Holding Time Calculations for Feed Ingredients to Mitigate Virus Transmission

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The science on viral transmission through feed and feedstuffs is still relatively young, but it has yielded some interesting and potentially useful information on mitigating the spread of costly viruses, such as African swine fever (ASF). One study has shown the theoretical ability for pathogenic swine viruses to survive transport to the United States in imported feedstuffs.[1] Another one has shown the ability for ASF to infect pigs via feed and normal feeding activities.[2] Results such as these have increased interest in viral mitigation processes for feed ingredients, and more studies are expected.

Imported feedstuffs are not all manufactured and handled in the same way. Consideration should be given to the manufacturing conditions and how these products are handled and transported. Feedstuffs manufactured, sealed, handled and shipped under biosecure conditions that produce a product that is free of pathogens and that prevents post-processing contamination are not a risk to animal health. However, a feedstuff can pose an animal health risk if it is not produced under biosecure conditions, if it is produced under unknown conditions or if it is not sealed to prevent post-processing contamination. This is where holding time offers an opportunity for viral contaminants to naturally degrade.

Ingredients are transported either in sealed or secure containers (examples - Vitamins, Amino Acids, etc.) or non-sealed or non-secure containers, totes, etc. (examples - soybean meal, DDGS).

1. **Produced under biosecure conditions**
   a. Confirm with the product supplier that product safety steps and compliance are in place ***or***
   b. Use the FDA Foreign Supplier Verification Program and/or blockchain to confirm manufacturing conditions or handling.
2. **Produced under non-biosecure or unknown conditions**
   a. Hold the product prior to use under the appropriate time and temperature conditions to decrease risk from potential contamination
   b. Add a feed-ingredient mitigant to the product preshipping, which may shorten, but not eliminate, the holding time ***or***
   c. Consider not sourcing from regions/countries where FADs are present

The information in the table is for general informational and educational purposes only and is not to be construed as recommending or advocating any specific course of action.

Adding more holding time will give additional assurances of further viral degradation because variations of the same feed components might cause variations in holding time confidence. For example, according to research using Seneca Valley A, suggested to have the longest holding time of viruses studied, adding 30% to holding times would provide the opportunity for 99.999% degradation of contaminating viruses. More research is needed to confirm that the results could be extrapolated to other feed ingredients in like classes to those studied.

Mean Holding Time for 99.99% Degradation	Days at 4°C (39.6°F)	Days at 15°C (59°F)	Days at 30°C (86°F)
Conventional SBM	143	52	26
DDGS	494	182	26
Vitamin D	39	26	26
Lysine	78	13	13

The transit time to the United States of a potentially contaminated feed ingredient can be applied to the total holding time after the "born on date" if the ingredient is transported in such a way that would prevent further contamination. For example:

If Vitamin D in an overseas shipment took 14 days in transit to reach the United States and you need 26 total days of holding (beyond the "born on date"), then 12 more days of holding time will be needed before the feed is used.

Talk with your feed suppliers and ask for the "born on date" for all imported feed products. Detailed information about research leading to the holding time calculation can be found at **swinehealth.org** in a document authored by the American Feed Industry Association, *U.S. Pork Industry Organizations Provide "Options" for Handling Imported Feed Ingredients.* The document contains a definition for biosecure feed manufacturing facilities.

[1]Dee., S., F. Bauermann, M. Niederwerder, A. Singrey, T. Clement, M. DeLima, C. Long, G. Patterson, M. Shehan, A. Stoian, V. Petrovan, C.K. Jones, J. De Jong, J. Ji., G Spronk, J. Hennings, J. Zimmerman, B. Rowland, E. Nelson, P. Sundberg, D. Diel, and L. Minion. 2018. Survival of viral pathogens in animal feed ingredients under transboundary shipping models. PLoS ONE. 13(3): e0194509. https://doi.org/10.1371/journal.pone.0194509

[2]Megan C. Niederwerder, Ana M.M. Stoian, Raymond R.R. Rowland, Steve S. Dritz, Vlad Petrovan, Laura A. Constance, Jordan T. Gebhardt, Matthew Olcha, Cassandra K. Jones, Jason C. Woodworth, Ying Fang, Jia Liang, and Trevor J. Hefley. Infectious Dose of African Swine Fever Virus When Consumed Naturally in Liquid or Feed. Volume 25, Number 5. May 2019. https://wwwnc.cdc.gov/eid/article/25/5/18-1495_article

pork checkoff

National Pork Producers Council

American Association of Swine Veterinarians

SHIC Swine Health Information Center