

African Swine Fever-Vitamin Supply Chain Workshop Notes
April 26, 2019
University of Minnesota – St. Paul Campus
1364 Eckles Ave.

Executive summary:

- 1) Group composed of pork industry representatives (National Pork Board, National Pork Producers Council, American Association of Swine Veterinarians, Swine Health Information Center), vitamin manufacturers and blenders (Adisseo, ADM, Cargill, DSM, JNJ Oriental, Land O' Lakes/Purina/NutraBlend, VitaPlus), University of Minnesota, and feed industry (American Feed Industry Association) acknowledged that contaminated feed and feed ingredients can be a vector of ASF transmission. Therefore, it is imperative that actions be taken to avoid virus entry into the U.S. from feed products and cross-contamination.
- 2) Vitamin suppliers have industry wide standards for ingredient safety that minimize the opportunity for virus introduction. However, pork producers are responsible for knowing their suppliers and asking the right questions to screen potential suppliers that do not follow standards of safety. A comprehensive description of the entire vitamin supply chain is needed and a unified, accurate, and consistent message to the pork industry. Several vitamins are produced exclusively in China, while others are also primarily produced in China by a few manufacturers. Likewise, most vitamin manufacturers produce human and animal grade vitamins using the same quality assurance and controls that meet human grade standards.
- 3) Most meeting participants consider the risk of ASF introduction from vitamins to be low but recognize that, if contaminated, vitamins can be a vehicle for virus introduction in the U.S.
 - a. Preliminary observations of vitamin manufacturing suggest:
 - i. Vitamins are produced by chemical or fermentation processes, which use time, temperature, and pH conditions that are likely to inactivate the virus. Post-processing sanitation and transportation practices are essential to prevent cross contamination.
 - ii. Pure, concentrated forms of vitamins are produced and transported into the U.S. at the highest concentration possible to decrease transportation cost. Therefore, there is almost no blending with carriers or post-processing at the place of origin (e.g. China).
 - iii. Gelatin coatings are applied to some vitamins (e.g. Vit A, D₃) to provide stability and reduce potency losses, but may be a source of virus in vitamin products. However, most manufactures use multiple processes (e.g. extraction, sterilization) that are likely to inactivate the virus in gelatin.
 - iv. However, blending of choline chloride with corn cobs at the country of origin (e.g. China) may be of concern that needs to be investigated.
 - b. Preliminary observations of the vitamin supply chain:
 - i. Most suppliers pack vitamins in sealed containers and have extended chain of custody of products (> 80 days). Additional holding times may decrease vitamin potency. However, current holding times (approx. 90 days) from the time of manufacturing, and the duration of extended holding times in vitamin premixes before use in commercial feed mills (approx. 6 months) seem sufficient to inactivate the ASF virus based on current research information.
 - ii. There are 3rd party certification programs (GMA, GMP+, FAMI-Q) that likely decrease chances of product cross contamination with blood, feces, and animal products that may be contaminated with the ASF virus.
 - iii. All participants acknowledge that the existence of unconventional, non-certified, or uninspected suppliers may pose a heightened risk of ASF introduction. Therefore, all participants recommend that pork producers **know their vitamin suppliers and request documentation to verify that vitamin sources use certification programs.**

Developing a simple questionnaire or decision-tree for pork producers may help with screening vitamin suppliers.

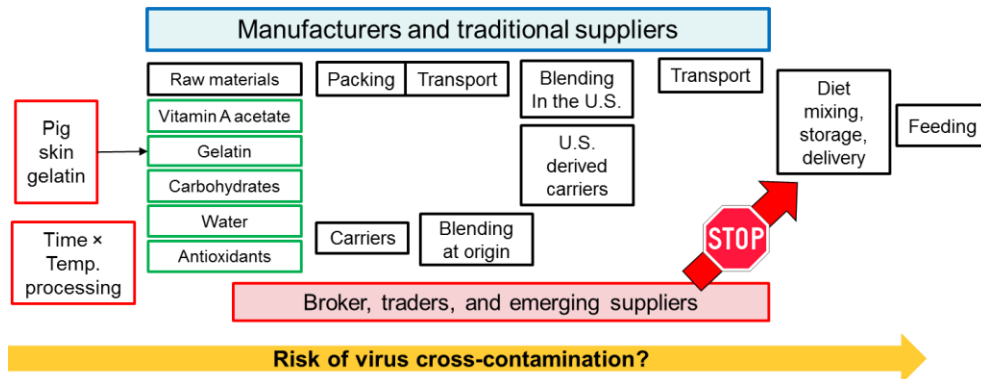


Figure 1. Generalized diagram of vitamins manufacturing and supply chain

- 4) Research and development:
 - a. A surrogate for ASF virus can be a useful method for monitoring processes that can inactivate the virus if it was present.
 - b. Develop 3rd party biosecurity modules and audits that could be implemented for feed ingredient manufacturers.
 - c. Risk assessment of virus transmission throughout the vitamin supply chain would be useful.
 - d. Blockchain technology could be used for transparency and trust in the vitamin supply chain.
- 5) Communication:
 - a. A clear, transparent, and unified message is needed to educate the feed and pork industry to decrease confusion and suspicion of the perceived risks of virus transmission in the vitamin supply chain. Key components of this story include: 1) what is known about ASF virus characteristics, survival, and inactivation, 2) general description of raw materials, chemical and fermentation processes used to produce various vitamins, 3) current quality assurance programs, 4) packaging and transport, 5) potential for cross contamination from other porcine derived feed ingredients in multi-species feed mills, 6) approved sources vs. brokers and traders, and 7) holding times, origin of carriers, and premix manufacturing processes used before delivery to feed mills and commercial swine farms.

Introduction:

- Dr. Shurson read anti-trust guidelines (handed out before meeting)
- ASF continues to spread and is a significant threat to U.S. agriculture.
- Some vitamins have been identified as potential risk factors
- Pre-workshop survey results: motivation
 - Learn about vitamin industry
 - Share knowledge and concern
 - Determine if a surrogate ASFv screening assay would be useful
 - Determine relative risk and mitigation strategies
 - Develop educational materials
 - Begin conversation, identify needs, develop action plan

Groups assessment of risk (participants were asked for their assessment of risk and reasons why):

- Low
 - Risk is low because gelatin in vitamin A was only one of a few potential contamination sources and cross-contamination during blending was limited because blending occurs predominantly in the U.S. There are biosecurity controls through supply chain.
 - Manufacturing process and facilities have safe practices already in place resulting in minimal risk for cross contamination
 - Long supply chain from China, large number of days during shipment before the mix is incorporated into premix (estimate average over 80 days)
 - 3rd party audit validates best practices, this is a documented process
 - Survival of ASFv has raised some concerns - feed and feed ingredients should be on our radar after PEDv
 - Note: Participant pointed out it has not been 100% confirmed that PEDv was initially introduced by feed, but was later confirmed that it was likely disseminated in feed after entry. Participant: PEDv is completely different from ASFv, but shares characteristics with longevity and survival ability. Can take lessons from PEDv but cannot make assumptions on how ASFv will behave. Difficult to prove Koch's postulate: evidence does not need to be 100% to allow you to move forward.
 - Post-processing contamination of vitamins could be a risk, but there is a potentially higher risk for other feed ingredients.
 - Production practices and manufacturing processes prevent entry. Feed/vitamins likely not the reason it gets here, but can potentially be the reason that it spreads.
 - USDA risk assessment supports low risk. Also, the volume of imported vitamins compared to other feed ingredient imports is low, and there is a low diet inclusion level of vitamins.
 - Animals can be infected by eating contaminated feed, but there is currently no research on the amount of contamination identified.
 - Chain of custody in Company 1 is 120 days. Once it is in blend facility there are multiple supplier questionnaires that are reviewed and vetted before blending (this is done on a global basis). Concerns will lead to facility audit.
 - There is a global standard quality system because a large amount of vitamins go to the human food industry and so they have higher standard and are produced using the same production processes and lines.
 - Since the ASF outbreak in China, the Minister of Agriculture in the Chinese government provides information on the infected areas, and plan can be adjusted based on current threats.
 - Closed packaging system (double package possibly?)
 - Dee research did not support survival over 34 days in Vitamin D. Note: Dee research paper had sample size of 2.
 - Production facilities have low likelihood of contamination with manure, blood, and other fluids
 - What is Food Safety Modernization Act?
 - Should ASFv be considered a hazard that should be controlled like salmonella?
 - Vitamin production occurs in a well-controlled environment and it is easy to limit potential contamination.
 - Vitamins produced by chemical synthesis controls potential viral load
 - Note: There is a range in relative risk in the low category where pork producers would like risk to be 0, not negligible risk. There may be tension between producer expectations of zero risk and the practical ability to achieve it.

- Medium
 - Low doses can still contribute to high cross contamination risk
 - Chemical synthesis, fermentation pathways (using corn for fermentation), choline chloride has corn cob carrier. This overall produces higher risk when lumping them all together because of potential contamination of one potential source.
 - Initial media attention and serious concerns of producers
 - Amount of focus in the room
 - The challenge is not our assessment- the challenge is the producer's assessment and the producer risk assessment is medium. Producers have concerns on what the vitamins are mixed with and the country of origin of the carriers used. We need of clear and accurate communication of messages to pork producers.

- High
 - Pre-emptive. If the consequences are very high and severe, we instead should expect high initial concern until we conduct a risk assessment and determine lower risk. In addition, vitamins are included in every swine diet and used at high volume and frequency.
 - Pork producers will be concerned if we didn't ask difficult enough questions.
 - Note: Risk models take into account severity and likelihood of occurrence. Most people focus on likelihood, we also need to consider severity as this is commonly the producer perspective.
 - Note: Companies reacted based on their knowledge and had different responses from suppliers, increased producer perceived risk. Need to keep pork producer concerns and perceptions in mind.
 - Note: There are a lot of other foreign animal diseases that are more difficult to eliminate than ASFv. We should also think of this as a foreign animal disease challenge through a supply chain and not only focus on ASFv.
 - Note: There is limited information on ASFv and we need to be careful not to generalize virus transmission in feed. Control strategies in place right now may not be effective against this virus. Therefore, we need some focus on ASFv because it is not as well understood.
 - Note: Concern is different from risk

- **Group Assessment Summary:** Majority of participants viewed ASFv transmission from the vitamin supply chain as a low risk situation due to current production practices and procedures in the vitamin supply chain. It was also frequently noted that the low diet inclusion rate and extended length of time between production in China and when it reaches the pig in a diet reduces risk of transmission. On the medium threat level, views focused on unknowns in cross contamination and taking into account producer concerns.
 - Continue working together as an expanded team
 - Our initial focus should be ASFv, but we also need to remember that there are multiple other foreign animal diseases to keep out of the USA and efforts should include these as well.

ASFv Background:

- Current status: 116 officially reported Chinese ASFv cases, 900,000 pigs culled, but producers say cases are under reported. About 20-30% of pigs have been lost and there are massive depopulations taking place.
- Virus is able to survive in specific ingredients based on Trans-Atlantic and Trans-Pacific models (Dee study). The issue is not just vitamins, but it also survives in many other feed and pet food sources.

- ASFv was able to survive in positive control media, which is unique. No other viruses evaluated were able to do that. Feed ingredients gave it some sort of protection instead of just surviving.
- We need to be careful not to generalize among all vitamins because chemical forms, production processes, and coatings and carriers vary among vitamin types. Descriptions of the different characteristics, carriers, and coatings are needed when developing educational materials.
- What makes an ingredient a high or low risk? pH, moisture, carrier?
- Two pieces to the equation - Can it become contaminated? How long can it survive?
- Higher risk of infection through water in one exposure, when the number of exposures increases (as it would on a farm with pigs eating multiple times), the probability of infection dramatically increases to 25% with a very low TCID50 (Niederwerder et al. 2019 study)
- If an ingredient is not biosecure, or if you don't know if you can use a mitigation process or increase holding time to reduce risk, or if you don't get it from a reputable company/location, it is higher risk.
- ASFv encodes for genes to repair itself. Therefore, even though it may be inactivated, it can reactivate and repair itself. The capsid can be inactivated without eliminating the genome-DNA molecule itself which can make it contagious. The cell itself engulfs the virus making the DNA the problem. ASFv is one of the most stable virus groups known in literature. We cannot treat this virus like other viruses.
- How sure are we of the effectiveness of inactivation mitigation strategies, and when is inactivation good enough?
- ASFv cannot replicate in another animal.
- ASFv is a very specific virus that cannot be carried by other species, but there is potential risk of contamination through non-swine feed ingredients used in multi-species feed mills.
- Discussed documents available on swinehealth.org
- If contaminated, feed is a vector.
- We need a scientifically based document describing the unique characteristics of ASFv compared to other viruses. This is important because we need to know how it behaves, what its capable of doing, how it can be inactivated, and when it can repair itself. Also an explanation of how to interpret virology research results is needed.
- Vitamin production is very different than other types of feed ingredient production and transportation processes. Media attention has focused on images of rural China with grain being dried on the soil, which does not apply to raw materials used in vitamin production.
- We need to actively differentiate how vitamins are different from other feed ingredients and communicate that information to pork producers. This will include images of sanitary, highly sophisticated vitamin production facilities and how they operate.

Vitamin supply with China:

- Need update statistics of global vitamin production, the proportion produced in China, and current quality control/quality assurance procedures used in China to reflect the current situation.
- Producers want to remove all China-based vitamin sources but that is not realistic.
- Because there are only a few major vitamin producers, any improvement in biosecurity and quality assurance programs should be relatively easy to implement.
- Do any of these quality assurance procedures apply to the context of virus transmission?
 - The short answer is no. Instead they have generic risk assessments
 - Companies can make specific assessments as needed based on general understandings on preventing contamination of other biological pathogens. QA specifics may not be spelled out in the process, but the system already is heading in the right direction.
 - Most of QA procedures address bacterial contamination and not virus.

- Some certifications create a process of HACCP principles to minimize risk of exposure from where we know many pathogens may originate. Part of the process is keeping known risks to swine away from the process. Procedures in place for other reasons will still be useful. This information needs to be communicated.
- What additional measures need to be reviewed and implemented to help the feed and pork industry feel confident in their supply source?

Risk based preventative controls:

- Time and temperature conditions should be known for virus survival and inactivation.
- Validate and verify that these conditions are achieved in specific ingredient processing.
- Outline steps that decrease risk to help build trust with end-users.
- Example of gelatin: identify heating processes that can reduce virus survival and verify that the manufacturers are meeting these temperature conditions.
- Risk of cross contamination in other feed ingredients.
- Extrapolation of virus survival can be dangerous, rarely follows a linear decrease in concentration. Holding times should not be the only risk mitigation strategy to use.
- We could use a portion of the PEDv model and apply it to the vitamin supply chain. This can be developed into a document that can be communicated and distributed to pork producers.
 - There is a difference between general controls and preventive controls. When a virus is elevated to be considered a significant hazard, it adds a lot of additional unnecessary measures. The terminology needs to be rethought.
 - A process control approach is a good way to take viruses into account, but we need to be careful with how it is described.
 - The issue is more related to the intensity and frequency of monitoring, the regulatory work that will go with it, and the oversight involved.
 - We also need to be careful when considering using a risk assessment approach from a food safety standard and perspective.

Virus surrogate:

- Classify 2500 viruses, ASF stands on its own and is an extraordinary virus.
- Closest relative is an algae virus that is common in the ocean.
- ASF and algae virus are both double stranded DNA virus, similar structures, similar capsid structures, encode for evolutionary similar enzymes, and stand on their own regarding classification.
- The algae virus could serve as a surrogate virus for ASFv that will not infect any animals in the supply chain.
- Using the surrogate virus would be a good way to address the question of a negative result (i.e. you know you added the virus and so the test should come back positive).
- A surrogate virus could also be used to evaluate effectiveness of inactivation mitigation treatments and confirm negative test results.
- If the virus is released, it doesn't matter because it is already out there in the natural environment.
- Comparison between ASF data and algae survival data- ideally the surrogate should be slightly more resistant than the virus of interest.
 - Temperature data for inactivation are similar, but still unknown with other types of treatments
 - First part would include validation data
 - Could be tested in the field
 - Using a surrogate virus would be useful in quality control processes because you no longer have to take someone's word for the temperature and time conditions used.
- Facilities will likely not contain this virus because it is derived from microalgae

Breakout Discussions – Questions:

- **Q1: What steps are needed to reduce actual risk in the supply chain while satisfying producer concerns?**
- **Q2: What are unintended consequences?**

Breakout Session (Group A):

- **What steps are needed to reduce actual risk in the supply chain while satisfying producer concerns?**
 - We need to describe how to reduce risk of ASFv transmission in feed (vitamins)
 - Already a significant amount of quality assurance procedures in place for regulation.
 - What needs to be done to confirm the approach we have is effective?
 - There are still unknowns- further understanding on the virus characteristics, what it takes to kill it or isolate it is needed.
 - Once that is defined, we can evaluate existing processes to assess if they are adequate to reduce virus concentration if it is present.
 - Additional treatments, such as additives as mitigations strategies, need to be evaluated.
 - Need accurate tests to identify contaminant. PCR? Bioassay? Where/how do we obtain representative samples for this? What about using disinfectants?
 - Little is known about the virus or if a specific vitamin would be a good carrier.
 - What steps along the supply chain are the critical points for contamination?
 - Focus on carriers (those are mostly U.S.A. products).
 - Unintended consequence for testing-what happens when you find it?
 - Temperature and humidity in different matrix conditions need to be evaluated for this virus.
 - We need to understand the potential risk for contamination.
 - Produce a one-page handout that outlines current biosecurity practices in place to ensure safety and quality in vitamins from China. Should also include a photo of the inside of a facility.
 - Also include the chemical process and regulations
 - What if there is damage to the bag? Is it disposed of? **IT GOES TO THE TRASH**
 - Producers recognize that vitamins are a lower risk than other feed ingredients
 - Common carriers are used to haul packaged products, will use clear wrap and cardboard to protect from damage
 - Manufacturing sites only produce high-grade vitamins for feed and humans.
 - About 30 companies manufacture vitamins and bring them to the U.S. Different companies have different standards on what is required of each company.
 - For Company 2, there is an extensive audit of the manufacturing facility that conducts over multiple years. The liability is so high and there is motivation to audit everything. The company also audits the manufacturing facility. The FDA sometimes inspects European plants, but not sure on the Chinese plants.
 - Just because there are certifications it does not mean it is necessarily compliant. Global quality management sends in people to evaluate and verify.
 - System is automated, but not high output. Negative pressure, high quality
 - **COMMUNICATION IS KEY**
 - Can we create harmonized manufacturing biosecurity strategies that focus specifically on ASFv? Or all viruses in feed? Can we do that?
 - All systems in place are great but we need to focus on ASFv

- **What are the unintended consequences of achieving the desired level of risk?**
 - Note on early comment on FDA implications: It is more of an issue that we cannot confirm if it is effective since the virus can repair itself.
 - Vitamin supply is not always readily available and experiences shortages. Currently unrelated explosion has made vitamin processing go under review for safety reasons. It is not always guaranteed that the vitamins will be available.
 - The supply is coming from China, we can't not use their products.
 - China is only source of B6 and biotin. Limiting other vitamin sources to outside of China will result in more demand than supply, and that takes a while to work through the industry.
 - Pork producers need to use reputable suppliers, not those in the black market. There is concern about a small number of bad suppliers that can cause virus introduction if contaminated that would affect the entire industry.
 - The barrier to entry from the broker in the U.S. is low, and if the price is low enough, somebody will buy it. This is very difficult to control and will take too much time to shut them down.
 - Recent import rules had that mindset of trying to prevent and regulate such a situation, but it is not perfect.
 - Include this part of the vitamin supply chain in the risk assessment.
 - Continue to encourage pork producers to identify reputable suppliers
 - Increasing transparency on the biosecurity and quality assurance processes in place will help put pork producers at ease and make them aware of false claims.
 - Three item questionnaire for producers to give to their premix producers to weed out high risk vitamin suppliers.
 - As FDA steps up animal feed inspections, some of these can be eliminated.
 - For several B vitamins, brokers are a significant part of the supply chain.
 - Even though you have a Certificate of Analysis (CoA), it can still be a result of a broker.
 - Pirates are selling straights, not premixes.
 - We are only as good as our weakest link.
 - Black market risk can be at manufacturing or distributing.
 - Note: Toll market manufacturing is not bad but depends on how it is done.
 - Small to mid-size regional blenders will buy from pirates to compete with larger companies.
 - Somebody is still going to buy what is rejected by large companies.
 - Provide leadership and information and let the market do its job.
 - If we add a holding period, will the vitamins lose potency? Is also true with thermal treatments and other treatments? Most are stable over a year in unopened bag (vit A is 15 months, E is 24 months, K3 is 24 months)
 - 6 weeks is the absolute shortest time period for vitamins to come from China to a U.S. feed mill.
 - The challenge is to try to manage inventory to keep it at a low working level and reduce cost.
 - Warehouses are not heated or cool, sometimes it gets warm, but usually the temperature is between 50-60 degrees.
 - Provide traceability for pork producers
 - Bags come with a certificate of analysis (or certificate of conformance), when it was manufactured, and for every lot of every vitamin. If it is a customer requirement, another sample will be collected and retained for the total premix. They can also provide a country of origin statement. These are customer tailored documents that suppliers can create. Documents are provided to feed mills and

- customer can access it. This adds traceability to the process, but it also will add cost.
- Pork producers can decide if they want to pay the extra cost for these additional documents to provide choices and more information.
 - Compared to other feed ingredients, the vitamin industry has the advantage that the digital technology is already in place to implement block chain technology (traceability solution where you can see chain of custody and who worked with it. Once it is put in the chain it cannot be changed, but ability to view details can be altered)
 - Develop a FAQ and make available on what is being done to control for ASF
 - It is important to document inventory turnover of vitamins/premixes.
 - Economics will make decisions on what the producer decides to do, usually this means that the producer will take the risk only if they are making a profit.
 - Producers just want to know what is happening.
- Biosecurity add-on module
 - It is important to communicate additional verification points that a manufacturer is adhering to relative to biosecurity practices.
 - This would be done by a third party.
 - This would help build trust among pork producers.
 - Lobby the organization to embrace and add this piece to existing quality assurance procedures.
 - AFIA has a biosecurity guide, but needs more information on what happens at a vitamin manufacturing facility to apply it to ASFv and vitamins
 - Realistically could take a year to develop this module but we should consider it as an add-on to existing procedures.
 - Determine if the risk actually exists
 - Identify possibilities of where the virus could come from instead of testing
 - Vulnerability assessment-based risk assessment could take 6 months to 2 years and would require:
 - Good understanding of supply chain
 - Potential sources of contamination (e.g. blood, feces)
 - Concerns about spending time on vitamins when the risk is low. If the virus gets here, we are too late.
 - Could be done from an international assessment - then could add information on if it does get here, then what?
 - After it is created with vitamins, it will be easy to replicate and apply to other feed ingredients
 - How do we sample and how many samples are needed? The USDA will not allow testing. How are you going to prove a negative? When can you say it is not a risk?

Breakout Session (Group B):

- 1) Communication may not decrease risk, but necessary to create trust of pork producers.
- 2) Communicate that risk is minimal or none, and vitamin manufacturers use human grade standards for vitamins used in animal feed. Premix blenders may be animal feed only.
- 3) Collect data on time x temperature conditions that inactivate the virus and apply to chemical and fermentation processes of vitamin production
- 4) The Food and Drug Administration has inspectors in China. However, based on risk matrix, inspection of vitamin suppliers may be infrequent.
- 5) Develop a 3rd party biosecurity module that can be added to current audit programs

Breakout Session (Group C):

- Most communication about prevention measures has been among vitamin companies and within pre-mix companies; limited information sharing down to the producer level.
 - Create a communication cascade to the producer level.
- With respect to ASF, there was an “arms race of mitigation” by some for competitive advantage (claims regarding best measures for prevention were inconsistent/different messages from different pre-mix manufacturers re: start date, duration of holding time).
- There is universal concern regarding control measures, including holding time.
- Need to work with a neutral authority that all producers trust (SHIC, Pork Board, etc.) as vehicle for delivery.
- Companies need to be transparent regarding vitamins and carriers (general comments on this topic follow).
 - Relatively few carriers and coatings
 - Vitamin E production is a chemical process; facility looks like a refinery
 - B5 used for food and feed are the same
 - Consider a fact sheet for each segment or type of vitamin?
- Need to be transparent re: carriers and country of origin
- Provide pork producers with three questions to ask their premix supplier

Most compelling concepts:

- Some vitamins are sold by traders and brokers and this needs to be considered in a risk assessment
- Storing vitamins has added cost, market volatility, and potency loss of vitamins
- Problems with testing - if you look for it what happens if you find it?
- Potential research- vitamins as a test case for block chain, dose and inactivation of ASFv,
- Vulnerability assessment - does the risk exist? Where is the risk for contamination?
- Communication - facilities on where they are produced, questionnaires, allow producers to make their own judgements, the process, pictures, chemicals used
- Biosecurity module - potentially lobby an add on, AFIA biosecurity extension to vitamins,

Closing discussion:

- With confidence, we can say:
 - ASF potential introduction via feed is a definite and increasing threat to the pork supply chain
 - Risk of introduction through vitamins is low given standard manufacturing practices today (statement from several publications including USDA documents)
 - Cannot be guaranteed if such industry standards are not followed
 - Pork producers have the responsibility to ask questions and gain information on their supply- **know your supplier**
 - Letter of guarantee is not accurate term - instead letter of best practices
 - Most effective approach to reduce risk is to tell and show producers what you are doing and keep them informed
- Additional research:
 - Vitamins as test case for implementing block chain
 - Determine virus inactivation conditions
 - Conduct a vulnerability assessment
 - Conduct research to develop a surrogate virus for testing applications in feed ingredients
 - Chinese manufactured choline on corn cobs – identify broker network from 5 or 6 major choline companies that sell into the United States

- Compile information on:
 - structure of the supply chain
 - characteristics of the virus
 - terminology and process control
 - biosecurity practices and add-on module
 - what are the carriers/coatings, where do they come from, and why are they safe
 - UMN can start a draft and share with the team for accuracy and input
 - Missing piece of the blending, carrier, source of origin, and other components that encapsulates the story of the entire chain.
 - There are many different, simple statements that need to be given to the pork industry to communicate this information.
 - Carriers are produced in the USA, ripped bags are destroyed, facilities have high standards, facilities are clean.
 - Include definitions on what is straight, blend down, and other technical terms
 - Everyone should place this information in the CoA, FAQ, or other document and other specific components can be shared by the company to consumers who request it.
 - Can you buy premix right out of China- yes, but to the local market, no because it is not economical for it to be shipped to the U.S. Broker market for premix is limited. This is not a risk for specific companies, but is a risk overall.