

TID Lys +10%), were achieved with increased SBM, crystalline AA and fat. Pig weights and feed disappearance were measured on d 0, 7, 14, and 24. A summary of the overall (d 0 to 24) results is presented in Table 1. Feeding 3 ppm DON resulted in reduced ADG and ADFI (PC vs. NC;  $P < 0.02$ ). Pigs fed 0.5% DEF (TRT 4) had improved performance compared with the NC ( $P < 0.01$ ) and similar to PC ( $P > 0.10$ ) with pigs fed 0.25% DEF (TRT 3) having intermediary performance. Pigs fed TRT 6 had similar ( $P > 0.10$ ) ADG and improved ( $P < 0.01$ ) G:F compared with PC. These results suggest that 0.50% inclusion of DEF in meal diets or 0.25% inclusion of DEF in an increased nutrient dense pelleted diet can alleviate the negative impact of 3 ppm DON.

**Table 1. The effect of DEF and diet modifications on growth performance of pigs fed high levels of DON**

Treatment	1	2	3	4	5	6	SEM	P-value
d 0 to 24								
Initial BW, kg	12.44	12.59	12.53	12.47	12.57	12.58	0.15	0.98
ADG, g	622 <sup>ab</sup>	586 <sup>c</sup>	602 <sup>bc</sup>	619 <sup>ab</sup>	588 <sup>c</sup>	637 <sup>a</sup>	7.83	<0.01
ADFI, g	892 <sup>a</sup>	850 <sup>b</sup>	863 <sup>ab</sup>	883 <sup>a</sup>	798 <sup>c</sup>	818 <sup>c</sup>	10.90	<0.01
G:F	0.70 <sup>c</sup>	0.69 <sup>c</sup>	0.70 <sup>c</sup>	0.70 <sup>c</sup>	0.74 <sup>b</sup>	0.78 <sup>a</sup>	0.01	<0.01
Ending BW, kg	27.38 <sup>ab</sup>	26.65 <sup>b</sup>	26.99 <sup>b</sup>	27.33 <sup>ab</sup>	26.69 <sup>b</sup>	27.87 <sup>a</sup>	0.28	<0.04

<sup>abc</sup> Within a row, means without common superscript differ ( $P < 0.05$ ).

**Key Words:** deoxynivalenol, mycotoxin, nursery pigs

**195 The effects of pelleting, increased nutrient density, and a flow agent on growth performance of nursery pigs fed high levels of deoxynivalenol.** E. D. Frugé<sup>\*1</sup>, E. L. Hansen<sup>2</sup>, S. A. Hansen<sup>1</sup>, M. D. Tokach<sup>3</sup>, and H. L. Frobose<sup>3</sup>, <sup>1</sup>Hubbard Feeds Inc., Mankato, MN, <sup>2</sup>New Fashion Pork, Jackson, MN, <sup>3</sup>Kansas State University, Manhattan.

An experiment was conducted to determine the effects of pelleting, increased nutrient density (ME + 6% and TID Lys + 10%), and Defusion<sup>®</sup> (DEF; Provimi N.A., Inc., Brookville, OH) on growth performance of nursery pigs fed high levels of Deoxynivalenol (DON) from naturally contaminated DDGS. Pigs (n = 980, 12.0 kg) were allotted to 7 dietary treatments (TRT) with 5 replicates and 28 pigs per pen in a randomized complete block design. The experimental TRT were; 1) PC (meal), < 0.5 ppm DON; 2) PC (pellet); 3) NC (meal), 3 ppm DON; 4) NC (pellet); 5) NC (meal) + 0.25% DEF; 6) NC (pellet) + 0.25% DEF; and 7) as 6, with increased nutrient density. Pig weights and feed disappearance were measured on d 0, 7, 14, 21, and 28. A summary of the overall (d 0 to 28) results is presented in Table 1. Pigs fed meal diets with 3 ppm DON (TRT 3 and 5) had reduced ADG and ADFI compared with the PC meal diet (TRT 1). Pigs fed 3 ppm DON in pelleted form (TRT 4 and 6) had ADG similar to the PC pelleted diet (TRT 2) and similar or better G:F than TRT 2. Pigs fed pelleted diet + DEF (TRT 6) had improved G:F over those fed pelleted diet without DEF (TRT 5). Pigs fed the increased nutrient dense diet (TRT 7 vs. TRT 6) showed no improvement in performance. These results suggest that DEF or increased nutrient density did not improve performance. However, pelleting a diet with 3 ppm DON resulted in similar performance to the PC containing < 0.50 ppm DON.

**Table 1. The effect of DEF and diet modifications on growth performance of pigs fed high levels of DON**

Treatment	1	2	3	4	5	6	7	SEM	P-value
d 0 to 28									
Initial BW, kg	11.9	12.0	12.0	12.0	11.9	12.0	11.9	0.10	0.93
ADG, g	641 <sup>b</sup>	666 <sup>c</sup>	589 <sup>a</sup>	653 <sup>bc</sup>	603 <sup>a</sup>	663 <sup>bc</sup>	654 <sup>bc</sup>	9.64	<0.01
ADFI, g	995 <sup>c</sup>	988 <sup>c</sup>	912 <sup>a</sup>	950 <sup>b</sup>	934 <sup>ab</sup>	939 <sup>ab</sup>	937 <sup>ab</sup>	15.08	<0.01
G:F	0.64 <sup>d</sup>	0.67 <sup>c</sup>	0.65 <sup>d</sup>	0.69 <sup>bc</sup>	0.65 <sup>d</sup>	0.71 <sup>a</sup>	0.70 <sup>ab</sup>	0.01	<0.01
Ending BW, kg	29.9 <sup>b</sup>	30.6 <sup>c</sup>	28.5 <sup>a</sup>	30.4 <sup>bc</sup>	28.8 <sup>a</sup>	30.6 <sup>bc</sup>	30.2 <sup>bc</sup>	0.31	<0.01

<sup>abcd</sup> Within a row, means without common superscript differ ( $P < 0.05$ ).

**Key Words:** deoxynivalenol, mycotoxin, nursery pigs

**196 Actigen increases serum levels of cytokines and haptoglobin in pigs experimentally infected with porcine reproductive and respiratory syndrome virus (PRRSV).** T. M. Che<sup>\*1</sup>, M. Song<sup>1</sup>, R. W. Johnson<sup>1</sup>, K. W. Kelley<sup>1</sup>, W. G. Van Alstine<sup>2</sup>, K. A. Dawson<sup>3</sup>, and J. E. Pettigrew<sup>1</sup>, <sup>1</sup>University of Illinois, Department of Animal Science, Urbana, <sup>2</sup>Purdue University, Animal Disease and Diagnostic Laboratory, West Lafayette, IN, <sup>3</sup>Research, Alltech Biotechnology Center, Nicholasville, KY.

Mannan oligosaccharide products alter inflammatory responses in pigs. A study was conducted to evaluate effects of Actigen (a refined yeast-based mannan preparation, Alltech, Inc.) on serum levels of cytokines and haptoglobin (Hp) in pigs infected with PRRSV. Weaned pigs (n = 64, 21 d old), free of PRRSV, were divided into blocks of 4 based on BW, sex, and litter origin. They were randomly assigned from within blocks to 1 of 4 treatments in a 2 × 2 factorial arrangement [2 types of diet: control (0%) and Actigen addition (0.04%); 2 levels of PRRSV: with and without]. Pigs (16/treatment) were kept individually in each pen. After 2 wk of an 8-wk period of feeding the treatments, pigs were intranasally inoculated with PRRSV or a sterile medium (Sham) at 5 wk of age. Serum cytokines and Hp were measured at d 0, 3, 7 post-inoculation (PI), and subsequently weekly until d 42 PI. Data were analyzed as repeated measures over time using the MIXED procedure of SAS. Infection by PRRSV increased the levels of tumor necrosis factor (TNF)- $\alpha$  ±, IL-1 $\beta$ , interferon (IFN)- $\gamma$ , IL-10, IL-12, and Hp in the infected pigs ( $P < 0.001$ ). The levels of these inflammatory mediators increased at d 3 PI (except Hp at d 7 PI), peaked at d 14 PI (except IFN- $\gamma$  at d 7 PI), and then declined to normal by d 35 PI, whereas IL-10 increased at d 14 PI and reached the highest level at d 35 PI. These results indicate PRRSV-induced secretion of cytokines involved in innate, T-helper 1, and T-regulatory responses. Actigen enhanced IL-1 $\beta$  (18.3 vs. 14.0 pg/mL;  $P = 0.019$ ), but decreased TNF- $\alpha$  ± (129.1 vs. 141.6 pg/mL;  $P = 0.058$ ). It also increased levels in infected pigs but not in Sham, specifically IL-1 $\beta$  ( $P = 0.016$ ) and IL-12 ( $P = 0.026$ ) at d 7 PI, Hp ( $P = 0.047$ ) at d 14 PI, and IL-10 ( $P = 0.088$ ) at d 21 PI. The IL-1 $\beta$  and IL-12 favorably promote innate and T cell immune functions, whereas IL-10 is anti-inflammatory and capable of stimulating B cell-produced antibody. Briefly, the modulation of secretion of inflammatory mediators by Actigen at critical time points may enhance protection against PRRSV and secondary bacterial infections.

**Key Words:** actigen, pigs, PRRSV