K-STATE Research and Extension

SWINE DAY 2024

KANSAS STATE UNIVERSITY SWINE INDUSTRY DAY 2024

Survey of Biosecurity Practices Applied to Feed Ingredients Imported from ASF/CSF Positive Countries in the U.S. Swine Industry

Jamil E. G. Faccin, Jordan T. Gebhardt,[1] Olivia L. Harrison, Cassandra K. Jones, and Jason C. Woodworth

Summary

The importation of feed ingredients poses a well-documented threat of introducing African swine fever virus (ASFV) and Classical swine fever virus (CSFV) to the U.S. swine industry. The Biosecure Ingredient Imports Program, part of the U.S. Swine Health Improvement Plan (SHIP), developed a survey focusing on the importation of non-bulk feed ingredients to assess biosecurity practices from manufacturing in ASF/CSF-affected regions through arrival at a feed manufacturer in the United States. Four key biosecurity aspects were evaluated and graded based on a tiered system with four levels (1 to 4 stars), with biosecurity practices addressing traceability, biosecurity at origin, biosecurity upon arrival, and quarantine facility capabilities. Traceability ensures tracking from source to a U.S. warehouse. Biosecurity at origin includes using clean containers and disinfection protocols, and upon arrival, damaged products must be managed to prevent cross-contamination. Quarantine involves storing imported ingredients in a separate and biosecure manner for at least 30 days under controlled temperature. Eight swine production companies participated in the survey, revealing varying biosecurity practices. Data showed that non-bulk ingredients from ASF/CSF-affected regions are widely used in U.S. swine diets, with significant variations in biosecurity measures. Approximately 45% of these ingredients did not undergo any biosecurity measures and thus are characterized as being in the 1-star tier, 43% adhered to a 30-day holding period without temperature control, and only 12% were stored at or above 68°F. Amino acids, vitamins, and trace minerals comprised the bulk of imports, typically receiving 1- to 3-star biosecurity ratings. Enzymes, feed additives, and antibiotics generally were held to a higher biosecurity tier, with 2- or 3-star ratings. China was the primary source of non-bulk feed ingredients from ASF/CSF-affected regions, with ten countries identified as suppliers. The survey highlights the reliance on ASF/CSF-affected countries for non-bulk feed ingredients in the U.S. swine industry. While over half of these imports undergo some biosecurity practices, many do not meet critical holding time and temperature guidelines and are not always segregated from domestic ingredients. Although the risk of disease introduction through these imports is low, enhancing biosecurity measures is crucial to effectively mitigate potential risks.

[1] Department of Diagnostic Medicine/Pathobiology, College of Veterinary Medicine, Kansas State University.

Introduction

The risk of introducing viruses of veterinary significance through the importation of feed and feed ingredients from countries of high risk is well documented.[2,3,4] In the last five years, more than 30 countries have detected the African swine fever virus (ASFV) and Classical swine fever virus (CSFV) in feral pigs and/or commercial production. Most of these are in Europe and Asia, where many feed ingredients used by swine producers in the U.S. originate from. The U.S. Swine Health Improvement Plan (SHIP) is a collaborative effort involving industry, state, and federal officials tasked with establishing a "national playbook" of technical standards associated with biosecurity, traceability, and sampling/testing. As part of the U.S. SHIP, the feed biosafety working group developed the Biosecure Ingredient Imports Program. The initial target of the program is to investigate the biosecurity standards applied to any non-bulk ingredient (defined as 1 metric ton packaging or less) originating from or undergoing transit through a region with a known presence of ASF and/or CSF. Most of the non-bulk ingredients used in swine diets are vitamins, trace minerals, amino acids, enzymes, and other feed additives, and a significant amount of these are imported. Although the U.S. imports other feedstuff from areas affected by both viruses, the scope of the program at this stage will focus on non-bulk ingredients. The objective of this survey was to understand how non-bulk swine feed ingredients imported from ASF/CSF affected countries are treated from a biosecurity standpoint from the point of manufacturing until they become available for use in swine diets in the United States.

Materials and Methods

The scope of the survey was based on four actions that are suggested to mitigate the risk of introducing ASFV or CSFV through feed ingredient importation (Figure 1). The Animal Health Status of Regions from the USDA[5] was used as a reference to determine which countries are positive for ASF and CSF. Below, the four actions are explained:

Traceability

Suppliers/importers must have documented traceability practices with the ability to track individual lots of ingredients back to the source, including manufacture location, manufacture date, arrival date to port in the United States, and arrival date to the quarantine location within the United States.

Biosecurity at origin

Suppliers/importers must certify that a clean container is used when a product is loaded at the port of origin, including a protocol of disinfection of interior surfaces of shipping containers prior to loading using a United States EPA-registered disinfectant approved

[2] Niederwerder, M. C. 2021. Risk and mitigation of African swine fever virus in feed. Animals. 11(3):792. doi:10.3390/ani11030792.

[3] Stoian A. M. M., J. Zimmerman, J. Ji, T. J. Hefley, S. Dee, D. G. Diel, R. R. R, Rowland, M. C. Niederwerder. 2019. Half-Life of African swine fever virus in shipped feed. Emerg. Infect. Dis. 25(12):2261-2263. doi:10.3201/eid2512.191002.

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

[5] *https://www.aphis.usda.gov/regionalization-evaluation-services/region-health-status* Accessed 03/23/24

for use against ASFV applied at the validated concentration and allowed the appropriate contact time.

There must be no use of refurbished, or re-used bags or pallets. Recycled pallets that went through steam/high-temperature processes are accepted.

Products must be bagged, palletized, and shrink wrapped prior to loading into shipping containers or into the vessel storage hold.

Containers must be sealed and locked at port of origin with tamper proof seals.

Biosecurity upon arrival in the United States at ingredient importer warehouse

If a product arrives damaged, the supplier/importer must handle the product in a biosecure manner, including sealing of damaged packaging, cleaning and disposing of spilled material to prevent cross-contamination, and disinfecting surfaces contacting spilled material using a United States EPA-registered disinfectant approved for use against ASFV with appropriate contact time.

In case of product residues from damaged bags in trailers bringing products to the importer's warehouse, trailer areas with spilled materials must be properly cleaned and disinfected using a United States EPA-registered disinfectant approved for use against ASFV with appropriate contact time following transport of ingredients to quarantine warehouse.

Requirements of quarantine facility and process

Ingredients imported from ASF/CSF + countries should be stored separately from domestic ones to prevent cross-contamination and contact with personnel during the quarantine period.

Ingredients should be stored for a minimum of 30 days under controlled temperature before being eligible for transport to feed manufacturing facilities.

The quarantine facility should implement biosecurity measures to reduce the risk of employees and visitors becoming contaminated during the quarantine of incoming ingredients. The use of dirty/clean lines and signage in English and Spanish is recommended.

Employees and visitors are required to observe a five-day downtime period prior to being admitted entry to the facility following travel to a region with a known presence of ASFV and/or CSFV, regardless of pig contact.

Data collection

Nutritionists and procurement teams from eight swine production companies, totaling over 1.6 million sows, were contacted from October 2023 to March 2024 to introduce the program and invite them to volunteer for the survey. They were asked to provide information regarding biosecurity practices applied by the importer/supplier to non-bulk ingredients manufactured in ASF/CSF-affected countries and used in swine diets. Ingredient-specific information that was collected included:

- Inclusion rate in all swine diets.
- Numeric and volumetric participation in all swine diets.
- Country of origin.
- Category (amino acid, vitamin, trace mineral, enzyme, antibiotic, or feed additive).
- Ingredient status (Table 1, 4-star tier system based on importer biosecurity practices).

Results and Discussion

Data captured from the production systems were compiled into graphs. Figure 2 indicates an average of 31.4, 42.6, and 29.7% of non-bulk ingredients imported from ASF/CSF + countries used in nursery, grow-finish, and sow diets, respectively. However, the inclusion rate average in all three production categories is below 1% of the complete diet (Figure 3), being 0.92, 0.45, and 0.61% for nursery, grow-finish, and sow diets, respectively. Also, Figures 2 and 3 highlight the variation between systems in terms of the number and the inclusion rate of these ingredients.

Of all non-bulk ingredients coming from ASF/CSF + countries imported by the companies surveyed, 45% do not undergo any biosecurity practices at the warehouse (tier 1; Figure 4). Additionally, 43% guarantee 30 d of holding time since the container is sealed but hold the products in a common area and/or do not apply any temperature control, while 12% keep these ingredients at or above 68°F. Of the companies participating in the survey, none apply the 4-star practices to any feed ingredient.

Figure 5 depicts that amino acids, vitamins, and trace minerals represent the largest volume of non-bulk ingredients imported from ASF/CSF + countries and are classified as 1-, 2-, or 3-star standards. All enzymes, feed additives, and antibiotics undergo some biosecurity practices at the warehouse, reaching 2- or 3-star classifications.

Finally, Figure 6 points out that China is the main origin of the non-bulk ingredients imported from ASF/CSF + countries. The survey found 10 positive countries from which swine feed ingredients were sourced for the U.S. industry.

Results indicate the U.S. swine industry's reliance on ASF/CSF + countries for non-bulk feed ingredients. From swine production companies surveyed thus far, over 50% of these imports undergo biosecurity practices, but many do not meet minimum holding time and temperature requirements or are handled alongside domestic ingredients. Although the risk of introducing foreign diseases through non-bulk feed imports is low, it remains possible and additional information should be gathered to fully determine the risk and how to implement practices to mitigate it.

Brand names appearing in this publication are for product identification purposes only. No endorsement is intended, nor is criticism implied of similar products not mentioned. Persons using such products assume responsibility for their use in accordance with current label directions of the manufacturer.

Table 1. Four-star tier: biosafety practices when importing from ASF/CSF affected countries.

		★★★★	★★★★	★★★★	★★★★
Traceability		✓	✓	✓	✓ or ✗
Biosecurity	at origin	✓	✓	✓	✓ or ✗
	upon arrival	✓	✓	No clean truck policy	✓ or ✗
Quarantine	Area	Enclosed, dedicated forklift	Segregated, not enclosed	Common area	No control
	Time	≥ 30 d (at the warehouse)	≥ 30 d (at the warehouse)	≥ 30 d (since container sealed)	No control
	Temp.	≥ 75°F	≥ 68°F	No control	No control

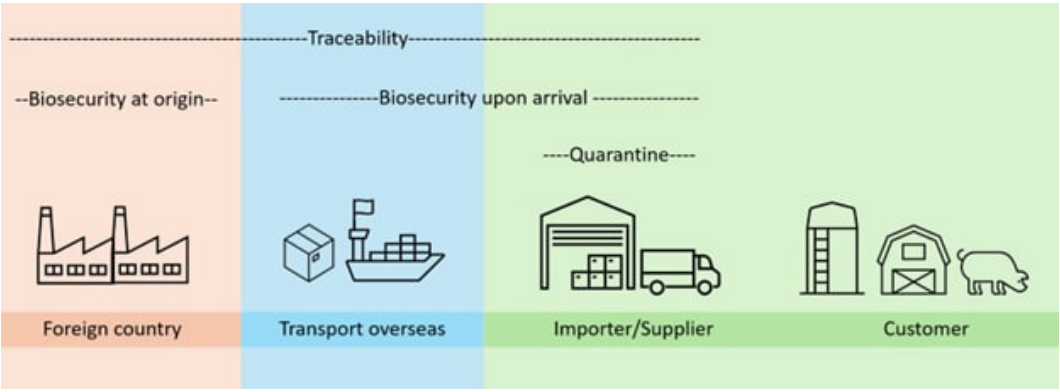

Figure 1. Sites where each of the four biosecurity practices were evaluated.

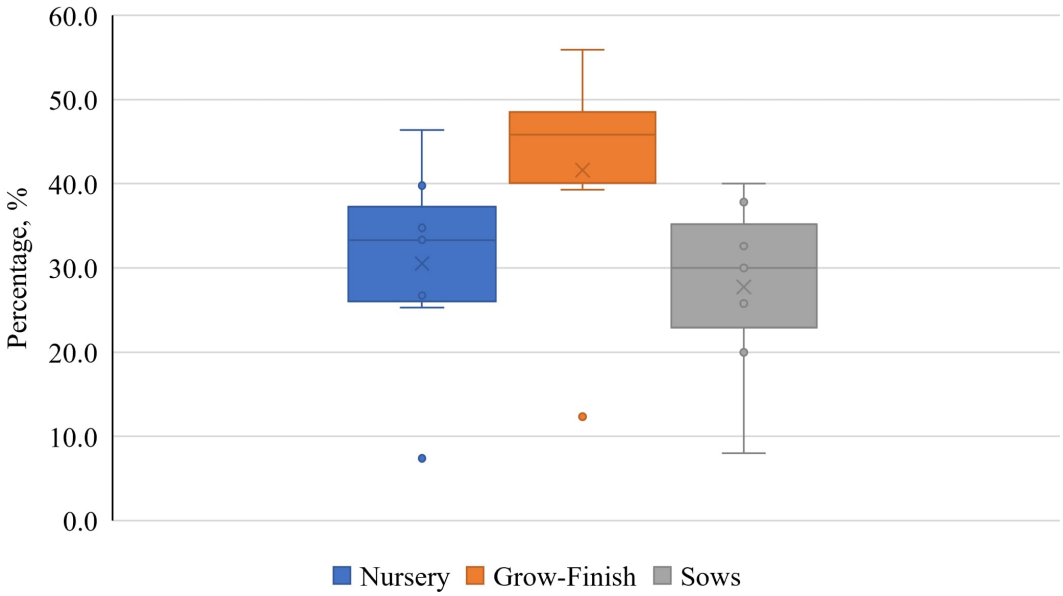

Figure 2. Percentage distribution of the number of ingredients (non-bulk imported from ASF/CSF + countries) in complete nursery, grow-finish, and sows' diets from eight production companies.

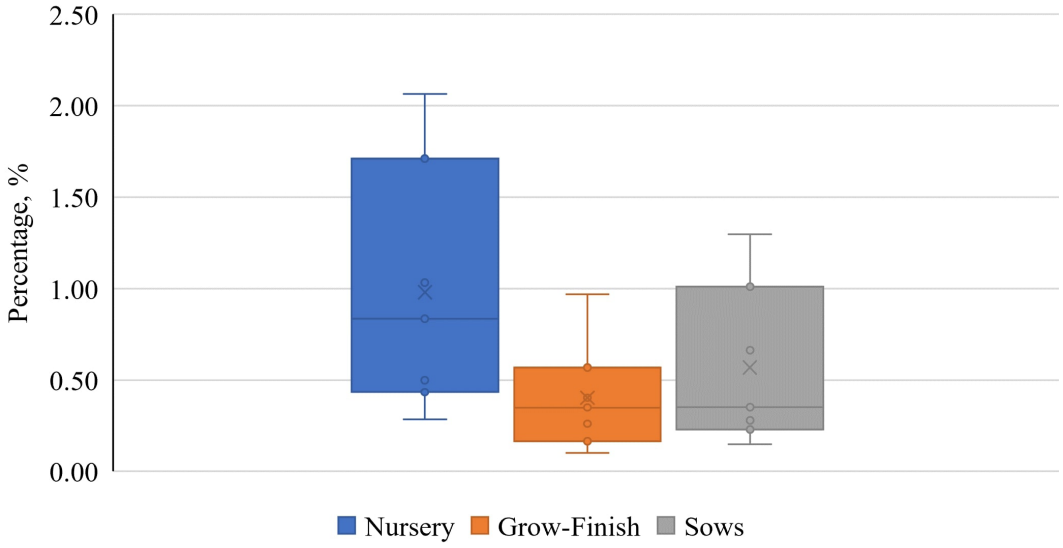

Figure 3. Inclusion rate distribution of ingredients (non-bulk imported from ASF/CSF + countries) in complete nursery, grow-finish, and sows' diets.

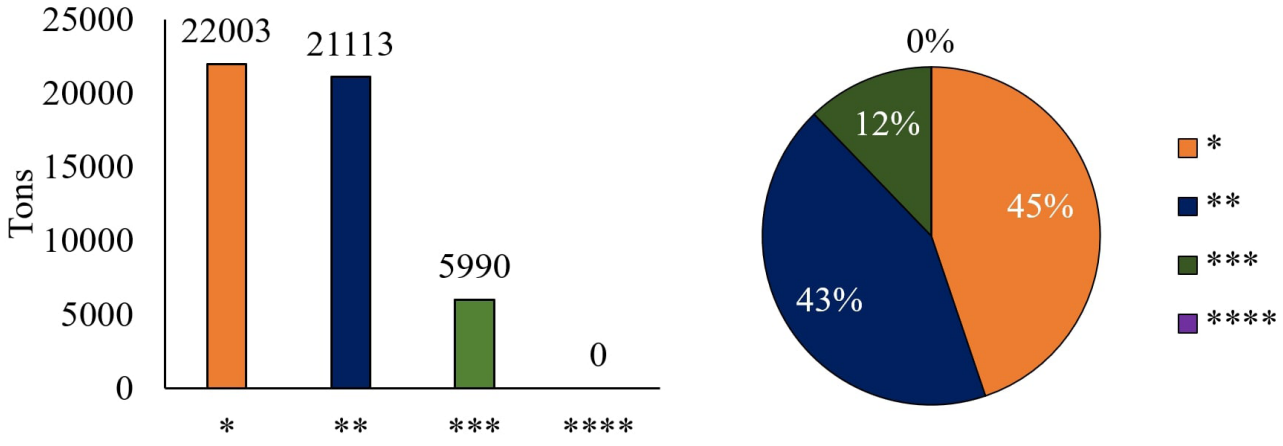

Figure 4. Tons and percentage of ingredients (non-bulk imported from ASF/CSF + countries) according to the four-star tier of biosecure practices. The number of stars refers to the biosecurity tier system that is described in greater detail in Table 1.

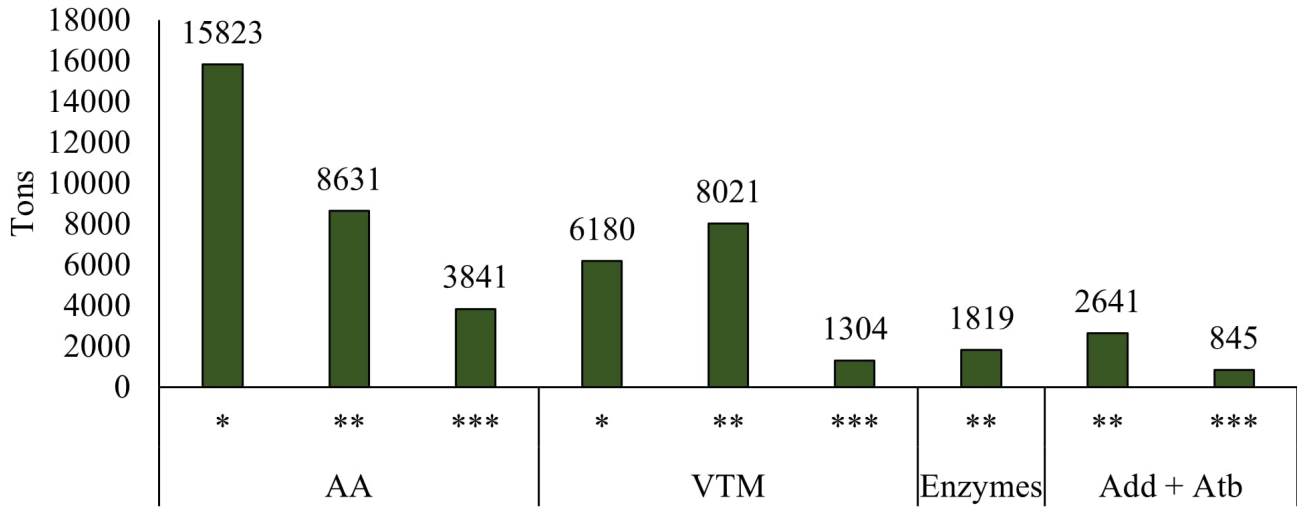

Figure 5. Tons and category of the ingredients (non-bulk imported from ASF/CSF + countries) according to the four-star tier of biosecure practices. The number of stars refers to the biosecurity tier system that is described in greater detail in Table 1.

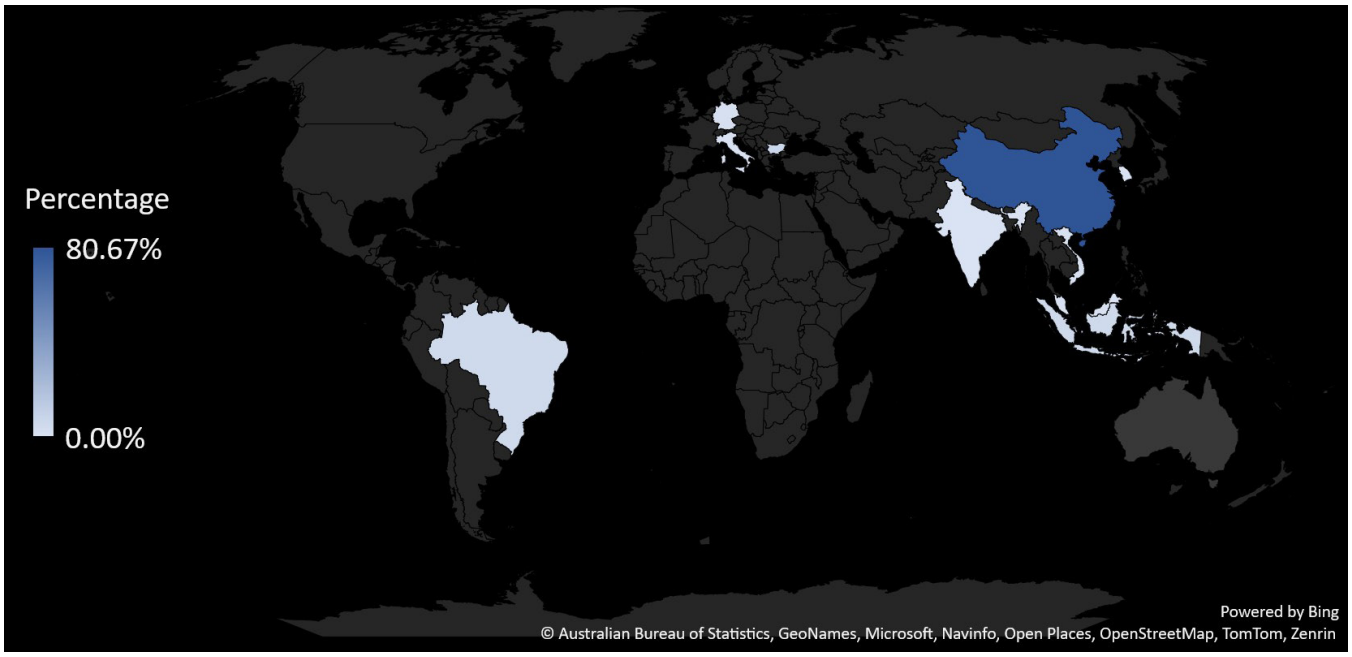

Figure 6. Percentage of ingredients (non-bulk imported from ASF/CSF + countries) according to its country of origin.