Table 173. Effect of increasing BPC supplementation on pig performance, d 0 to 42 after weaning

	Dietary ButiPEARL C, mg/kg						Contrast ($P <$)	
	0	250	500	750	1000	SEM	Linear	Quadratic
ADG, g	389	397	408	414	417	9	0.01	0.01
ADFI, g	546	547	564	563	567	12	0.04	0.11
G:F, g/kg	710	725	721	737	735	15	0.01	0.01
D 42 BW, kg	22.1	22.5	23.0	23.3	23.4	0.4	0.01	0.01

Table 174.

		Low Lys			High Lys				Probability, $P <$
Item:	Control	Industry AA	95% AA	Max AA	Industry AA	95% AA	Max AA	SEM	Low vs. High Lys
d 0 to 14									
ADG, g	369^{a,b}	346^{c}	361^{b,c}	370^{a,b}	379^{a}	384^{a}	362^{b}	6.9	0.001
ADFI, g	451^{b}	451^{b}	467^{a,b}	465^{a,b}	461^{a,b}	472^{a}	456^{a,b}	9.2	0.692
G:F	0.819^{a,b}	0.769^{c}	0.774^{c}	0.797^{a,b,c}	0.823^{a}	0.814^{a,b}	0.794^{b,c}	0.0099	0.001

^{a,b,c} Means within a row with differing superscripts differ $P < 0.05$.

were formulated to Ile requirement with feed-grade Lys, Met, Thr, Trp, and Val added. The control contained less feed-grade AA (0.39% L-Lys HCl vs. 0.50-0.55% in other diets) and 5% fermented soy protein to achieve similar soybean meal level to high SID Lys diets. Experimental diets were formulated using analyzed AA for corn, soybean meal, and dried distillers grains with solubles and fed for 14 d in meal form. Pens were weighed and feed disappearance was measured on d 0, 7, and 14. Data were analyzed using PROC GLIMMIX. From d 0 to 14, feeding high Lys diets increased *(P* < 0.001) ADG and G:F compared with low Lys diets with no evidence for differences in ADFI between Lys level. Furthermore, for ADG, maximum AA ratios improved ($P < 0.05$) performance compared to industry ratios at low Lys, but not at high Lys levels. In conclusion, higher AA ratios were more critical in diets formulated below the Lys requirement of the pig.

Key Words: AA ratios, lysine, nursery pigs
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175 Evaluation of dietary phytogenics on growth performance, carcass characteristics, and economics of grow-finish pigs housed under commercial conditions.

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A total of 1245 pigs (PIC 327 × 1050, initially 22.1 kg) were used in a 125-d trial to determine the effects of 2 dietary essential oil mixtures on growth performance, carcass characteristics, and economics of finishing pigs. Pens of 27 or 28 pigs were randomly assigned to 1 of 5 dietary treatments with 9 replications/treatment with treatments fed in 6 phases. Treatment 1 was the control with no feed additives. Treatment 2 contained essential oil mixture 1 (EOM 1) in all phases. Treatment 3 contained EOM 1 fed from phase 3 to 6 and essential oil mixture 2 in all phases (EOM 1+2). Treatment 4 contained EOM 1 in all 6 phases. Treatment 5 contained Ractopamine HCl (RAC) in phase 6. Treatments 1–3 and 4–5 had 12% and 16% CP (0.66 and 0.90% Standardized ileal digestible Lys, respectively) in phase 6 diets, respectively. Overall (d 0 to 125), pigs fed diets with EOM 1+2 had increased ($P = 0.003$) ADFI compared with pigs fed the control diet. Pigs fed EOM 1 + 16% CP had increased ($P = 0.032$) ADFI compared with pigs fed RAC. Pigs fed RAC had increased ($P = 0.027$) G:F compared with pigs fed EOM 1 + 16% CP. Pigs fed EOM 1+2 had heavier ($P < 0.05$) HCW compared with pigs fed the control treatment or EOM 1 + 12% CP. Pigs fed RAC had reduced ($P = 0.001$) backfat thickness and increased ($P = 0.001$) percentage lean, and greater ($P < 0.030$) income over feed cost (IOFC) compared with pigs fed EOM 1 + 16% CP. In summary, while ADG was not affected in this study, pigs fed RAC had the greatest G:F and IOFC. The addition of EOM 1+2 increased HCW similar to those fed RAC with EOM 1 + 16% CP being intermediate. Additional research to confirm these responses to essential oil additions is warranted.

Key Words: essential oils, feed additives, phytogenics
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176 Effect of feeding varying levels of *Lactobacillus plantarum* on nursery pig performance.

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A total of 360 pigs (PIC C-29 × 359, initial BW 5.95 ± 0.007 kg) were used in a 42-d trial evaluating the effects of feeding varying levels of *Lactobacillus plantarum* on nursery pig performance. Pigs were weaned at 18 to 20 d and allotted to pens based on initial BW and gender to 1 of 4 dietary treatments in a completely randomized design with 10 pigs

per pen and 9 replications per treatment. Experimental diets were fed in 3 phases (Phase 1, d 0 to 7; Phase 2, d 7 to 21; and Phase 3, d 21 to 42). Treatment diets were formulated to include 0, 0.05, 0.10, or 0.20% *Lactobacillus plantarum* product (LP1; Nutraferma Inc., Sioux City, IA). All treatment diets within phase were formulated to similar nutrient levels with diets containing 15% and 7.5% lactose in Phases 1 and 2, respectively. Furthermore, all diets were fed in pellet form and did not include antibiotics. Data were analyzed using the PROC GLIMIX procedure in SAS with pen as the experimental unit. Dietary treatment served as the fixed effect in the model. Means were evaluated using preplanned linear and quadratic orthogonal contrasts. During Phase 1 and 2, there were no differences among dietary treatments. During Phase 3, ADG and ADFI were not influenced by treatment; however, increasing LP1 marginally improved G:F (0.716; 0.728; 0.728; 0.718 for the 0, 0.05, 0.10, and 0.20 LP1 additions, respectively; quadratic $P = 0.085$). Overall (d 0 to 42), no evidence for differences in growth performance were observed among dietary treatments. In conclusion, feeding increasing dietary levels of *Lactobacillus plantarum* had no evidence of an impact on nursery pig performance.

Key Words: growth performance, *Lactobacillus plantarum*, nursery pig
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Table 175.

Phase 6 CP, %		12	EOM	16		
Feed additive	Control	EOM 1[1]	1+2[2]	EOM 1	RAC[3]	SEM
ADG, kg	0.81	0.83	0.83	0.83	0.83	0.014
ADFI, kg	2.19^{bc}	2.23^{ab}	2.27^{a}	2.23^{ab}	2.17^{c}	0.046
G:F	0.373^{ab}	0.375^{ab}	0.368^{b}	0.372^{b}	0.383^{a}	0.026
Final BW, kg	122.7	124.6	124.6	123.8	123.9	2.37
HCW, kg	94.5^{b}	94.8^{b}	97.1^{a}	96.1^{ab}	97.3^{a}	1.34
IOFC, $/pig	65.99^{ab}	64.55^{b}	65.64^{b}	65.45^{b}	67.77^{a}	0.723

Means within a row without a common superscript differ $P < 0.050$.
[1]Contained caraway, garlic, thyme, and cinnamon as key ingredients.
[2]Contained oregano, citrus and anise oils as key ingredients.
[3]Ractopamine HCl.

177 The effect of feeding AmbitineFA on growth performance and carcass characteristics of finishing pigs.

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Two studies were performed to determine the effect of feeding AmbitineFA (blend of plant extracts and acidifiers) on growth performance and carcass characteristics of finishing pigs. Both studies used a RCBD with 2 treatments: Control (no AmbitineFA); AmbitineFA (0.10% dietary inclusion). Studies 1 and 2 used 1610 (23 replicates) and 4682 (68 replicates) barrows and gilts, respectively, in single-sex groups of 35. AmbitineFA was included in the final or final 2 dietary phases in Studies 1 and 2, respectively. Experimental diets were fed for approximately 28 and 49 d between start and end BW of 103.1 ± 4.75 kg to 128.0 ± 2.59 kg and 89.4 ± 2.29 kg to 121.9 ± 4.16 kg for Studies 1 and 2, respectively. Diets were formulated to a constant standardized ileal digestible lysine:ME ratio within each dietary phase and to meet or exceed nutrient requirements of NRC (2012). Pigs had ad libitum access to feed and water. At the end of each study, pigs were sent to a commercial facility for harvest and collection of carcass measurements in 2 groups/pen. The heaviest 50% of pigs was sent at mean pen weights of 117.0 ± 2.5 kg and 108.0 ± 2.0 kg BW for Studies 1 and 2, respectively, and the remaining 50% of pigs was sent 14 d later. Ractopamine hydrochloride (7.4 ppm) was fed during the final 28 d of the study period to pigs on both treatments in both studies (14 d for the first group and 28 d for the second group). The pen of pigs was the experimental unit; data were analyzed using PROC MIXED of SAS; the model accounted for the effects of treatment, block, and replicate. Compared to Control, feeding the blend of plant extracts and acidifiers had no effect ($P > 0.05$) on ADFI in either study, increased ADG in Study 1 (1.12 vs. 1.17 kg; SEM 0.015; $P = 0.02$) but not Study 2 (0.76 vs. 0.77 kg; SEM 0.010; $P = 0.16$) and increased G:F in both studies (0.405 vs. 0.418 kg:kg; SEM 0.0047; $P = 0.02$ and 0.362 vs. 0.368 kg:kg; SEM 0.0028; $P = 0.02$ for Study 1 and Study 2, respectively). There was no effect ($P > 0.05$)

Table 176.

		LP1				Probability, $P <$	
Diets	Control	0.05%	0.10%	0.20%	SEM	Linear	Quadratic
Initial BW, kg	5.95	5.94	5.94	5.95	0.007	0.689	0.483
ADG, g	418	411	410	410	7.0	0.508	0.567
ADFI, g	562	552	546	551	9.2	0.448	0.316
G:F	0.74	0.74	0.75	0.74	0.005	0.814	0.313
Final BW, kg	23.53	23.34	23.16	23.17	0.298	0.402	0.612