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This study evaluated survival of important viral pathogens of swine or their surrogates in contaminated feed ingredients during simulated transboundary transportation. Based on global significance, 11 viruses were selected, including Foot and Mouth Disease Virus (FMDV), Classical Swine Fever Virus (CSFV), African Swine Fever Virus (ASFV), Influenza A Virus of Swine (IAV-S), Pseudorabies virus (PRV), Nipah Virus (NiV), Porcine Reproductive and Respiratory Syndrome Virus (PRRSV), Swine Vesicular Disease Virus (SVDV), Vesicular Stomatitis Virus (VSV), Porcine Circovirus type 2 (PCV2) and Vesicular Exanthema of Swine Virus (VESV). To model the survival of FMDV, CSFV, PRV, NiV, SVDV and VESV, surrogate viruses with similar physical properties and stability were used, and those consisted of Seneca Virus A (SVA) for FMDV, Bovine Viral Diarrhea Virus (BVDV) for CSFV, Bovine Herpesvirus Type 1 (BHV-1) for PRV, Canine Distemper Virus (CDV) for NiV, Porcine Sapelovirus (PSV) for SVDV and Feline Calicivirus (FCV) for VESV. Remaining assessments involved the actual pathogen. Controls included complete feed (positive and negative controls) and stock virus positive controls (virus only, no feed matrix). Virus survival was evaluated using either a Trans-Pacific or Trans-Atlantic transboundary model, involving representative feed ingredients, transport times and environmental conditions, with samples tested by PCR, VI and/or swine bioassay. Select viruses (SVA, FCV, BHV-1, PRRSV, PSV, ASFV and PCV2) maintained infectivity during transport, while others (BVDV, VSV, CDV and IAV-S) did not. Survival was maximized in ingredients such as conventional soybean meal, lysine hydrochloride, choline chloride, and vitamin D. These results demonstrate survival of certain viruses in specific feed ingredients ("high-risk combinations") under conditions simulating transport between countries. This work supports previously published data on the survival of Porcine Epidemic Diarrhea Virus in feed and provides further evidence indicating that contaminated feed ingredients may serve as risk factors for foreign animal diseases.

Key Words: swine, viral pathogens, feed ingredients

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105 Young Scholar Presentation: A Review of Medium Chain Fatty Acids and Their Recent Role in Feed Safety. R. A. Cochrane*[,1], R. G. Amachawadi[1], S. Remfry[1], A. B. Lerner[1], J. T. Gebhardt[1], T. G. Nagaraja[1], J. R. Pluske[2], M. C. Niederwerder[3], J. C. Woodworth[1], S. S. Dritz[1], C. K. Jones[1], *[1]Kansas State University, Manhattan, KS, [2]Murdoch University, Western Australia, Australia, [3]Department of Diagnostic Medicine/Pathobiology, Kansas State University, Manhattan, KS*

Medium chain fatty acids (MCFA), have been researched extensively to reduce the likelihood of animal feed being contaminated by biological pathogens, including bacteria and viruses. Medium chain fatty acids have shown to be bactericidal and bacteriostatic by incorporating themselves into the lipid membrane of bacteria, which alters the cell membrane permeability leading to cell death. However, the effectiveness can be dependent upon the MCFA chain length and species of bacteria. Most research completed prior to 2013 focused on the antimicrobial properties of MCFA. However, with the emergence of Porcine Epidemic Diarrhea Virus (PEDV), MCFA began to gain more attention for their potential uses in feed safety and swine nutrition as a potential antiviral additive. Medium chain fatty acids have shown repeated success against PEDV *in vivo* and *in vitro*. Notably, 2% MCFA [1:1:1 blend of caproic, caprylic, and capric] was equally successful at mitigating PEDV as commercially-available formaldehyde products in complete swine feed ($P>0.05$). However, the effectiveness varies within feed matrix, as MCFA was not as effective as formaldehyde at mitigation in spray dried animal plasma and meat and bone meal ($P<0.05$). A lower concentration of the MCFA blend (1%), as well as the individual addition of 0.66% caproic, 0.66% caprylic, or 0.66% capric acids also enhanced the RNA degradation of PEDV in complete swine feed ($P<0.05$). Other research has evaluated the same 2% MCFA blend in a transboundary based study, replicating the time and environmental condition that feed ingredients undertake during a trip from China to the United States. Again, the MCFA treated ingredients were deemed to be negative throughout the simulated transboundary trip ($P<0.05$). Medium chain fatty acids have also been evaluated as a surface decontaminate and as a potential feed mill flush step. However, the overall effectiveness was not as substantial as the results observed in the feed ingredient studies. Currently, it is not known what the exact mode of action of the MCFA is against PEDV, but it is hypothesize that the MCFA are interacting with the lipid bilayer envelope of the virus and altering the envelope in a way in which it cannot bind with the host receptors. This mode of action would be similar to that of the bacteria as both outer membranes consist of a lipid bilayer. Future research is now focused on the use of MCFA against other enveloped and non-enveloped swine viruses as well as an antibiotic alternative in swine production.