

**P067 (GS-PHD) Impact of an acute water and feed deprivation event on performance, histology, and stress markers in weaned pigs.** N. Horn<sup>1,\*</sup>, F. Ruch<sup>2</sup>, K. Ajuwon<sup>1</sup>, G. Miller<sup>3</sup>, O. Adeola<sup>1</sup>, <sup>1</sup>*Animal Sciences, Purdue University, West Lafayette*, <sup>2</sup>*Enzyvia, LLC, Sheridan*, <sup>3</sup>*Biomatrix, Princeton*.

The impact of acute stressors on performance, histological parameters, and serum stress markers in weaned nursery pigs were evaluated. Pigs (6.21 ± 0.29 kg) were allotted in a randomized complete block design to 4 post-weaning treatments on the basis of body weight at the time of weaning. There were 8 pigs per pen and 12 replicate mixed-sex pens per treatment. The post-weaning treatments were arranged in a 2 x 2 factorial of 0 or 24-h feed deprivation period and 0 or 24-h water deprivation period after which the piglets were returned to normal management procedures. Growth performance was measured the day following the stressor, 7, 14, and 28 d post weaning. Serum and intestinal samples were taken d 2 and 7 post weaning. Serum was analyzed for cortisol and corticotrophin releasing factor, and villus height and crypt depth were measured in the jejunum and the ileum. There was a decrease in ADG with the water stressor ( $P < 0.01$ ) immediately following the stressor although there was a significant improvement in ADG and feed efficiency ( $P < 0.01$ ) at d 7 post weaning. Furthermore, there was a reduction in ADFI during the last 14 d of the trial and cumulatively ( $P < 0.05$ ) in the water stress group. On d 7 post weaning, there was a reduction ( $P < 0.05$ ) in jejunal crypt depth with the water stressor and a reduction ( $P = 0.05$ ) in ileal villus height with the feed stressor. With administration of the water stressor there was an increase ( $P < 0.05$ ) in serum cortisol and corticotrophin releasing factor on d 2 post weaning and an increase in serum cortisol but not corticotrophin releasing factor 7 post weaning. There was no impact of the feed stressor or a feed x water stressor interaction on growth performance or any of the serum measurements. The results from the current trial show that an acute water stressor at the time of weaning has negative impacts on growth performance, histological measurements, and serum stress indicators not only immediately following the stress event but throughout the nursery period.

**Key Words:** acute stressors, nursery pig

## NONRUMINANT NUTRITION: NURSERY AND GROW-FINISH NUTRITION

**P068 An evaluation of dietary natural zeolite or humic acid substances and high sulfate water on nursery pig performance.** J. R. Flohr\*, M. D. Tokach, J. L. Nelssen, S. S. Dritz, J. M. DeRouchey, R. D. Goodband, *Kansas State University, Manhattan*.

A total of 350 nursery pigs (PIC 1050 barrows, initially 21 d of age) were used in a 21-d study to determine the effects of high-sulfate water, and natural zeolite and humic substances on growth and fecal consistency of nursery pigs. Treatments were arranged in a 2 x 5 factorial with 2 water treatments (control or water with 2,000 ppm Na<sub>2</sub>SO<sub>4</sub>) and 5 dietary treatments (control, 1 or 2% zeolite, 1% humic acid [HA], or 1% humic and fulvic acid [HFB]). There were 7 replications/treatment and 5 barrows/pen. Water treatments remained the same from d 0 to 21, and all diets were fed in 2 phases, with the same treatment inclusion rates in both phases. Phase 1 diets were fed in a pellet form (d 0 to 8) and Phase 2 diets were fed in meal form (d 8 to 21). Fecal samples were

collected on d 5, 8, 15, and 21, visually scored for consistency (1 = firm, 5 = watery), and analyzed for DM. Overall (d 0 to 21), a water source x diet interaction ( $P < 0.03$ ) occurred for ADG and G:F, because pigs fed 1% HA had poorer ( $P < 0.01$ ) ADG and G:F than other treatments when drinking 2,000 ppm Na<sub>2</sub>SO<sub>4</sub> water but improved ADG and G:F when drinking control water. Pigs drinking 2,000 ppm Na<sub>2</sub>SO<sub>4</sub> water had poorer ( $P < 0.01$ ) ADG and G:F; and tended ( $P = 0.08$ ) to have lower ADFI than pigs drinking control water. Pigs drinking 2,000 ppm Na<sub>2</sub>SO<sub>4</sub> water had more fluid fecal samples ( $P < 0.01$ ) and lower ( $P < 0.01$ ) fecal DM on d 5 and 8 compared to pigs drinking control water. In conclusion, pigs drinking water with 2,000 ppm Na<sub>2</sub>SO<sub>4</sub> had decreased ADG, G:F, and tended to have lower ADFI, also they had more watery feces on d 5 and 8 as measured by fecal DM compared to pigs drinking control water. The zeolite or humic acid products tested did not improve pig growth or alter fecal DM for pigs drinking high sulfate water.

	Dietary Treatment					
Item	Control	1% Zeolite	1% HA	1% HFB	2% zeolite	SEM
Control water						
ADG, g	268	274	300	274	248	13.4
G:F	0.72	0.74	0.78	0.73	0.71	0.021
d 8 fecal score	3.3	2.8	3.1	3.0	2.7	0.15
d 8 fecal DM, %	23.1	26.7	25.6	26.5	28.7	1.70
2,000 ppm Na <sub>2</sub> SO <sub>4</sub>						
ADG, g	264	249	229	255	262	13.4
G:F	0.71	0.70	0.67	0.70	0.74	0.021
d 8 fecal score	3.3	3.7	3.3	3.5	3.4	0.15
d 8 fecal DM, %	22.3	18.8	22.7	22.0	22.1	1.70

**Key Words:** non-nutritive feed additives, nursery pig, sulfate water

**P069 Effects of varying ingredient particle size and diet form on nursery pig growth performance and caloric efficiency.** J. A. De Jong\*, J. M. DeRouchey, M. D. Tokach, R. D. Goodband, S. S. Dritz, J. L. Nelssen, *Animal Science, Kansas State University, Manhattan*.

A total of 675 pigs (initial BW 11.1 kg) were used in a 21-d study to determine the effects of varying ingredient particle size and diet form on nursery pig growth performance and caloric efficiency. Pens of pigs were balanced by initial BW and randomly allotted to 1 of 8 dietary treatments (17 pens/treatment). The 8 diets included 3 corn-soybean meal-based diets consisting of: 1) corn ground to 620 µ and fed in meal form, 2) corn ground to 352 µ and fed in meal form, and 3) diet 2 pelleted. The remaining 5 diets contained 20% wheat middlings (mids) and 30% dried distillers grains with solubles (DDGS). Diets 4 to 8 consisted of: 4) corn ground to 620 µ, mids and DDGS unground (534 and 701 µ), and fed in meal form; 5) diet 4 but corn also ground to 352 µ and fed in meal form; 6) diet 5 fed in pellet form; 7) corn, soybean meal, DDGS, and mids finely ground (352, 421, 377, and 357 µ), and fed in meal form; and 8) diet 7 fed in pellet form. Diets were not isocaloric. Overall (d 0 to 21), pelleting improved ( $P < 0.03$ ) ADG, G:F, and caloric efficiency on a ME or NE basis. Reducing corn particle size did not influence G:F or caloric efficiency, but tended ( $P < 0.08$ ) to reduce ADFI, which led to a reduction ( $P < 0.02$ ) in ADG. High-by-product diets reduced ( $P < 0.01$ ) ADG, ADFI, final BW, and ( $P < 0.01$ ) G:F, but caloric efficiency was similar to pigs fed the corn-soybean meal-based diet. Grinding the by-products to a smaller particle size further reduced ( $P < 0.05$ ) ADG, ADFI, and final BW, but did not influence