171 Effect of phytase dosage and source on growth performance of nursery pigs.
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A 28-d growth assay was conducted to determine the effect of phytase dosage and source on growth performance of nursery pigs. A total of 342 pigs (initially 11.0 kg, PIC C22 × 326) were blocked by weight and allotted randomly to nine dietary treatments. Each treatment had eight replications and four or five pigs per pen. The basal diet was corn-soybean meal based and was formulated to contain 5% added fat, 1.4% total lysine, and 0.13% available P. Monocalcium phosphate was substituted for sand to form the other control diets (0.18 and 0.23% available P). Phytase (100, 225, or 350 FTU or FYT/kg) from either Natuphos® or Ronozyme™ P was added to the 0.13% available P diet at the expense of sand. Calcium to total P ratio was maintained at 1.12:1 in all diets. All ingredients were analyzed for phosphorus before diet formulation and analyzed diet values agreed with formulated values. Increasing available P linearly ($P < 0.01$) improved ADG and feed efficiency. There were no phytase source × level interactions ($P > 0.23$) or differences between phytase sources ($P > 0.27$). Increasing phytase level linearly ($P < 0.01$) increased ADG and feed efficiency. Regression analysis of the ADG response indicated that, when adding less than 350 phytase units/kg, each 100 phytase units/kg will release 0.022 and 0.017% available P for Natuphos® and Ronozyme™ P, respectively.

	Available P, %			Ronozyme, FYT/kg			Natuphos, FTU/kg		
	0.13	0.18	0.23	100	225	350	100	225	350
ADG, g	602	650	694	623	642	659	624	669	667
Gain/ feed	0.639	0.655	0.673	0.668	0.663	0.673	0.650	0.655	0.680

Key Words: Phytase, Phosphorus, Nursery Pigs

172 Response of barrows to phytase in pelleted diets.
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Crossbred barrows (n=288, 20.5 kg BW) were used to evaluate prepelleting additions of 2 phytase sources in diets fed to slaughter weight (111.8 kg BW). There were 4 pens of 12 pigs/pen/treatment. Treatments were: 1) control formulated to University of Nebraska (UNL) recommendations for available P (0.29%, 20-36 kg BW; 0.22%, 36-59 kg BW; 0.19%, 59-86 kg BW; and 0.16%, 86 kg to market), 2)UNL formulated to 0.1% lower available P (NEG), 3)Ronozyme P CT (R) added to NEG at 500 FYT/kg (R500), 4)R added to NEG at 750 FYT/kg (R750), 5)Natuphos 10000G (N) added to NEG at 500 FTU/kg (N500) and 6)N added to NEG at 750 FTU/kg (N750). All diets contained 10% wheat midds with a pellet exit temperature of 65.5 to 71.1^o C. Contrasts to separate treatment means were: 1)UNL vs NEG, 2)UNL vs 500 phytase (FYT or FTU) units, 3)UNL vs 750 phytase units, 4)500 versus 750 phytase units and 5)R versus N. Compared to UNL, pigs fed NEG had decreased daily gain (809 vs 886 g/d, $P<0.01$), decreased daily feed (2.32 vs 2.46 kg/d, $P<0.05$) and gain:feed (0.351 vs 0.364, $P<0.05$). Similar responses were observed ($P>0.2$) when comparing 500 or 750 phytase units to UNL on daily gain, daily feed, gain:feed, carcass lean and daily lean gain. There was no difference ($P>0.2$) between 500 vs 750 phytase units on daily gain, daily feed, gain:feed or carcass lean percentage. There was no effect ($P>0.2$) of R vs N on daily gain or daily feed (2.43 vs 2.49 kg/d). However, the numeric difference in gain and feed resulted in a difference in gain:feed for R vs N (0.360 vs 0.352, $P<0.05$). Feeding NEG diets resulted in a decrease ($P<0.01$) in bone ash (59.5 vs 61.5%) and bone breaking strength (186 vs 244 kg) versus UNL. While bone ash decreased ($P<0.1$) going from 500 to 750 phytase units (61.2% vs 60.4%), there was no effect ($P>0.2$) of phytase level on bone breaking strength (230 vs 240 kg). There was no difference ($P>0.2$) in R vs N for bone ash or breaking strength. Phytase from either source added prior to pelleting was effective in preventing the decrease in performance associated with diets formulated to contain 0.1% lower available P than current UNL recommendations.

Key Words: Pigs, Phosphorus, Phytase

173 Phytase additions to conventional and low-phytate corn for pigs.
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Two experiments were conducted to assess the efficacy of phytase (Natuphos®, 600 units/kg) addition on bioavailability of P in corn and corn-soybean meal (SBM) for growing pigs. In Exp. 1, a low P (0.11%), phytate-free basal diet (1.2% lysine, 0.8% Ca) consisted of casein (15%), dextrose-sucrose (1:1), and supplemental AA, minerals (except P), and vitamins. In Diets 2 and 3, monosodium phosphate (MSP) provided 0.10 and 0.20% added P. Diet 4 was a 3:1 blend of corn and SBM substituted for the sugars to provide 0.27% added P. Diet 5 was as Diet 4 with phytase. Diets 6 and 7 included phytase addition to Diets 1 and 3. Each diet was fed to four individually penned pigs for 28 d, from 12 to 28 kg. Breaking strength of metatarsals, metacarpals and femurs were regressed on added P intake and single-point, slope-ratio procedures were used to assess P bioavailability in the corn-SBM mix. Bone responses in Diets 1-3 were linear ($P < 0.001$) with a good fit (r^2=0.99). Gain and relative bone strength of pigs fed Diets 1-7 were: 436, 519, 580, 588, 730, 413, 613 g/d; 100, 199, 301, 159, 328, 95, 285 (both $P < 0.01$), respectively. Bioavailability of P increased from 24% in the corn-SBM diet to 79% when phytase was added. In Exp. 2, the efficacy of phytase was assessed in diets containing low-phytate (LP) corn or a near-isogenic, normal (N) corn. The N- and LP-corn contained 0.25 and 0.26% total P and 0.21 and 0.09% phytate P, respectively. Diets were the basal with (1) no added P, and 0.20% P added as (2) MSP, (3) N-corn, and (4) LP-corn. Diets 5 and 6 were as Diets 3 and 4, but with added phytase. Each diet was fed to six pigs (one/pen) for 28 d, from 11 to 27 kg. Gain and relative bone strength were: 584, 732, 653, 623, 623, 691 g/d; 100, 313, 143, 217, 253, 288 (both $P < 0.01$). Bioavailability of P was estimated at 29 and 70% for the N- and LP-corn, and they increased to 91 and 103%, respectively, when phytase was added. The results indicate that phytase is efficacious when added to diets containing high- or low-phytate corn, but its efficacy is approximately twice as great in high- vs low-phytate diets.

Key Words: Pigs, Phosphorus, Phytase

174 Effect of low phytate corn and dietary phytase addition on pig growth and fecal phosphorus excretion in a commercial environment.
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Eight hundred thirty-two pigs housed in a commercial research facility were utilized to evaluate the effects of low phytate corn and phytase enzyme on pig growth and fecal phosphorus excretion. Pigs were randomly allocated by gender to thirty two pens of 26 pigs. One of four corn source/phytase treatments was randomly assigned to each pen: typical corn (TC), typical corn plus 300 FTU phytase (TC+300), low phytate corn (LP) and LP plus 300 FTU phytase (LP+300). From 28 to 127 kg BW pigs were fed fortified corn-soybean diets in a five phase feeding program. Within a phase, diets were formulated to contain equal nutrient and available phosphorus contents by altering the ratios of energy, amino acids and available phosphorus sources. Fecal grab samples were collected from each pen. The right front legs from 5 pigs per pen were collected at slaughter. Initial weight, final weight, ADF, ADG, G:F, HCW, BF, loin depth and calculated lean % did not differ between treatments. Addition of phytase enzyme or substitution of LP for TC reduced fecal phosphorus content 25%, while the combination of LP corn plus phytase reduced fecal phosphorus 54%. Force required to break the MC/MT bones was similar for all treatments. These results indicate that the effects of low phytate corn and phytase enzyme on fecal phosphorus content are similar and additive.