

NPB FINAL RESEARCH GRANT REPORT FORMAT

Facilitating the U.S. Swine Health Improvement Plan Feed Biosecurity Working Group

Project # 22-027

Jordan T. Gebhardt

Kansas State University

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Industry Summary:

The US Swine Health Improvement Plan (US SHIP) has experienced tremendous support since its inception. One of the core concepts of biosecurity incorporated into the program has been Feed Biosafety. With the support of this project, our team has been able to coordinate the efforts of the US SHIP Feed Biosafety working group. The objective of this project was to determine appropriate application of best practices for responsible import of feed and ingredients from ASF/CSF affected countries and to develop industry standards for feed biosecurity that can be rapidly implemented across the swine and feed industry in the event that ASFV or CSFV enters the US domestic and/or feral swine population. Using a working group consisting of 30-35 industry stakeholders representing swine producers, nutritionists, veterinarians, and allied industry, we have been able to have robust discussions related to these topics ultimately presenting information for consideration by the US SHIP HOD for deliberation and securing consensus on whether to include in the program. With the support of this National Pork Board-funded project, we have been able to make substantial progress focused on Feed Biosafety within the framework of the US SHIP program. As the US SHIP program transitions to a USDA Animal Health program, the discussions, dialogue, and contributions of the Feed Biosafety working group continue to be an important component of the US SHIP program. Feed Biosafety is extremely complicated as it impacts many segments of the feed and ingredient supply chain, but is an essential component of the greater industry effort to prevent foreign-animal disease incursion or spread within the United States. Further evaluation and understanding of feed ingredient import practices should be considered as the US SHIP program continues to grow. Specifically, how feed biosafety practices could be implemented on a national scale and how such practices should fit within current regulatory policy needs to be defined.

Key Findings:

- The US swine industry has focused and improved many aspects of feed biosafety in recent years.
- There has been strong support for Feed Biosafety within the US SHIP program, with information presented at every HOD meeting including working group updates, proposed and approved resolutions, and program standards.
- Current Feed Biosafety program standards within the US SHIP program include prohibition of “garbage” or “swill” feeding and defined feeding practices in the event of an ASF/CSF incursion into the US.
- Current practices have been characterized for non-bulk feed ingredient imports into the US from countries/regions affected by ASF and/or CSF.

Keywords: Feed biosecurity, US Swine Health Improvement Plan, US SHIP, biosecurity, biosafety

Scientific Abstract:

The US Swine Health Improvement Plan (US SHIP) is an animal health certification program that has undergone substantial development since its inception as a case study completed in 2019. Since that time, the program has grown as a collaboration between producers, state, and federal partners aimed to establish a platform to safeguard, improve, and represent health status across participating farm sites, supply chains, states, and regions. Initially developed through the leadership of a group of collaborators largely at academic institutions, the program rapidly grew with the support of swine producers, packers, and state and federal partners and has made progress towards becoming a fully-codified USDA Animal Health program. At the core of the US SHIP program, working groups have been focused on establishing dialogue focused on biosecurity, sampling and testing, and traceability. Many of these discussions resulted in program standards considered and ultimately voted upon by the US SHIP House of Delegates body. Within the biosecurity efforts of the US SHIP program, Feed Biosafety has been very active since the program's inception. This project largely supported the efforts of the Feed Biosafety working group by providing for travel and salary expenses associated with coordination of the working group. Through these efforts, several resolutions have been passed by the US SHIP HOD and program standards have been incorporated into the program. Current program standards related to feed biosafety include the requirement that participants not participate in "garbage" or "swill" feeding, and an additional standard that outlines feed practices that will be implemented in the event of an ASF/CSF incursion into the United States. Using the framework of the US SHIP program, the Feed Biosafety working group has discussed the latest scientific findings related to feed biosafety and provided recommendations for consideration by the US SHIP HOD. The working group includes a broad range of stakeholders representing US SHIP stakeholders, swine producers, feed ingredient suppliers and feed industry representation, state, and federal partners. In addition to the program standards that have been incorporated into the US SHIP program, the working group also has extensively discussed practices associated with importing feed ingredients into the US from countries and regions affected by ASF/CSF. Through these efforts, a wide range of current practices have been identified and implemented with the goal of reducing risk of ASF/CSF introduction via imported feed ingredients. A practice implemented by many participants in our working group was extended holding time of ingredients imported from ASF/CSF affected regions. While such a practice has been shown to be quite common, there is significant variability in the specifics of this process including differences in duration of ingredient quarantine, when the clock starts for the quarantine period, as well as environmental storage conditions. For such practices to be consistently and effectively incorporated across a wide spectrum of swine producers, there needs to be greater clarity and consensus regarding what specific practices should be incorporated. Furthermore, questions remain regarding how such a program could be implemented on a meaningful scale including communication between ingredient manufacturers, distributors, feed manufacturers, and swine producers. The US SHIP Feed Biosafety working group aims to create a set of commonly accepted practices and create a framework upon which a responsible import program can be implemented by the US swine industry. With the support of this National Pork Board-funded project, we have been able to make substantial progress focused on Feed Biosafety within the framework of the US SHIP program. As the US SHIP program transitions to a USDA Animal Health program, the discussions, dialogue, and contributions of the Feed Biosafety working group continue to be an important component of the US SHIP program.

Introduction:

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. Since its inception, the program has grown as a collaboration between producers, state, and federal partners aimed to establish a platform to safeguard, improve, and represent health status across participating farm sites, supply chains, states, and regions.

Initially developed through the leadership of a group of collaborators largely at academic institutions, the program rapidly grew with the support of swine producers, packers, and state and federal partners and has made progress towards becoming a fully-codified USDA Animal Health program. At the core of the US SHIP program, working groups have been focused on establishing dialogue focused on biosecurity, sampling and testing, and traceability. Many of these discussions resulted in program standards considered and ultimately voted upon by the US SHIP House of Delegates body. Within the biosecurity efforts of the US SHIP program, Feed Biosafety has been very active since the program's inception.

Within the scope of feed biosafety within the US SHIP program, there have been two primary areas of focus. 1) Determining best prevention and response plans within the US feed industry (domestic practices such as "garbage" feeding), and 2) understanding the hazards associated with feed ingredient importation from countries or regions affected by ASF and/or CSF. To address the risk of ASF/CSF transmission through improper handling and processing of food waste that has the potential to contain pork products, a program standard was discussed and ultimately approved at the inaugural HOD meeting that prohibits program participants from feeding food waste that has the potential to contain pork products. After this initial discussion and program standard, the efforts of the Feed Biosafety working group began to spend additional time focused on feed ingredient important practices into the US as a means to minimize risk of ASF or CSF incursion into the US.

The risk of introducing viruses of veterinary significance through the importation of feed and feed ingredients from countries of high risk is well documented. 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. As part of the US SHIP program with the support of this project, the feed biosafety working group developed the Biosecure Ingredient Imports Program. The initial target of the program was 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 focused on non-bulk ingredients. With this initial survey and assessment of current practices, the objective 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.

Objectives:

The overall goal of this project was to facilitate the U.S. Swine Health Improvement Plan Feed Biosecurity Working Group to create opportunities for discussion, debate, and ultimately present information to the US SHIP HOD for consideration to incorporate into the US SHIP program. Specifically, the objective were:

- Objective 1: Determine appropriate application of best practices for responsible import of feed and ingredients from ASFV- and CSFV-endemic regions.
- Objective 2: Develop industry standards for feed biosecurity that can be rapidly implemented across the swine and feed industry in the event that ASFV- or CSFV- enters the U.S. domestic and/or feral swine population.

Materials & Methods:

To complete this objective, the Feed Biosafety working group was established representing a diverse set of stakeholders of nutritionists, veterinarians, SHIP leadership, and allied industry input specifically with representation of the feed industry and ingredient suppliers. The goal was to establish the working group to be comprised of stakeholders representing many different aspects of the supply chain from large producers all the way down to small scale producers. In total, there have been approximately 30-35 members active within the working group. Through electronic communication, web-based video calls, and in-person meetings dialogue was facilitated to discuss the topics of importance. Using these initial small-scale discussions, we were able to openly discuss the current status and potential paths forward and then present information and

recommendations to the larger US SHIP HOD body. We have actively communicated information such as resolutions and/or program standards at every US SHIP HOD meeting.

Most recently, the working group has established a framework of ingredient import practices called the Biosecure Ingredient Imports Program. This was initiated as 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. 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 USDA¹ was used as a reference to determine which countries are positive for ASF and CSF. Below, the four actions are explained:

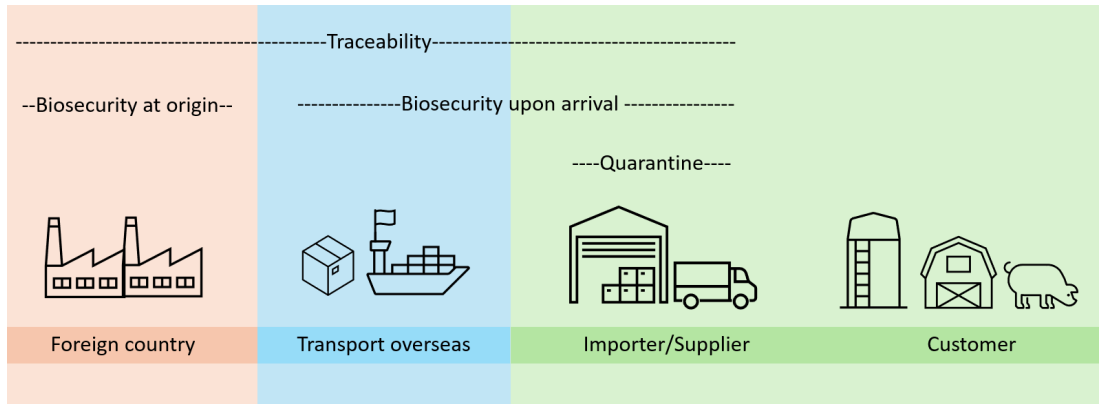


Figure 1. Sites where each of the four biosecurity practices were evaluated.

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 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

¹<https://www.aphis.usda.gov/regionalization-evaluation-services/region-health-status> Accessed 03/23/24





- 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).

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

					
Biosecurity	Traceability	✓	✓	✓	✓ or ✗
	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

Results:

Objective 1:

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.

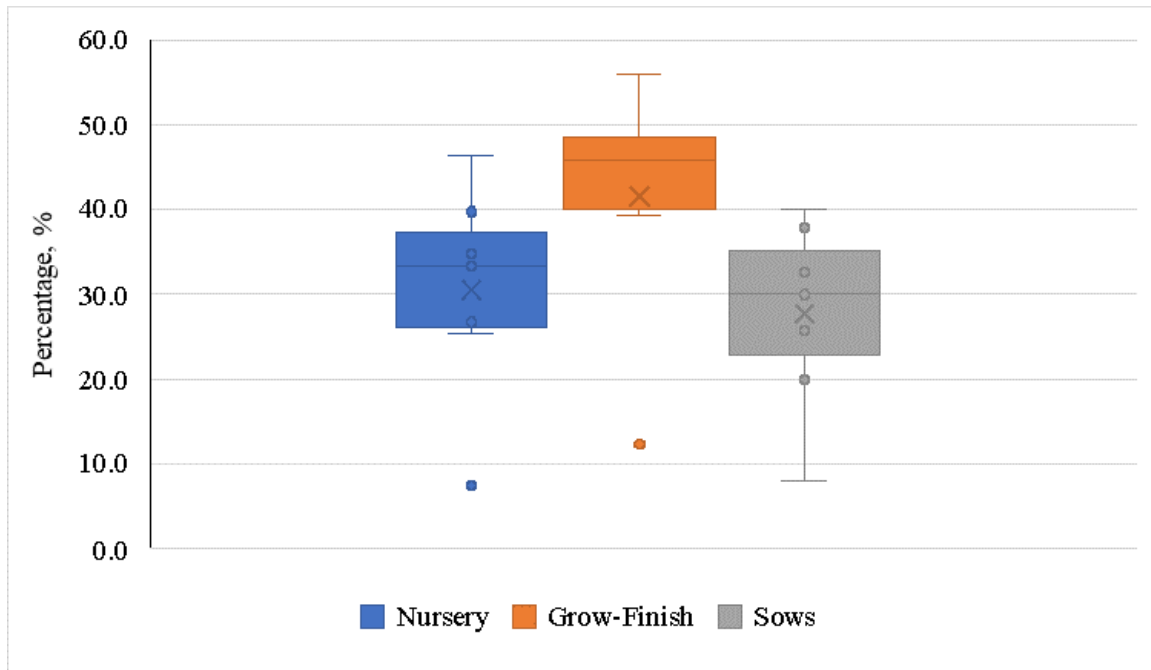


Figure 2. Percentage distribution of the number of ingredients (non-bulk imported from ASF/CSF + countries) in complete nursery, grow-finish, and sows' diets from eight production companies.

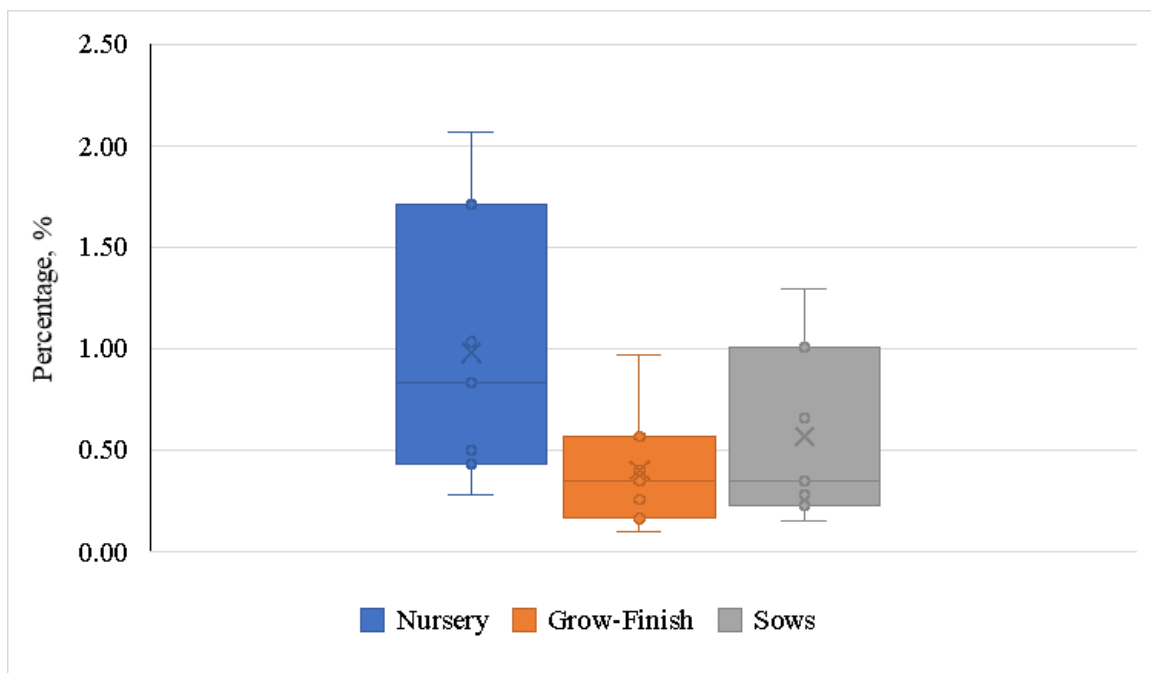


Figure 3. Inclusion rate distribution of ingredients (non-bulk imported from ASF/CSF + countries) in complete nursery, grow-finish, and sows' diets.

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.

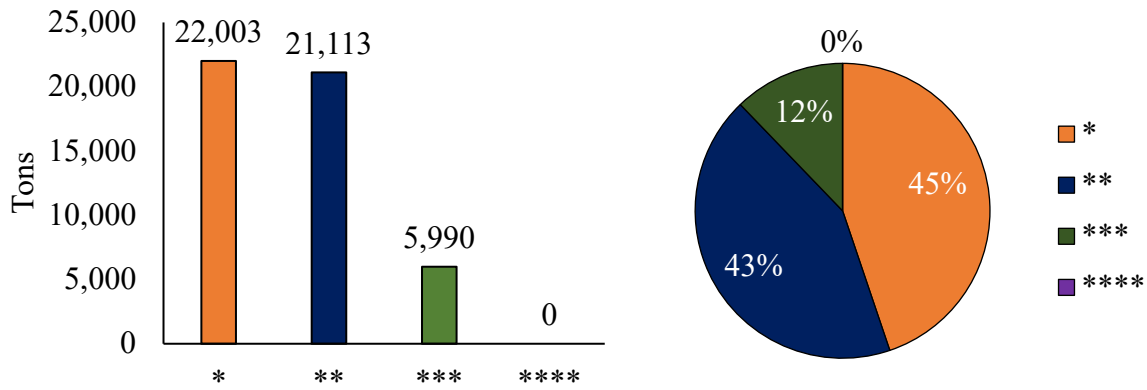


Figure 4. Tons and percentage of ingredients (non-bulk imported from ASF/CSF + countries) according to the four-star tier of biosecure practices. The number of stars refers to the biosecurity tier system that is described in greater detail in Table 1.

Figure 5 depicts amino acids, vitamins, and trace minerals as 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.

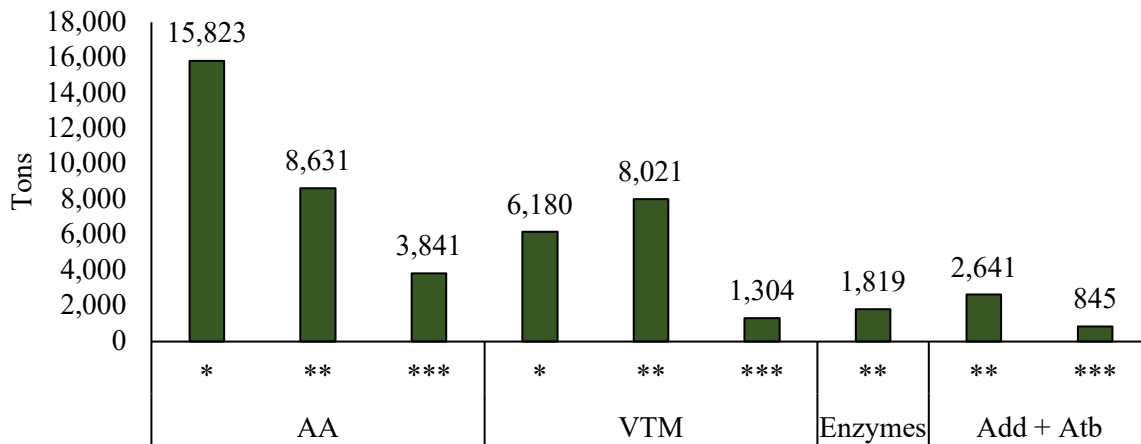


Figure 5. Tons and category of the ingredients (non-bulk imported from ASF/CSF + countries) according to the four-star tier of biosecure practices. The number of stars refers to the biosecurity tier system that is described in greater detail in Table 1.

Results indicate the U.S. swine industry's heavy 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. Using this information of current practices,

progress can then be made using scientifically valid research findings to have further dialogue regarding feed ingredient import practices into the US.

Objective 2:

In the event of an ASF/CSF incursion into the US, we have established a program standard within the US SHIP program that would temporarily modify feeding practices for porcine-origin ingredients (Figure 6). This program standard would be implemented only in the event of an ASF/CSF incursion, and with further discussion with the working group following questions from industry stakeholders it was determined that this standard should be implemented as soon as practically achievable if the need arises. This means that feed already manufactured and delivered to a site can continue to be fed, any feed in transit can continue to its final destination, and that no further feed should be manufactured for the purpose of feeding to swine unless the conditions necessary for lifting of the temporary cessation have been incorporated.

<p>In the event of an ASF or CSF incursion into the US (ASF/CSF Risk Level 3; immediately after incursion, or if state/region positive), participants are to implement a temporary cessation of feeding spray-dried plasma, blood meal, meat and bone meal, intestinal peptide products, or other meal-based feedstuffs that have the potential to be of porcine origin.</p>	
<p>This temporary cessation will be lifted if ingredients described above are sourced from:</p>	
<p>a. Suppliers with enhanced post-processing biosafety measures in place^{1,2} b. States or regions at ASF/CSF Risk Level 2 (Operations normalizing, State or Region negative). c. US returns to ASF/CSF Risk Level 1 (US Negative).</p>	
<p>¹Requirements of post-processing treatment facilities:</p> <p>Enhanced post-processing treatment must occur at facilities that have premises level segregation from:</p> <p>Premises in which protein sources of porcine origin were initially heat treated (rendered or spray-dried) in accordance with feed grade safety requirements.</p> <p>AND</p> <p>Finished feed facilities manufacturing feed for swine.</p>	<p>²Approved post-processing treatments:</p> <p>Thermal processing</p> <p>OR</p> <p>Ingredient quarantine/holding time and temperature</p>

Figure 6. Current US SHIP program standard for modified feeding practices in the event of an ASF/CSF incursion into the US (from current US SHIP program standards document).

Discussion:

Ultimately, the United States animal health and pork production industries wish to reduce the risk of ASFV- and CSFV- entry, as well as be prepared for its potential transmission throughout the feed supply chain. When porcine epidemic diarrhoea virus entered the U.S., our industry did not understand the potential role of feed-based transmission and, as such, we were underprepared. This allowed the disease to quickly spread to multiple sites and be introduced to naïve animals through the feed supply chain. In a similar fashion, both controlled and field research has demonstrated the ability for the feed supply chain to play a role in ASFV-transmission. We collectively understand that steps must be taken to reduce the risk of ASFV- and CSFV-entry through feed, ingredients, and garbage intended for consumption by U.S. pigs, but also that we must simultaneously prepare for rapid implementation of domestic feed biosecurity if the virus were to come within our borders, regardless of the means of entry.

Through the US SHIP program, we have been able to collect input from a wide variety of stakeholders to discuss, debate, and ultimately present information to the US SHIP HOD for consideration. With this information made available, the US SHIP HOD has voted to include two program standards focused on Feed Biosafety and work continues to better understand how scientifically supported best practices for feed ingredient import can be incorporated on a national-scale. The NPB choice to fund this proposal has directly supported these efforts to build and enhance the US SHIP program based on working group member input and feedback leading to meaningful discussion and content for consideration at the HOD meetings.