

Effect of dietary Ca content and microbial phytase inclusion on Ca and P excretion and growth performance in growing pigs

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Sixty growing pigs (Hypor Libra*Maxter, body weight 30.4±1.3 kg) were used to test the hypothesis that the negative effect of dietary high Ca content on P absorption was greater in microbial phytase supplemented diets than in phytase-free diets. Pigs were arranged in a 2×3 factorial block design including 2 levels of phytase (0 vs 500 FTU/kg microbial phytase) and 3 levels of dietary Ca content (1.8, 5.3 and 8.8 g/kg). The total P content was fixed at 4.7 g/kg for all diets. Treatments were applied to pigs for 21 days including a 4-d balance trial period (d 14-17) to quantitatively collect the feces and urine. Results indicated that the incremental dietary Ca content enhanced while phytase inclusion reduced fecal Ca and P excretion ($P < 0.001$). Compared to the low Ca content, high Ca content increased fecal P excretion by 0.3 g/kg in phytase-free diets and by 0.7 g/kg in microbial phytase-supplemented diets ($P_{\text{interaction}} < 0.001$). The negative effect of the high dietary Ca content on P absorption in microbial phytase supplemented diets, therefore, was about 2-2.5 times as great as in phytase-free diets. Phytase enhanced the P absorption by 1.5, 1.2 and 1.1 g/kg in the low, medium and high Ca diets, respectively. Hence the phytase efficacy to improve P absorption was about 50% greater in the low Ca diet compared to the high Ca diets. As for growth performance in the entire experimental period (d0-20), the incremental Ca level impaired ($P = 0.016$) while phytase improved ($P = 0.025$) the average daily gain. Microbial phytase inclusion also reduced the feed:gain ratio at high Ca diets (2.01 vs 1.80) but not at low Ca diets (1.77 vs 1.74, $P_{\text{interaction}} = 0.067$). In conclusion, the negative effect of the dietary high Ca content on total tract P absorption was greater in microbial phytase-supplemented diets than in phytase-free diets; phytase efficacy to improve P absorption was greater in low Ca diets than in high Ca diets.