Investigating the efficacy of a new *Buttiauxella* sp. phytase on P digestibility in weaned piglets

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Two trials were conducted to determine the efficacy of a *Buttiauxella* sp. phytase (6-phytase, expressed in *Trichoderma Reesei*) on P digestibility in piglets. In both trials, two barley/maize/SBM based basal diets were prepared: (1) positive control (PC), formulated to meet the nutrient requirements of piglet with 0.75% Ca and 0.36% digestible P; (2) negative control (NC) with same nutrient composition as PC but deficient in Ca (0.60%) and digestible P (0.20%). The phytase was added on-top to the NC diet at 0, 250, 500, 750 (1st trial only), and 1000 FTU/kg, resulting in a total of 6 (5 for the 2nd trial) treatments, with 10 and 8 replicates per treatment in trial 1 and 2, respectively. In trial 1, piglets were fed testing diets from 12 to 24 d post-weaning. Feed was increased from 0.4× maintenance on d 12 to 3.5× maintenance on d 19 based on expected growth. Feed amount was fixed after d 19. In trial 2, test diets were provided at 3.2× maintenance from 8 to 22 d post-weaning. Faeces were collected from d 19 to 24 (trial 1) or d 18 to 22 (trial 2), pooled by animal and analyzed for digestibility. Digestibility data from the two trials were pooled to determine the efficacy of phytase. Across the two trials, in the absence of phytase, P digestibility in piglets fed NC diet (37.1%) was reduced by 17.5 percentage points as compared to those fed PC diet (54.6%, P<0.05). P digestibility was significantly improved by adding phytase to the NC diet. With only 250 FTU phytase/kg inclusion, P digestibility (58.1%) was increased by 21 percentage points vs NC (P<0.05) and was similar to those fed PC diet (54.6%; P>0.05). Feeding piglets with increased phytase from 250 to 1000 FTU/kg resulted in linear improvement in P digestibility (P<0.05), which was 58.1, 61.2, 64.4 and 67.1%, respectively, for those fed diets containing 250, 500, 750 and 1000 FTU/kg phytase. Calculated dig P release for *Buttiauxella* sp. phytase expressed as net digestible P improvement vs NC were 1.06, 1.22, 1.31 and 1.46 g/kg for 250, 500, 750 and 1000 FTU/kg. In conclusion, *Buttiauxella* sp. phytase effectively improved the P utilization in piglets fed P deficient diet.

Effects of physicochemical characteristics on *in vitro* and *in vivo* nutrient digestibility in pigs

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Two experiments determined correlations between physicochemical characteristics, concentration of DE and ME, and *in vitro* apparent total tract digestibility (IVATTD) and *in vivo* apparent total tract digestibility (ATTD) of DM and nutrients in corn, wheat, soybean meal, canola meal, corn distillers dried grains with solubles, corn germ meal, copra expellers, sugar beet pulp, cellulose, and pectin. In Exp. 1, IVATTD of DM was determined. Results indicated that bulk density was negatively correlated with NDF and ADF (P<0.05; *r*=-0.78 and -0.69). Soluble dietary fiber was positively correlated with viscosity and swelling (P<0.05; *r*=1.00 and 0.64). Swelling was also positively correlated with water binding capacity (P<0.01; *r*=0.89). The IVATTD of DM was negatively correlated (P<0.05) with concentrations of total dietary fiber (TDF; *r*=-0.76) and insoluble dietary fiber (*r*=-0.92). In Exp. 2, 80 pigs (initial BW: 48.41±1.50 kg) were allotted to a randomized complete block design with 10 diets and 8 replicate pigs per diet. Diets included a corn-based diet, a wheat-based diet, a corn-SBM basal diet, and 7 diets based on a mixture of the corn-SBM basal diet and each of the remaining ingredients. Results indicated that swelling was positively correlated with ATTD of NDF, ADF, IDF, and TDF (P<0.05; *r*=0.75, 0.80, 0.89, and 0.84). Viscosity was positively correlated with ATTD of NDF, ADF, and IDF (P<0.01; *r*=0.92, 0.86, and 0.79). Water binding capacity was positively correlated with ATTD of IDF and TDF (P<0.05; *r*=0.67 and 0.68). Concentration of TDF, but not concentrations of ADF and NDF, was negatively correlated (P<0.01) with ATTD of GE (*r*=-0.80) and concentration of DE and ME (*r*=-0.86 and -0.85), which indicates that TDF is a better estimate of DE and ME than NDF and ADF. However, physical characteristics were not correlated with concentration of DE and ME, which indicates that these parameters may influence fiber digestibility but not digestibility of energy *in vivo*.