130 Assessing current phytase release values for calcium, phosphorus, amino acids and energy in diets for growing pigs. Madie R. Wensley[1], Jason C. Woodworth[2], Joel M. DeRouchey[3], Mike D. Tokach[3], Robert D. Goodband[3], Steve S. Dritz[3], *[1]Kansas State Univeristy, [2]Department of Animal Sciences & Industry, College of Agriculture, Manhattan, KS 66506, [3]Kansas State University*

A total of 2,268 pigs (PIC 337×1050, initially 28.5±2.3 kg) were used in a 55-d growth study. On d 0, pens of pigs were blocked by body weight and randomly allotted to 1 of 6 dietary treatments with 27 pigs per pen and 14 pens per treatment. Treatments were fed in 2 different phases containing 1.05 and 0.89% SID Lys, respectively. The 6 treatments consisted of a control with no phytase and inorganic P from monocalcium P, or 5 diets with 1,500 phytase units (FYT/kg; Ronozyme HiPhos 2,500; DSM Nutritional Products, Inc., Parsippany, NJ) assuming supplier-provided nutrient release values for Ca and P (CaP), Ca, P, and AA (CaPAA), Ca, P, AA, and half of the suggested net energy (CAPAA+halfNE), Ca, P, AA, and full NE (CaPAA+fullNE) and no nutrient release (None). The assumed release values were 0.146% STTD P, 0.102% STTD Ca, 41.8 kcal/kg of NE, and 0.0217, 0.0003, 0.00886, 0.0224, 0.0056, 0.0122, and 0.0163% digestible Lys, Met, Met + Cys, Thr, Trp, Ile, and Val, respectively. All diets within phase were corn-soybean meal-based and contained a STTD Ca:STTD P ratio of 1.60:1. Data were analyzed as a randomized complete block design for a one-way ANOVA using the lmer function from the lme4 package in R. Overall (d 0 to 55), there was no evidence for differences in ADG or ADFI. However, pigs fed the diet containing 1,500 FYT/kg assuming no nutrient release had increased (P< 0.05) G:F compared to pigs fed diets containing 1,500 FYT/kg assuming either CaP or CaPAA+fullNE release, with others intermediate. Based on diet formulation and using supplier recommended phytase release values, all pigs should have had similar performance. However, pigs fed full matrix release values for CaPAA+fullNE had decreased (P< 0.05) G:F, suggesting that full matrix release values, especially energy, may be too aggressive and resulted in diets contributing less nutrients than needed to optimize performance.

Table 1. Effects of different nutrient release values of Ronozyme Hiphos 2,500 phytase on pig growth performance[1]

	Inorganic P	1,500 FYT/kg added phytase					SEM	Probability, $P <$
Item	Control	CaP	CaPAA	CaPAA + half NE	CaPAA + full NE	None		
Body weight, kg								
d 0	28.5	28.5	28.5	28.5	28.5	28.5	0.61	0.999
d 55	72.4	72.9	72.5	71.9	72.2	72.6	0.95	0.786
Overall (d 0 to 55)[2]								
ADG, g	828	834	829	817	825	833	10.4	0.768
ADFI, g	1,673	1,718	1,675	1,666	1,704	1,660	23.6	0.222
G:F	0.496$_{ab}$	0.486$_{b}$	0.495$_{ab}$	0.491$_{ab}$	0.484$_{b}$	0.502$_{a}$	0.0038	0.002

$_{ab}$ Values with different superscripts differ, $P < 0.05$.

[1] Treatments consisted of a control with no phytase and inorganic P from monocalcium P, or 5 diets with 1,500 phytase units (FYT/kg; Ronozyme HiPhos 2,500; DSM Nutritional Products, Inc., Parsippany, NJ) assuming supplier-provided nutrient release values for Ca and P (CaP), Ca, P, and AA (CaPAA), Ca, P, AA, and half of the suggested net energy (CAPAA+halfNE), Ca, P, AA, and full NE (CaPAA+fullNE), and no nutrient release (None).

[2] ADG = average daily gain; ADFI = average daily feed intake; G:F = gain to feed.

Keywords: phytase, pigs, release value

76 Compensatory growth following lysine restriction in grow-finish pigs: literature review and analysis. Mariana Boscato Menegat[1], Steve S. Dritz[1], Mike D. Tokach[1], Jason C. Woodworth[2], Joel M. DeRouchey[1], Robert D. Goodband[1], *[1]Kansas State University, [2]Department of Animal Sciences & Industry, College of Agriculture, Manhattan, KS 66506*

A literature review on compensatory growth induced by lysine restriction in grow-finish pigs was conducted. First, a database was developed to standardize comparisons across the peer-reviewed literature and characterize the occurrence of compensatory growth. Publications had to include: pigs with minimum initial weight of 15 kg; a group of "non-restricted pigs" not subjected to a restriction period; a group of "restricted pigs" subjected to a restriction period induced by decreasing lysine alone, lysine and other amino acids, or crude protein in diets; a recovery period following the restriction period in which the same diet was fed to restricted and non-restricted pigs; and ad libitum feed consumption. The database included 14 publications and 57 comparisons expressed as relative differences between restricted pigs and non-restricted pigs. The database analysis categorized compensatory growth into complete, incomplete, and no compensatory growth, and characterized the patterns of restriction and recovery in each category (Table 1). The data analysis supports that compensatory growth induced by lysine restriction in grow-finish pigs occurs. The degree of lysine restriction as well as restriction and recovery duration seem critical in explaining differences between complete and incomplete compensatory growth. Also, inadequate lysine level in the recovery period seems to be associated with incomplete or no compensatory growth. Compensatory growth is more likely if: degree of lysine restriction is between 10 to 30%; lysine restriction is induced before pigs reach their maximum protein deposition; duration of lysine restriction is short and duration of recovery period is long; and lysine level in the recovery period is close to or above the estimated requirements.

Table 1. Characteristics of compensatory growth categories in grow-finish pigs following lysine restriction[1]

Item[2]	Complete compensatory growth[3]	Incomplete compensatory growth[4]	No compensatory growth[5]
Restriction period			
Initial BW, kg	27.7	29.9	24.2
Degree of lysine restriction, %[6]	30	35	33
Lysine to calorie ratio, g/Mcal[7]	2.53	2.38	2.34
Duration, % overall duration[8]	37	45	44
Recovery period			
Initial BW, kg	53.6	58.6	55.7
Lysine to calorie ratio, g/Mcal[7]	2.47	2.68	2.50
Duration, % overall duration[8]	63	55	56
Recovery to restriction ratio[9]	1.8	1.4	1.5
Overall growth performance			
ADG, % difference[10]	3.4	-2.9	-9.1
ADFI, % difference[10]	1.2	1.8	-3.8
G:F, % difference[10]	2.2	-4.3	-5.3

[1] Compensatory growth categories were defined by the distribution of 57 database comparisons from 14 peer-reviewed publications.
[2] ADG = average daily gain, ADFI = average daily feed intake, G:F = gain to feed ratio, BW = body weight.
[3] Indicates an increase in ADG in recovery period and greater final BW compared to non-restricted pigs.
[4] Indicates an increase in ADG in the recovery period but lower final BW compared to non-restricted pigs.
[5] Indicates a decrease in ADG in recovery period and lower final BW compared to non-restricted pigs.
[6] Compared to lysine levels in diets of non-restricted pigs.
[7] Expressed as a ratio of standardized ileal digestible lysine to net energy in g per Mcal.
[8] Estimated by dividing the duration of each period by the overall duration in days.
[9] Estimated by dividing the duration of recovery period by the duration of restriction period in days.
[10] Relative differences between restricted pigs and non-restricted pigs.

Keywords: amino acid restriction, compensatory growth, lysine

77 The effect of naturally occurring levels of multiple mycotoxins on growth performance and carcass parameters of grow-finish pigs.

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Mycotoxins may not be an issue every year, but the proper environmental conditions can cause a spike in contaminated grains and cause severe economic impact on pork producers. The objective of this study was to determine the effect of naturally occurring infections of deoxynivalenol, zearalenone and fumonisins (DZF) on growth performance and carcass parameters in grow/finish pigs. One hundred pigs (BW 34.0 ± 0.9 kg; L337 × Camborough, PIC, Hendersonville, TN) were randomly assigned to 1 of 2 dietary treatments with 10 split-sex pens/treatment. The control diet (CTL) contained low levels of DZF and the CTL+DFZ diet contained high levels of DZF. Diets were fed in 4 phases over the 126-d experiment period. The CTL diet contained 1.6, 1.6, 1.8 and 1.2 mg deoxynivalenol/kg and CTL+DZF contained 9.2, 6.9, 5.8 and 3.8 mg deoxynivalenol/kg in the 4 diet phases, respectively. The CTL contained 0.30, 0.32, 0.51 and 0.32 mg zearalenone/kg and 0.7, 0.8, 0.8 and 0.9 mg total fumonisins/kg; CTL+DFZ contained 0.59, 0.72, 0.86 and 0.57 mg zearalenone/kg and 1.0, 1.1, 1.2 and 0.9 mg total fumonisins/kg for phases one through four, respectively. Data were analyzed using PROC MIXED of SAS (9.4) with treatment, sex, and their interaction as fixed effects. Compared to CTL, feeding CTL+DFZ decreased final BW (130.3 vs 120.5 kg; P< 0.001), ADG (0.95 vs 0.79 kg/d; P< 0.001), ADFI (2.73 vs 2.49 kg/d; P=0.016), and G:F (0.35 vs 0.32; P=0.043). Feeding CTL+DFZ decreased HCW (92.3 vs 89.4 kg; P=0.024) and increased dressing percentage (70.9 vs 74.3%; P=0.009) and tended to reduce loin depth (7.0 vs 6.8 cm; P=0.057) compared to CTL. Diet did not affect backfat depth or lean percentage (P >0.10). In conclusion, diets naturally contaminated with multiple mycotoxins reduced growth performance and adversely affected carcass parameters; pigs did not adapt over time to the mycotoxins.

Keywords: Deoxynivalenol, zearalenone, fumonisin