

The effect of phytase and dietary Ca:P ratio on the excretion of total and soluble phosphorus by weanling pigs

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Phytase enzyme increases the bioavailability of phytate phosphorus, allowing swine diets to be formulated with less total phosphorus (tP), potentially reducing both diet cost and P excretion. Phytase efficacy may be decreased at wide dietary Ca:tP ratios. Additionally, concern has been expressed that the addition of phytase to the diet might actually increase the output of soluble P in the manure. Theoretically, at least, soluble P would have a greater negative effect on the environment because it is more easily leached from the soil.

Two studies were conducted to examine the effect of the Ca:tP ratio on phytase efficacy and the effect of phytase on the amount and form of P excreted. In Exp. 1, pigs (n=144; 6.52 ± 0.75 kg; 19.6 ± 2.7 d; mean ± sd) were housed in pens of 3 and fed corn-soybean meal diets (0.5% tP) supplemented with either 0, 250, 500, 1000 or 2000 FTU/kg phytase or dicalcium phosphate (positive control; 0.7% tP). In Exp. 2, pigs (n=36; 7.62 ± 0.81 kg; 28.6 ± 1.21 d) were assigned to one of 6 dietary treatments (0 or 500 FTU phytase/kg; Ca:tP ratio, 1.1, 1.7, 2.3) for a 14-d metabolism trial. In Exp 1, phytase supplementation improved ADG and feed efficiency during d0-21. The output of soluble inorganic P was 2.98 and 1.60 g/d on the positive control or the 1000 FTU phytase/kg diet, respectively. In Exp. 2, phytase decreased total and soluble inorganic P output (tP, 1.43, 1.23 mg/d; soluble P, 1.05, 0.89 mg/d; 0 or 500 FTU/kg respectively). The decreased output of total and soluble P with phytase supplementation averaged 23% and 6.3% when Ca:tP ratios were 1.1 or 2.3 respectively.

Implications:

Phytase decreases the excretion of total and soluble inorganic P when used in corn-soybean starter diets fed to weanling pigs. This effect, however, is mitigated at Ca:tP ratios above 1.7.