# Holding Time Calculations for Feed Ingredients to Mitigate Virus Transmission

February 4, 2020

Recent studies have shown the theoretical ability for pathogenic swine viruses to survive transport to the United States in imported feedstuffs[1] and the ability for African swine fever virus (ASF) to infect pigs via feed and normal feeding activities.[2] The following mitigation options will be updated as more research results are published.

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

**Ingredients are transported either in sealed or secure containers (examples - vitamins, amino acids, etc.) or non-sealed or non-secure containers, totes, etc. (examples - SBM, DDGS).**

1. **Produced under biosecure conditions**
   a. Confirm with the product supplier that product safety steps and compliance are in place ***or***
   b. 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 allow for natural degradation of a potential contamination
   b. Addition of a feed-ingredient mitigant to the product preshipping may shorten, but not eliminate, the holding time ***or***
   c. Consider not sourcing from regions/countries where Foreign Animal Diseases (FADs) are present

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

Research using Senecavirus A (SVA) was used to calculate the following holding times after the "born on date" (the date of manufacture or the last potential contamination point in processing) to degrade 99.99% of potential viral contamination (based on viral half-life data). More research would be needed to confirm if these results could be extrapolated to other feed ingredients in like classes to those studied. Implementing additional feed biosecurity practices, such as sourcing from FAD-free countries of the world and/or adding a mitigant approved as a feed ingredient to whole feed, will increase feed safety confidence.

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

In addition, updated information about African swine fever half-life, under the conditions of transpacific shipment from Asia (average temperature of 54° F), is available. If the objective is to address potential ASF contamination in soybean meal the holding time is longer, although this experiment used slightly different temperatures than those used for SVA.

| Mean Holding Time for 99.99% ASF Degradation at 54°F Avg.[3] | | | |
|---|---|---|---|
| | Average | 95% Confidence Interval - Lower | 95% Confidence Interval – Higher |
| **Conventional SBM** | 125 days | 113 days | 135 days |
| **Organic SBM** | 168 days | 150 days | 186 days |
| **Choline** | 155 days | 142 days | 168 days |

The transit time to the United States of the 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:

26 days total holding time for Vitamin D at 59° F after sealing, or the "born on date", – 14 days in transit = 12 days further holding time needed to meet the 26 total holding days after the "born on date."

Talk with your feed suppliers and ask for the "born on date" for all imported feed products. To learn more about the original study on viral half-life, see Stability of SVA in animal feed ingredients at www.swinehealth.org/originalfeedholdingtime on the Swine Health Information Center website. Also, find biosecurity guidelines in Developing Biosecurity Practices for Feed & Ingredient Manufacturing at www.swinehealth.org/AFIAbiosecuritypractices from the American Feed Ingredient Association website.


[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

[3] Stoian, A., Zimmerman, J., et al. Half-Life of African Swine Fever Virus in Shipped Feed. Emerging Infectious Diseases. 2019;25(12):2261-2263. doi:10.3201/eid2512.191002.


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