

**PSV-5 Effects of Benzoic Acid and an Essential Oils Blend on Detection of Swine Viruses in Inoculated Swine Feed and Premix.** Allison K. Blomme<sup>1</sup>,

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**Abstract:** Feed has been shown to harbor viable viruses over an extended period. This study investigated the use of benzoic acid (BA) and an essential oils blend (EO) to mitigate the presence of porcine epidemic diarrhea virus (PEDV), porcine reproductive and respiratory syndrome virus (PRRSV), and Senecavirus A (SVA) in a complete diet (Exp. 1) and a vitamin premix (Exp. 2). Experiment 1 consisted of a control with no additive, 0.5% BA, 0.5% BA and 200 ppm EO, 0.3% BA and 120 ppm EO, and 0.25% BA and 100 ppm EO. Feed samples were inoculated with PEDV, PRRSV, and SVA. For Exp. 2, the control contained no additive, and treatment had 2.68% EO included to mitigate PEDV. Inoculated feed or premix was stored at room temperature with sampling points at 2, 5, and 15 d post-inoculation (dpi). Samples were analyzed using triplex qRT-PCR to detect changes in RNA quantities for all viruses. Detectable PRRSV in the feed demonstrated a quadratic decrease over time ( $P = 0.038$ ). A significant treatment  $\times$  day interaction was observed in the feed for both PEDV ( $P = 0.008$ ) and SVA ( $P < 0.001$ ). The 0.5% BA treatment had greater ( $P < 0.05$ ) amounts of detectable PEDV on d 2 and 5 and decreased detectable PEDV on d 15 compared with control. The 0.5% BA treated feed demonstrated decreased ( $P < 0.05$ ) detectable SVA at 2 dpi but greater detectable SVA at 15 dpi compared with control. Both PEDV and SVA demonstrated viral degradation over time. The use of the EO in the vitamin premix had no evidence of main or interactive effects. In conclusion, 0.5% BA decreased PEDV at 15 dpi, but BA and EO mitigation in this model did not provide consistent evidence for increased viral degradation. However, time decreased detectability of all three viruses.

**Table 1.** Interactive effect of treatment and day on viral Ct values (Exp. 1)<sup>1</sup>

Virus	Day			SEM	Treatment $\times$ day	P =			
	2	5	15			Day	Linear	Quadratic	Treatment
PEDV					0.38	0.008	0.001	0.001	0.135
Control	28.3 <sup>a</sup>	31.4 <sup>a</sup>	32.7 <sup>a</sup>						
0.5% BA	27.3 <sup>f</sup>	30.3 <sup>d</sup>	33.8 <sup>a</sup>						
0.5% BA, 200 ppm EO	28.7 <sup>e</sup>	30.5 <sup>d</sup>	33.6 <sup>ab</sup>						
0.30% BA, 120 ppm EO	28.6 <sup>e</sup>	31.3 <sup>e</sup>	33.5 <sup>ab2</sup>						
0.25% BA, 100 ppm EO	29.0 <sup>e</sup>	31.1 <sup>d</sup>	33.0 <sup>ab</sup>						
PRRSV					1.54	0.672	0.001	0.038	0.847
Control	30.8	34.7	39.5						
0.5% BA	31.3	34.4	39.8						
0.5% BA, 200 ppm EO	31.2	34.1	39.7						
0.30% BA, 120 ppm EO	31.5	34.7	37.0 <sup>e</sup>						
0.25% BA, 100 ppm EO	31.5	34.5	36.2						
SVA					0.18	0.001	0.001	0.131	0.062
Control	27.7 <sup>e</sup>	28.7 <sup>bcde</sup>	29.4 <sup>a</sup>						
0.5% BA	28.2 <sup>f</sup>	28.5 <sup>bcdf</sup>	28.5 <sup>bcdf</sup>						
0.5% BA, 200 ppm EO	28.4 <sup>bcdf</sup>	28.3 <sup>ef</sup>	29.0 <sup>ab</sup>						
0.30% BA, 120 ppm EO	28.8 <sup>abcd</sup>	28.7 <sup>bcde</sup>	28.8 <sup>abcd</sup>						
0.25% BA, 100 ppm EO	28.6 <sup>bcdf</sup>	28.9 <sup>bc</sup>	28.7 <sup>bcde</sup>						

<sup>1</sup>An initial tissue culture (2.5 mL of each diluted virus inoculum, 10<sup>7</sup> TCID<sub>50</sub>/mL) was inoculated into 17.5 g of sow gestation diet (FEED) treated with benzoic acid (BA, DSM Nutritional Products Inc., Parsippany, NJ) and/or an essential oil blend (EO, DSM Nutritional Products Inc., Parsippany, NJ), or no chemical treatment with three replications per treatment unless otherwise noted. Data reported as cycle threshold (Ct) required to detect viral genetic material. Higher Ct values indicate less viral genetic material detected. <sup>2</sup>One outlier with Ct of 45 and studentized residual > 4 removed from analysis resulting in n = 2. <sup>a,b,c,d,e,f</sup>Means without common superscript within matrix-virus group are significantly different.

**Keywords:** chemical mitigation, essential oils, feed acidifiers