GRADUATE STUDENT ORAL COMPETITION – PHD

60 Evaluation of Fat Sources and Inclusion Rate with the Supplementation of Vitamin A or Beta-Carotene in Nursery Pigs. Sarah Elefson[1], Laura L. Greiner[1], [1]*Iowa State University*

Abstract: The objective of this study was to evaluate the effect of fat inclusion level and fat source with supplementation of either vitamin A (ROVIMIX A 1000; DSM; NJ) or beta-carotene (ROVIMIX β-Carotene 10%; DSM; NJ) on growth performance and vitamin A, D, and E status of nursery pigs (n = 216; 5.81 ± 0.92 kg). The study was a 3 X 2 factorial with main effects being no fat, 3% saturated fat (choice white grease), or 3% unsaturated fat (soybean oil) and supplemented with either 4 mg/kg vitamin A or 40 mg/kg beta-carotene. Pigs were randomly assigned to mixed sex pens and dietary treatments. Blood samples from 1 pig per pen were taken at the beginning and end of the study to evaluate vitamin status. All data were analyzed using PROC GLIMMIX in SAS 9.4 with pen as the experimental unit. Repeated measures were utilized for growth performance as well as vitamin status. There were no significant differences ($P > 0.05$) for average daily feed intake, average daily gain, gain to feed ratio, and body weight throughout the study. There were no significant differences ($P > 0.05$) in the vitamin status at either the start or end of the study, although there is a significant time difference ($P < 0.05$) for each of the vitamins. There was a three-factor interaction ($P < 0.05$) for diet X sex X time for vitamin D. Vitamin A and D values were greater at the end of the study than at the beginning, but vitamin E values were less at the end of the study than at the beginning. In general, fat inclusion level, a type, or type of vitamin A source supplementation did not affect the growth performance nor the status of vitamin A, D, or E in the nursery pig.

Keywords: fat, nursery, vitamin status

61 Persistence and Distribution of African Swine Fever Virus in Feed and Feed Mill Environment Over Time After Manufacture of Experimentally Inoculated Feed and Subsequent Manufactured Batches of Feed. Catherine G. Elijah[1], Jessie Trujillo[1], Cassandra K. Jones[1], Taeyong Kwon[1], Charles R. Stark[1], Konner Cool[1], Chad B. Paulk[1], Natasha Gaudreault[1], Jason C. Woodworth[1], Igor Morozov[1], Carmina Gallardo[2], Jordan T. Gebhardt[1], Jurgen Richt[1], [1]*Kansas State University,* [2]*Animal Health Research Centre, Instituto Nacional de Investigacion y Technologia Agraria y Alimentaria*

Abstract: To reduce the risk of feed-based pathogens causing disease, some feed manufacturers quarantine high-risk ingredients before their inclusion in feed. Data exists that confirms this practice is effective, but there is no information about swine pathogen survival in mill environments. This objective of the study was to determine survival of African swine fever virus (ASFV) in swine feed and mill surfaces. A pilot-scale feed mill manufactured a batch of ASFV-free feed (Batch 1), followed by a batch inoculated with ASFV (5.6×10^4 $TCID_{50}$/gram; Batch 2). Then 4 subsequent ASFV-free batches were manufactured (Batch 3-6). After each batch,10 feed samples were aseptically collected in a double 'X' pattern. During feed manufacturing, 24 steel coupons were placed on the floor of the manufacturing area and feed dust settled on them during the milling process and overnight. Feed samples and steel coupons were stored at room temperature. Three of each were randomly selected and analyzed for ASFV DNA on d 1, 3, 7, 14, 28, 60, 90, and 180. The interaction of batch and day impacted ($P = 0.023$) the number of genomic copies detected per gram of feed. There were no differences of genomic copies/g in early batches; but the quantity of detectable ASFV decreased with increasing storage time after collection. In Batches 4-6, the greatest quantity of ASFV was detected on d 1, but the lowest quantity was detected on d 7, 60, and 28 or 180 for Batches 5, 6, and 7, respectively. There was no evidence ($P = 0.433$) of ASFV degradation on environmental coupons over the 180-d storage period. This study found that quarantine time can help reduce, but not eliminate ASFV in feed over time. However, ASFV survives on feed manufacturing surfaces for at least 180 d. Additional research is necessary to evaluate the viability of detected virus to cause illness.

Table 1. Detection and quantification of ASFV DNA in feed samples over time following manufacture of swine feed and subsequent feed batch sequencing[1]

	Batch of feed				
Item	2	3	4	5	6
Log_{10} genomic copies/g[2]					
d 1	4.7^{i}	$3.6^{f,g,h,i}$	$3.1^{d,e,f,g,h}$	$3.1^{c,d,e,f,g,h}$	$2.8^{b,c,d,e,f,g,h}$
d 3	$5.0^{h,i}$	$2.5^{a,b,c,d,e,f,g,h,i}$	$1.5^{a,b,c,d,e,f}$	$1.7^{a,b,c,d,e,f,g}$	$0.6^{a,b,c}$
d 7	$5.0^{h,i}$	$3.2^{b,c,d,e,f,g,h,i}$	$0.5^{a,b}$	$1.3^{a,b,c,d,e,f}$	$0.9^{a,b,c,d,e}$
d 14	$4.9^{h,i}$	$3.7^{b,c,d,e,f,g,h,i}$	$2.2^{a,b,c,d,e,f,g,h}$	$2.7^{a,b,c,d,e,f,g,h,i}$	$1.7^{a,b,c,d,e,f,g}$
d 28	$5.1^{h,i}$	$3.8^{b,c,d,e,f,g,h,i}$	$1.4^{a,b,c,d,e,f}$	$1.5^{a,b,c,d,e,f}$	0.00^{a}
d 60	$4.8^{g,h,i}$	$3.5^{e,f,g,h,i}$	$1.5^{a,b,c,d,e,f}$	$0.5^{a,b}$	$1.0^{a,b,c,d,e}$
d 90	$4.7^{g,h,i}$	$3.8^{b,c,d,e,f,g,h,i}$	$1.1^{a,b,c,d,e}$	$0.9^{a,b,c,d,e}$	$0.6^{a,b,c,d}$
d 180	$4.9^{h,i}$	$2.7^{c,f,g,h,i}$	$0.9^{a,b,c,d,e}$	$1.4^{a,b,c,d,e,f}$	0.0^{a}

[1]Batch 1 values were all 0.0 as this was the ASFV-free priming batch and not included in the statistical analysis.
[2]Log_{10} genomic copies/g of feed. Batch×day, P=0.023. SEM for batch 2, d 1=0.27; SEM for Batch 3-6, d 1=0.30; All other SEM=0.56.
[abc]Means lacking common superscript differ (P<0.05) using Tukey multiple comparison adjustment.

Keywords: African swine fever virus, feed safety, swine

58 Energy Values of Faba Beans and Field Peas Fed to Growing Pigs.

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Abstract: Faba beans (FB) and field peas (FP) are pulses and variation among cultivars may lead to differences in the response of pigs. Hence, information on the digestible energy (DE) and metabolizable energy (ME) of different cultivars is important. Two experiments (Exp) were conducted with growing pigs to determine the DE and ME of organic FB and Ds-Admiral FP (FPD) in Exp. 1, Hampton FP (FPH) and 4010 FP (FP4) in Exp. 2 using total collection method. Twenty-four barrows were individually housed in metabolism crates and assigned to 3 dietary treatments in a randomized complete block design with BW as blocking factor in each study. The reference diet was prepared to contain corn, soybean meal, and soybean oil as the sole sources of energy and the test ingredient was added to the reference diet at 300 g/kg. Daily feed allowance was estimated at 4.5% of mean BW of pigs in each block. On d 6 and 11, a marker was added to the first meal fed to the pigs and collection of feces started at the appearance of first marker in feces and stopped at the appearance of second marker. During this period, urine was quantitatively collected. In Exp. 1, diets containing FB or FPD had less ($P < 0.01$) DE and ME compared with the reference diet. The respective DE and ME were 3,772 and 3,603 kcal/kg DM in FB and 3,683 and 3,542 kcal/kg DM in FPD. In Exp. 2, diets containing FP4 had less ($P < 0.01$) DE and ME compared with FPH and reference diet. The DE and ME were 4,164 and 4,014 kcal/kg DM in FPH and 3,574 and 3,467 kcal/kg DM in FP4, respectively. In conclusion, the estimated energy values in FB and FP may be used in diet formulation.

Keywords: faba beans, field peas, energy