and a lower GF. In conclusion, under the conditions of this study, there may be a differing response to super-dosing phytase on the AID of nutrients, but it is dependent on body weight, and there is no growth performance benefit in a commercial setting.

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