49 Determining the Phosphorus Release of Grainzyme Phytase in Diets for Nursery Pigs.

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Abstract: A total of 360 pigs (Line 200 × 400, DNA, Columbus, NE, initially 9.9 ± 0.19 kg) were used in a 21-d growth study to determine the available P (aP) release curve for GraINzyme phytase (Agrivida Inc., Woburn, MA). Pigs were weaned at approximately 21-d of age, randomly allotted to pens based on initial body weight (BW) and fed common starter diets. From d 18 to 21 post-weaning, all pigs were fed a diet containing 0.11% aP. On d 21 post-weaning, considered d 0 of the study, pens were blocked by BW and randomly allotted to 1 of 8 dietary treatments with 5 pigs/pen and 9 pens/treatment. Dietary treatments were formulated to include increasing aP derived from either an inorganic P source (0.11, 0.19, or 0.27% from monocalcium P) or increasing phytase (150, 250, 500, 1,000, or 1,500 FTU/kg). Diets were corn-soybean meal-based and contained 1.24% standardized ileal digestible (SID) Lys. On d 21 of the trial, 1 pig/pen (weighing closest to the mean pen BW) was euthanized and the right fibula was collected to determine bone ash using the non-defatted processing method. Overall (d 0 to 21), pigs fed increasing aP from inorganic P or phytase had increased (linear, $P < 0.002$) ADG, ADFI, and G:F (quadratic, $P < 0.05$). Bone ash weight (g) and percentage bone ash increased (linear, $P < 0.001$) with increasing inorganic P or added phytase. The release equations developed for GraINzyme for ADG, G:F, bone ash weight, and percentage bone ash are: aP = (0.255 × FTU) ÷ (1,299.969 + FTU), aP = (0.233 × FTU) ÷ (1,236.428 + FTU), aP = (45,999.949 × FTU) ÷ (462,529,200 + FTU), and aP = (0.272 × FTU) ÷ (2,576.581 + FTU), respectively.

Table 1. Calculated aP release values of GraINzyme based on different response criteria[1]

	Phytase, FTU/kg						Probability, $P <$	
Item	150	250	500	1,000	1,500	SEM	Linear	Quadratic
Performance								
ADG	0.039	0.035	0.058	0.128	0.129	0.0187	<0.001	0.078
Gain:feed	0.044	0.018	0.052	0.138	0.110	0.0163	<0.001	0.045
Bone characteristics								
Bone ash, g	-0.026	-0.008	0.032	0.074	0.182	0.0195	<0.001	0.138
Bone ash, %	-0.029	0.044	0.083	0.035	0.116	0.0339	0.008	0.721

[1]GraINzyme (Agrivida Inc., Woburn, MA)

Keywords: bone ash, nursery pigs, phosphorus, phytase

57 Effect of Calcium Carbonate Level with or without Benzoic Acid on Weanling Pig Growth Performance, Fecal Dry Matter, and Blood Ca and P Concentrations.

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Abstract: A total of 360 barrows (DNA Line 200×400; initially 6.2 ± 0.03 kg) were used in a 38-d study to evaluate the interactive effects of added dietary calcium carbonate and benzoic acid on nursery pig growth performance, fecal dry matter, and blood Ca and P concentration. Upon arrival to the nursery research facility, pigs were randomly assigned to pens (5 pigs/pen) and pens were allotted to 1 of 6 dietary treatments (12 pens/treatment). Dietary treatments fed from d 0 to 24 were formulated to provide 0.45, 0.90, or 1.35% calcium carbonate with or without 0.5% benzoic acid (VevoVitall, DSM Nutritional Products, Parsippany, NJ). Diets were fed in 3 phases with total Ca of 0.66, 0.83, or 1.00% Ca from d 0 to 10, and 0.54, 0.72, or 0.89% from d 10 to 24. A common diet was fed from d 24 to 38 (0.68% Ca). Serum Ca and P was analyzed on d 21. There were no calcium carbonate×benzoic acid interactions observed for any response criteria ($P > 0.10$). For the experimental period (d 0 to 24), there was a tendency for benzoic acid to improve ADG ($P = 0.056$) and ADFI ($P = 0.071$) with no influence on G:F (P>0.10). Increasing calcium carbonate linearly reduced ($P < 0.05$) G:F. For serum analysis, serum Ca increased (linear, $P < 0.001$) as the level of dietary calcium carbonate increased. There were no differences ($P > 0.010$) in fecal DM. For the overall study (d 0 to 38), pigs fed benzoic acid had increased ADG ($P = 0.011$) and ADFI ($P = 0.030$) and marginally improved ($P = 0.096$) G:F. Calcium carbonate level did not influence overall performance. This data suggests that lower levels of calcium carbonate may improve feed efficiency in early nursey period. Adding benzoic acid to the diet for nursery pigs increased ADG and ADFI, and tended to increase G:F regardless of the calcium carbonate level.

Table 1. Main effects of calcium carbonate and benzoic acid on nursery pig growth and serum Ca and P

	$CaCO_3$, %				Benzoic acid			
Item	0.45	0.90	1.35	SEM	Without	With	SEM	$P^2 =$
Experimental Period (d 0 to 24)								
ADG, g	292	282	286	10.3	279	295	9.4	0.056
ADFI, g	368	360	373	10.5	358	376	9.4	0.071
G:F, g/kg[1]	792	784	766	8.5	777	784	7.3	0.374
Overall (d 0 to 38)								
ADG, g	393	385	387	9.5	378	399	8.7	0.011
ADFI, g	541	530	541	10.3	527	548	9.1	0.030
G:F, g/kg	726	725	716	5.8	718	727	5.1	0.096
Serum								
Ca, mg/dL[1]	10.8	11.3	11.6	0.15	11.2	11.3	0.13	0.470
P, mg/dL	10.9	11.0	10.9	0.23	10.9	11.0	0.19	0.591

[1]Calcium carbonate; G:F = linear ($P = 0.014$); Serum Ca =linear ($P < 0.001$)
[2]Main effect of benzoic acid

Keywords: benzoic acid, calcium carbonate, growth, nursery pig