which prevented prediction of maximum responses, but allowed for analysis of optimal STTD Ca:STTD P ratios. For concentrations of STTD P below, at, or above the requirement, the ideal ratio between STTD Ca and STTD P is less than 1:1, 1.25:1, and greater than 1.5:1, respectively, which indicates that the dietary STTD Ca:STTD P ratio depends on the quantity of STTD P in the diet. Predicted maximum bone ash (g) at STTD P concentrations of 0.14, 0.27, and 0.41% were 42.7, 55.9, and 64.0 g. These values were obtained at STTD Ca:STTD P ratios of 3.35:1, 2.30:1, and 1.92:1. In conclusion, excess Ca is detrimental to growth if the concentration of P is at or below the requirement. The STTD Ca needed to maximize bone ash is greater than that needed to maximize growth performance and the STTD Ca:STTD P ratio needed to assure sufficient bone mineralization without affecting growth performance is less than 1.35:1 if the concentration of P is at the requirement.

Key Words: digestible calcium, pigs, requirements

245 Effects of Increasing Zinc from Zn Hydroxychloride on Growth Performance, Carcass Characteristics, and Economic Return of Pigs Housed in a Commercial Environment.

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A total of 2,430 pigs (PIC 337 × 1050; initial BW=30.1 kg) were used in a 113-d growth trial to determine the effects of increasing Zn on growth performance and carcass characteristics of grow-finish pigs housed under commercial conditions. Two identical barns were used for a total of 18 pens per treatment with 27 pigs per pen. Pigs were placed in mixed gender pens and blocked by BW within barn in a randomized complete block design. The 5 dietary treatments consisted of 50, 87.5, 125, 162.5, and 200 ppm added Zn from Zn hydroxychloride (IntelliBond Z, Micronutrients, Indianapolis, IN). Corn-soy-dried distillers grains with solubles-based experimental diets were fed in 5 phases and contained a trace mineral premix without added Zn. Data were analyzed using PROC GLIMMIX of SAS with pen as the experimental unit and barn and block nested within barn as random effects. There was no evidence for Zn effects on overall ADG (P>0.10). Increasing Zn resulted in marginally significant quadratic responses in ADFI (P=0.073) and G:F (P=0.059), with the lowest ADFI and best G:F observed when 87.5 and 125 ppm of Zn was fed, respectively. There was no evidence for differences in carcass characteristics (P>0.10). Regarding economic variables, there was a marginally significant quadratic response in feed cost per pig (P=0.075) and feed cost per kg of gain (P=0.088). The lowest feed cost per pig and feed cost per kg of gain was observed when 87.5 and 125 ppm of added Zn was fed, respectively. In summary, there was no evidence for improvements in ADG when feeding beyond 50 ppm added Zn. However, feeding 125 ppm added Zn resulted in the best G:F and lowest feed cost per kg of gain.

	Added Zn, ppm					
	50	87.5	125	162.5	200	SEM
BW d 0	30.1	30.1	30.1	30.1	30.1	0.704
BW d 113	132.2	129.7	130.7	131.7	130.9	2.499
ADG, kg	0.94	0.92	0.93	0.93	0.93	0.021
ADFI, kg[1]	2.58	2.50	2.52	2.53	2.53	0.032
G:F[1]	0.364	0.366	0.371	0.369	0.367	0.005
Feed cost per pig, $[1]	67.65	65.77	66.33	66.77	66.89	1.413
Feed cost/kg gain, $[1]	0.637	0.636	0.629	0.633	0.637	0.006

[1] Quadratic, $P < 0.10$

Key Words: zinc hydroxychloride, performance, finishing pigs

246 Copper Hydroxychloride Improves Growth Performance and Reduces Diarrhea Frequency of Weanling Pigs Fed a Corn-Soybean Meal Diet.

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Two experiments were conducted to determine effects of Cu hydroxychloride on growth performance and diarrhea frequency of pigs fed corn-soybean meal (SBM) diets. In Exp. 1, 80 weanling pigs (6.80 ± 1.69 kg) were allotted to 2 dietary treatments with 4 pigs per pen and 10 pen replicates per diet. Pigs were fed a control diet without supplemental Cu or the control diet supplemented with 150 mg/kg of Cu from Cu hydroxychloride. Diarrhea scores were assessed visually using a score from 1 to 5 (1=normal feces to 5=watery diarrhea). Data were analyzed using Mixed Procedure of SAS and a chi-squared test was used to analyze diarrhea frequency among treatments. Results indicated that ADG and final BW were greater (P≤ 0.05) and fecal scores were reduced (P≤ 0.05) for pigs fed the Cu hydroxychloride diet compared with pigs fed the control diet (Table 1). In Exp. 2, 150 pigs (10.22 ± 1.25 kg) were used in a completely randomized design and allotted to 3 dietary treatments with 5 pigs per pen and 10 replicate pens per treatment. The control diet was a