



UNIVERSITY OF MINNESOTA

Swine Disease Eradication Center

July 2016
Volume 5, Issue 7

www.cvm.umn.edu/sdec

SDEC Partners Research Update

Project Update: Comparison of Thermal and Non-Thermal Processing of Swine Feed and the Use of Selected Feed Additives on Inactivation of PEDV

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Background

- Previous research suggests that PEDV can be transmitted via contaminated feed
- Irradiation of poultry feed reduces the survival of *Listeria monocytogenes*
- High temperatures are effective in reducing other pathogens, including *Salmonella*
- Feed additives have been shown to reduce *Salmonella* concentration in poultry feed
- However, there is limited research focusing on the survival of PEDV in feed exposed to various processing treatments

Objective

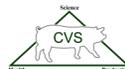
Determine if thermal and non-thermal methods of microbial inactivation, as well as the use of selected feed additives, are effective in reducing the survival of PEDV in experimentally contaminated swine feed

Results

- An irradiation dose of 17.25 kGy decrease virus concentration by 1 log and 3.5 log with 50 kGy
- To achieve a 1 log reduction in virus concentration, 130°C was the most efficient temperature.
- The first log reduction in virus concentration occurred after heating for 2.9 min at 130°C
- Novus Activate DA was the most effective additive, achieving a 1 log reduction in virus concentration in 0.81 days



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Conclusions

- ⇒ An irradiation dose of 50 kGy can inactivate low titers of PEDV in feed
- ⇒ High heat treatments can reduce PEDV concentration in feed, with 130°C for 15 min achieving a 3 log reduction
- ⇒ Additives were able to decrease virus concentration in feed, but effectiveness varied

Table 1. Comparison of PEDV inactivation when organic acids are added to complete swine feed based on manufacturers recommendations

Additive	Ingredients	Log reduction after 21 days	Weibul model	
			Delta ¹ value (days)	Adj. R ²
Control	no additive	1.4	17.23 ^{bc} ± 0.78	0.83
Ultracid P	orthophosphoric, citric, fumaric, and malic acids	1.6	13.00 ^{ac} ± 3.41	0.87
Activate DA	2-hydroxy-4-methylthio butanoic acid, fumaric and benzoic acid	2.0	0.81 ^a ± 0.52	0.78
Acid Booster	phosphoric, citric, and lactic acids	1.6	7.24 ^a ± 3.71	0.90
KEM-GEST	phosphoric, fumaric, lactic, and citric acids	3.8	3.28 ^a ± 2.05	0.83

¹ Different letters in the same column differ ($P < 0.05$)

Final Summary

Feed has been suggested as a possible vehicle of PEDV transmission. Results from this study have shown that both thermal (130°C for at least 15 min) and non-thermal (50 kGy eBeam dose) feed processing technologies can eliminate 99.9% of PEDV concentration). Additionally, the survivability of PEDV can be reduced by the use of selected acidifiers and organic acids in swine feeds. For future control of PEDV in feed, it is suggested that a combination of feed processing methods are used to maximize the total log reduction of virus.

Read the complete article: Trudeau MP, Verma H, Sampedro F, Urriola PE, et al. (2016) Comparison of Thermal and Non-Thermal Processing of Swine Feed and the Use of Selected Feed Additives on Inactivation of Porcine Epidemic Diarrhea Virus (PEDV). PLoS ONE 11(6): e0158128. doi:10.1371/journal.pone.0158128