WORKSHOP SUMMARY AND SUPPLEMENTAL INFORMATION

African Swine Fever-Soybean Meal Supply Chain Workshop
University of Minnesota – St. Paul Campus
365 Haecker Hall
1364 Eckles Ave., St. Paul, MN 55108
July 10, 2019

Objectives:

- Identify and discuss the various segments and potential risk factors of the soy supply chain in North America
- Identify and discuss potential prevention, mitigation, and product differentiation (country of origin) strategies for soy products used in the U.S. pork industry
- Identify research and education needs related to foreign animal viruses and soy products

Key Outcomes:

Potential risk factors	Prevention, mitigation, differentiation strategies	Research and education
• Contamination during transportation • Inadequate virus inactivation in soybean hulls • Imported organic soybean products for use as fertilizers • Risk of introduction vs. risk of spread once introduced (survival in manure)	• Develop diagnostic test to assess ASF in feed • Explore alternatives to inter-port shipment of soybean products (Jones Act) • Identify and educate importers about consequences of ASF introduction and suggest prevention and mitigation methods	• Improve data collection on country of origin for imported soy products • Write a report describing the soy supply chain including reasons for imports and benefits of exports • More research on survivability of the virus in different feed ingredient matrices and surfaces that is reproducible • Determine whether virus is present in feed ingredient supply chains • Determine most accurate methods to assess virus survival • What factors cause high virus survival in soybean meal?

Welcome and introductions:

- Reading of antitrust guidelines
- Individual introductions

Results from pre-workshop participant survey

What do we want to accomplish today?

- Begin a conversation and gather information
- Identify potential risk factors for ASF introduction from the soy supply chain
- Understand the risk of ASF and FAD transmission through various feed ingredients, including organic soybean meal
- Develop clear, concise, practical biosecurity plan
- Develop strategic partnerships to prevent ASF introduction into North America
- Identify action items needed to develop diagnostic assays to detect virus in large batches of feed
- Identify education and research needs, action plans, funding sources, and collaborative efforts focused on prevention, mitigation, product differentiation, and diagnostic assays for feed ingredients

Reservations and Concerns

- Most had none
- Open and transparent communication and don't violate anti-trust
- Is the issue too big to address?
  - Someone needs to address it, why not us
- If new government regulatory requirements are desired, unintended consequences need to be considered

Background on African Swine Fever and threat to the U.S. Agriculture

Potential consequences of ASF outbreak in the US

- Significant threat to U.S. agriculture and agriculture in other countries
  - An ASF outbreak will dramatically reduce demand and use of corn and soybean meal by the U.S. pork industry.
- ASF is already creating major changes in global feed ingredient and food trade
- If ASF enters the US, it will have devastating effects on the economy, soybean meal use, markets and exports, domestic pork supply and prices, inability to export pork.
  - Estimates of economic impact from the first year of a potential ASF outbreak in the U.S. would represent revenues losses of $8 billion for the pork industry and $20 billion for the U.S. economy
- Other commodities including beef, dairy, poultry, corn, and soybeans will be impacted by an ASF outbreak in the U.S.
- The primary issue with ASF is that there is no treatment to cure the disease nor vaccine to prevent infection.
- The likelihood of ASF virus spreading to other countries increased dramatically once the virus entered China for several reasons:
  - China has about 50% of the world population of pigs (about 40 million sows)
  - The majority of farms in China are small and medium size with limited capacity for biosecurity or biocontainment

    - Many countries import significant amounts of feed products from China such as vitamins, amino acids, and soybean products

ASF status in the world

- The current pandemic of ASF has spread to multiple countries. As of July 1, 2019, 14 countries reported new and ongoing ASF outbreaks in wild boar and domestic pig populations (i.e. Belgium, Hungary, Latvia, Moldova, Poland, Romania, Russia, Ukraine, mainland China, Hong Kong, North Korea, Vietnam, South Africa, and Laos)* https://www.swinehealth.org/wp-content/uploads/2019/07/SHIC-109-GSDMR-July-2019-7-1-19.pdf
- ASF is endemic in China and continues to spread to other countries including Vietnam (June 25, 2019), and Laos (June 20, 2019),
- Official reports from China indicate that ASF has affected about 30% of the sow herds, and that the situation is under control. However, other sources suggest that the situation is much worse. There is a lot of inaccurate information and knowledge gaps about the current situation in China.
- Indemnification is a process implemented by the Chinese government designed to reimburse pork producers for pigs that are dead during an outbreak, including those destroyed during disease control interventions.
    - China, like the U.S. and other countries, does not currently have the necessary amount of government funds to reimburse pork producers for all of the animals euthanized and animals affected during the ASF outbreak
    - Consequently, pigs are sold before euthanasia so that producers can recover some revenue to minimize financial losses. This results in ASF contaminated meat being sold to consumers, which further intensifies ASF virus spread.
    - There is also no transparency for details about the current ASF situation in China, and the maps designating geographic regions of ASF infection are biased (Cai Cai et al., 2019).
- Vietnam has recently contracted ASF and is much more transparent about the situation. Some U.S. veterinary groups are collaborating with Vietnam to use it as a "lab" to develop and evaluate protocols for disinfection, euthanasia techniques, containment, and other practices related to responding and recovering from ASF infection, which may be useful if the virus enters North America.

Current proposed action plans from U.S. pork producers

- Given the pandemic spread of ASF, the U.S. pork producers met on March 5-7, 2019 during the 2019 Pork Industry Forum to discuss and identify action plans in response to the threat of ASF: (https://www.nationalhogfarmer.com/business/pork-industry-forum-set-march-5-7).
- The major goal from the Pork Industry Forum was to keep the U.S. pork industry ASF-free. To achieve this goal, the following action items were identified:
    - Establish programs for monitoring of disease threats
    - Continue ongoing dialogue with Canadian and Mexican governments for coordination in disease prevention and control
    - Adopt a responsible feed ingredient sourcing strategies
        - Restrict imports of soybean-based animal feed products

        - Develop feed holding time information as a prevention and mitigation strategy

- In addition to the goals of the 2019 Pork Industry Forum, other industry collaborative programs are currently working toward the goal of decreasing the risk of virus entry via feed, including the Feed Risk Task Force.
  https://www.swinehealth.org/july-2019-shic-enewsletter/#two
    - The Feed Risk Task Force met on June 11, 2019 and agreed that there is risk of introduction of pathogens into and within U.S., and preventative actions should be achievable and based on science while minimizing trade disruptions.
    - The objective is to determine: 1) what is the risk, 2) how great is the risk, 3) quantify the risk. Even if risk of ASF entering the U.S. is negligible, we also need to evaluate the impact to the industry if it does enter the U.S. The Center for Epidemiology and Animal Health (CEAH) of the USDA is working on a risk analysis to answer these questions. Risk of introduction vs. risk of spread (low risk, high consequence).
    - The CEAH of the USDA (Fort Collins, CO) developed a qualitative assessment of the likelihood of ASF entry into the U.S. Pathways of disease entry were assessed under legal and illegal activities (**Table 1**).

Table 1. Qualitative likelihood of African swine fever virus entry to the United States

Pathway	**Legal**	**Illegal**
Live pigs	Negligible, with low uncertainty	Negligible to low, with moderate uncertainty
Semen	Negligible, with low uncertainty	Low, with moderate uncertainty
Swine products and by-products	Negligible to low, with moderate uncertainty	High, with low uncertainty
Wildlife: Meat and Trophies	Not reviewed	Low to moderate, with high uncertainty
Feed (animal origin)	Low to moderate, with high uncertainty	Negligible to low, with high uncertainty
Feed (plant origin)	Negligible to moderate, with high uncertainty	Low, with high uncertainty
Feed (supplements)	Negligible to low, with high uncertainty	No data to evaluate
Fomites	Not reviewed	Negligible to moderate, with high uncertainty
Regulated Garbage	Low, with moderate uncertainty	Not applicable

Source: USDA Qualitative Assessment of the likelihood of African swine fever virus entry to the United States: Entry Assessment.

    - Gaps in knowledge and subsequent research needs:
        - Develop diagnostic testing capability for feed/ingredients
        - Develop a response plan that will support feed/ingredient monitoring for FAD contamination

- Conduct a risk assessment for potential spread of a disease once identified within U.S.
- Develop a plan to assess and mitigate contamination within the feed supply chain once the virus is identified within the US
- Evaluate the regulatory needs and feasibility of potential regulatory actions for feed importation
- Develop and evaluate the efficacy of mitigations for feed contamination

Importation of soybean products

- There are no data indicating that ASF is present in imported feed ingredients, including soybean meal
- However, soybean meal has been identified as a potential risk factor for ASF transmission because the ASF is capable of surviving in soybean meal in transboundary shipping models (Dee et al., 2018).
- Previous research results (**Figure 1**) have shown that coronaviruses (Transmissible Gastroenteritis Virus – TGEV; Porcine Epidemic Diarrhea Virus – PEDV; and Porcine Delta Corona Virus – PDCoV) survive in soybean meal for a much longer time than in any other feed ingredient (Trudeau et al., 2017).

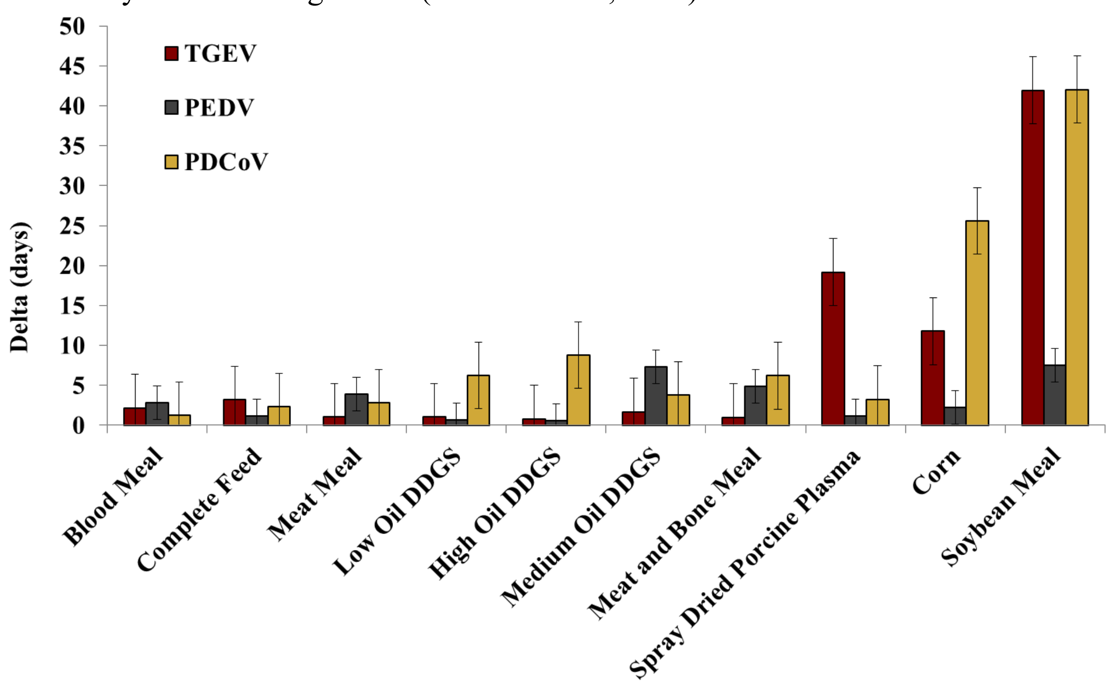

Figure 1. Delta (days to decrease virus concentration $TCID_{50}$ by one logarithmic unit). Adapted from Trudeau et al. (2017).

- **However, we cannot assume the ASF virus, which is a double stranded DNA virus, will have similar survival and inactivation kinetics compared with other viruses, of which many are single stranded RNA viruses with very different characteristics.**

- The proportion of soybean meal imported from China has steadily increased since 2012, but declined sharply in 2019.
- China is the only soybean meal exporter that is ASF positive (about 100,000 metric tons in 2018 were imported into the U.S. from China; **Figure 2**)
- Organic soybean from Turkey is most likely not exclusively from Turkey (**Figure 2**), but rather from countries in the Black Sea region, which may also be a risk factor.
- Soybean meal imports from China and India are primarily organic soy sources, which leads to higher imports than utilizing domestic sources. However, it is unclear how much of imported soy may be used for human consumption or organic fertilizers.
- **Due to apparent inaccuracies in data reporting and incomplete information, a comprehensive and thorough review of ASF positive countries and disease status is needed to understand the relative risk of virus transmission.**
    - This is an important item that was not completely clarified during the workshop.
    - There was debate on how these data were acquired. Generally data were obtained from tariff codes, but these codes do not allow distinguishing between organic soy, conventional soy, and soy used for human consumption.
    - We need clarity for what these import data represent for each exporting country (i.e. Canada, India, China, Turkey, Argentina), especially the "other" category.
    - We need to know country or region of origin and where soybeans are being crushed
    - Are some soy sources imported into one country (e.g. Canada), and subsequently transported to another country (e.g. U.S.)?

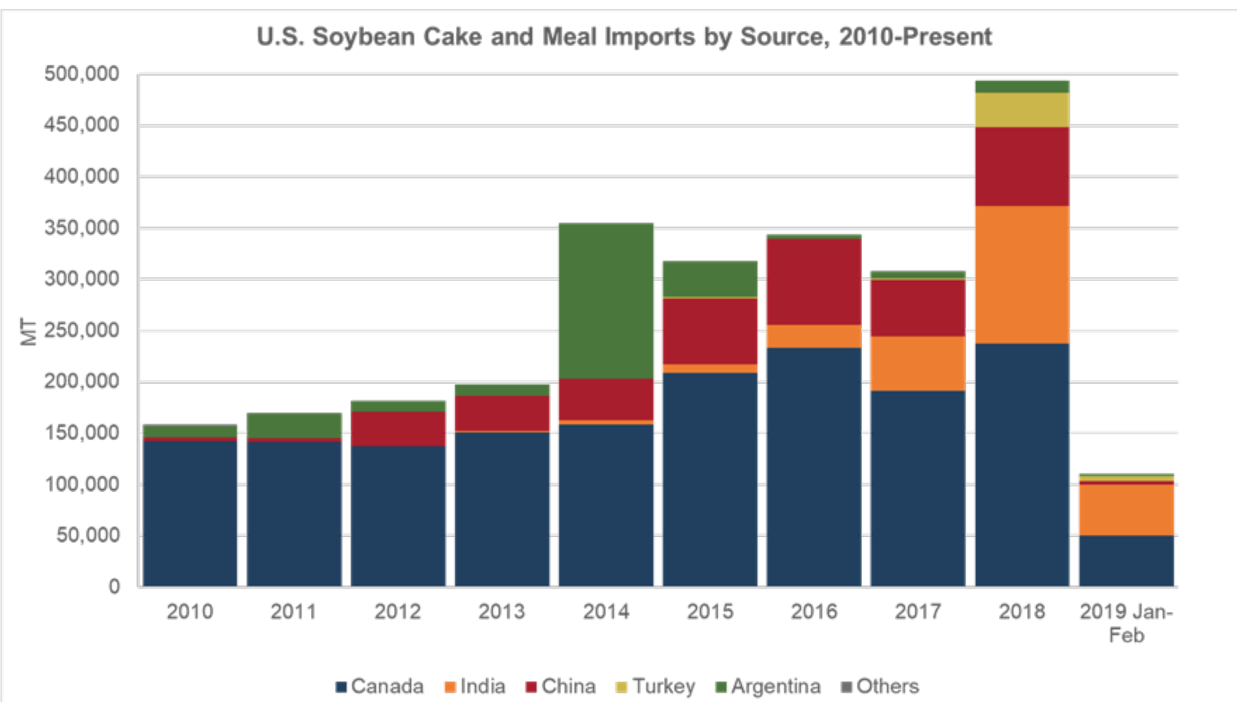

Figure 2. Imports of soybean products from country of origin and year (Source: NPPC)

- There is also a concern that Foot and Mouth Disease (FMD) virus as a potential risk factor for soybean meal being imported from India.
    - Currently, research is underway to investigate if FMD can cause infection through consuming contaminated feed
- **We need to determine the amount of feed ingredients being imported from each country and the FAD status in each country.**
- **We need to determine the factors that create U.S. demand for importing feed ingredients.**
    - It is likely a logistics and cost issue of acquiring soybean meal when it is needed at any given time (e.g. North Carolina that has imported soybean meal from South America.
    - More information needed on the logistics of soy product imports and exports. Data combined with context of the soy supply chain would be useful to improve understanding of pork producers.
- Canada is collecting feed ingredient import data in a different manner than that in the U.S. Both countries use the same international HTS codes, but Canada has developed a new system to request additional information from ingredient importers.
- Although imported organic soybean meal is assumed to be compliant with U.S. organic standards, it is uncertain if this is actually the case.
- China is the 4th largest producer of soybeans in the world, and about 13% of production is used for human food consumption (almost all of the soybeans produced in China are used for human consumption).
- Jones Act- The Jones Act requires goods shipped between U.S. ports to be transported on ships that are built, owned, and operated by United States citizens or permanent residents. It prevents shipping into a port in New Orleans and subsequently going to another U.S. port. Consideration for potentially reforming the Jones Act may be necessary.

Virus survival in soy products

- ASF virus is capable of surviving in conventional and organic soybean meal, and soy oil cake through a Trans-Atlantic and Trans-Pacific shipment to the U.S. (Dee et al., 2018).
    - Results from this study were obtained from PCR and bioassays.
    - The physical and chemical characteristics that promote ASF virus survival in soybean meal are unknown, but some have speculated that it may be the high protein content or moisture content/water activity.
    - Would determining the chemical and physical factors that enable ASF virus survival cause us to do things differently with the feed ingredients?
    - **Do we believe the data from the Dee et al. (2018) report? Are these data reproducible/repeatable?**
    - Some data from field observations are being used in China, where feed processing interventions involving heat treating feed (85 °C for 3 minutes) is being used to prevent an observation of a sick animal. This method is based on previous data on corona virus survival in animal protein by-products.

- Should more research and funding continue to evaluate the survival of ASF virus and other FAD viruses in soybean meal? Are any important viruses missing from the list evaluated by Dee et al. (2018)?

    - Are more replicates needed?
    - Do the experimental methods need to be reviewed?
    - Should more viruses such as HPAI be evaluated?
    - Should higher protein soy products such as soy protein concentrate and soy protein isolate be compared with soybean meal to determine if protein and/or moisture content/water activity are factors for ASF virus survival?
- **A comprehensive risk assessment is needed**
    - **How much of the ASF virus survives**
    - **How likely is it to be contaminated in feed ingredients?**
    - **If it is present, will is cause an infection if consumed**
    - **How will processing mitigation affect ASF virus survival in various feed ingredients?**
- **Many unanswered questions and speculation about how this virus moving around in China.**
    - We know that adding the virus in the feed or the water, and subsequent consumption of low doses by pigs will cause an infection. This infection was even true at very low concentrations with natural feeding behavior (Niederwerder et al., 2019).
- **We need to communicate to pork producers that they need to know and verify their sources of feed ingredients, and don't source from countries that are positive for FAD viruses.**
- **How much risk is transmission of viral pathogens through feed?**
    - **It has been determined this is negligible risk with low uncertainty.**
    - **If it is determined this risk is greater, we need more proof of this.**
    - **We also need to quantify this risk and what we think is acceptable.** ***Note: The risk assessment conducted in 2014 is outdated, and a revised risk assessment is currently being conducted.***

Etiology of African Swine Fever virus

The African Swine Fever virus is a double stranded deoxyribonucleic acid (dsDNA) virus, and is the only member of the family Asfarviridae. Some evolutionary scientists have hypothesized that humans potentially evolved from ASF virus and its relatives. Unfortunately, very little is known about dsDNA viruses because there are few examples of these viruses. Families include Asfarviridae (African Swine Fever Virus), Poxvirideae (swine pox virus), and Iridoviridae. These viruses have unique genetic capabilities that are more complex than those of RNA viruses (Coronoviruses, PRRS, etc). Therefore, these viruses have greater capability for environmental survival including DNA repair. For example, because of the large amount of DNA in the genome of the ASF virus, heat treatment and other interventions may destroy the virus capsid, but not necessarily the DNA because the DNA is very stable. The ASF virus DNA can still infect cells by self-repair or by pinocytosis. The ASF virus does not need a receptor to enter the cell and is instead engulfed by the cell (**Figure 3**). For this reason, we cannot create a vaccine to block the receptor because no receptor is necessary.

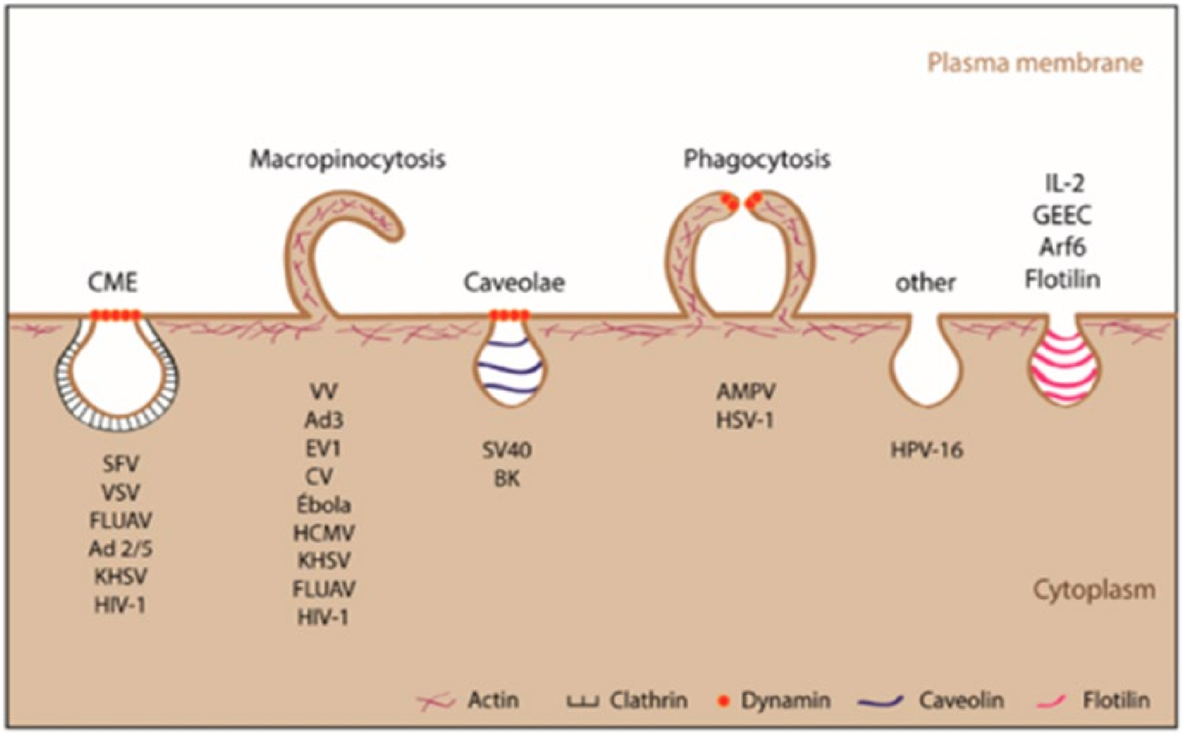

Figure 3. Pathways of African Swine Fever virus entry into host cells

The consequence of not having an effective vaccine for ASF is that pork producers can only control it by preventing transmission via biosecurity and biocontainment. However, determining the environmental and feed manufacturing conditions capable of inactivating ASF virus by using the virus itself, poses an uncontrollable very high risk of virus spread. Therefore, a bioassay based on a virus surrogate that was developed at the University of Minnesota could be used to test ASF virus survival *in situ*. The surrogate assay allows us to amplify closely related virus (no biosafety controls necessary), evaluate potential mitigations treatments, create survival curve/inactivation kinetics curves, and aid in the selection of most effective mitigation treatments based on mechanistic genomic analysis within 48 hours. This risk-free *in situ* non-animal (RISNA) surrogate method is safe, and can be used at a pilot level to develop inactivation curves representing real life conditions.

- All viruses want to get to an RNA stage to be infective. Therefore, use of RISNA will allow researchers to evaluate the RNA of this virus and begin identifying possible mitigation strategies to help answer many questions. This assay can be also be used as a spike control.
- dsDNA viruses are very stable and unlikely to dramatically mutate. Therefore, resistance of the RISNA surrogate virus and the ASF virus is likely very similar and unlikely to change in the near future.
- The virus can still be modified so the next time it is used for an experiment it is slightly different.
- **To conduct experiments beyond a bench top model, we must determine a way to clean feed mills and other equipment to make it free of the surrogate virus in between experiments.**

- No mechanistic data is currently available that involves destroying the ASF virus. In fact, there are not enough data on dsDNA viruses in general. **Therefore, we cannot compare virus inactivation and interventions in feed and feed ingredients for coronaviruses with ASF virus.**
- **RNA viruses are structured very differently than DNA viruses and we should not extrapolate data from RNA viruses. The mechanism of inactivation will be very different from each of these viruses and we should be working with a dsDNA virus to make conclusions.**
- **A factsheet about the characteristics of the ASF virus, how it survives, how it's different from other viruses, why we can't extrapolate RNA virus data to ASF virus, and other information is needed to improve everyone's understanding of the uniqueness of the ASF virus.**

Canada's approach to ASF control in the feed ingredient supply chain

The Canadian government has developed and implemented programs and requirements on imported animals and meat. Canada has evaluated the risk of foreign travelers and importation of food (adding sniffer dogs to detect meat and other animal products). The Canadian pork industry was concerned with virus transmission through feed and conducted a risk assessment. However, this risk assessment did not take into account animal by-products because it is regulated under another division. Highlights from this risk assessment were:

- Risk of ASF virus transmission in grains, oil seeds, and associated meals were ranked high because of the risk of cross-contamination (housed outside, exposed to elements and manure)
- Canadian government has implemented control zone capabilities to regulate the import of these products
- The volume of imported feed ingredients into Canada is relatively small compared to the U.S., and represents only a few thousand tons of grains and oil seeds
  - Majority of soy imports were for organic use
  - Conventional soy use comes from the U.S. or Canada
- There is a requirement for importers to declare the end use of the products, which allows tracking of imported ingredients
- A questionnaire was developed and implemented for feed ingredient importers http://www.inspection.gc.ca/animals/terrestrial-animals/diseases/reportable/african-swine-fever/facility-questionnaire/eng/1553626801594/1553626857123
- A government order was implemented in March, 2019 indicating that any feed products (grains or oilseeds) coming from countries with active ASF during the past 5 years (in domestic or wild pigs) were put on an alert list (available online).
- This regulation did not result in a complete ban on imports from that ASF infected countries, but you can impose required holding times for imported feed products or apply a specified heat treatment.
  - If importing ingredients from countries on alert list: (only for international seaports)
    - Grain, oilseeds, and associated meals must be held in Canada at 68 °F for 20 days for 50 °F for 100 days at an inland warehouse

        - Heat treatment can be applied either in country of origin or in Canada at tempertures of 158 °F for 30 min or 180 °F for 5 minutes
    - Use of extended holding times are difficult because of the high volume of ingredients and ability to maintain the specific temperaturea.
    - Use of heat treatment is also challenging because of negative impacts of high heat on amino acid digestibility and loss in nutritional value, but some temperature conditions may be met through normal soybean meal processing conditions.
    - The grain cannot be held at the port, but must go directly to an inland facility for holding
    - Because of low volume of imported feed ingredients, the negative effects have been fairly minor
- Importation requirements are only for international sea ports and do not take into account transport of ingredients across the U.S. and Canada border
- This also impacts the dairy and poultry industries, especially in the British Columbia, where there are many organic farms using imported organic ingredients
- The overall message is to encourage biosecurity and buyer awareness as the first line of defense to prevent ASF virus introduction

Overview of the U.S. soybean production and supply chain

Between 2017 and 2018, the U.S. produced about 4,411 million bushels (120 million metric tonnes) of soybeans per year (Ash et al., 2019). Of the U.S. soybean production, about 2,129 million bushels (45%) are exported, 2,055 million bushels are crushed for soybean oil and soybean meal production, and 511 remain as whole soybeans. Solvent extraction to remove oil and produce soybean meal accounts for the largest use of soybeans (98.9%). Interestingly, the U.S. imported about 594,000 million metric tonnes of soybeans and additional 449,000 million metric tonnes of soybean meal from 2017 to 2018. The importation of soybeans has increased exponentially in the last decade and seems expected to continue to increase (**Figure 4**). The U.S. imports soybeans primarily from India, Canada, and Turkey (**Figure 5**). Interestingly, imports of soybeans from ASF affected countries such as China, has decreased dramatically since August 2018 (**Figure 6**).

The primary products that the U.S. imports from China are flours and meals of soybean (harmonized tariff codes: 120810), organic soybeans (120100), organic soybean meal (210690), and soybean oil (150790). A strategy to mitigate the risk of ASF entry into the U.S. could be to apply intervention such as extended period of holding or additional heating. These strategies could be implemented at the port of entry (**Figure 7**). Likewise, another strategy could be to identify companies that import soybean products from ASF-infected countries, and devise programs for biosecurity audits and additional risk mitigation at the port of entry.

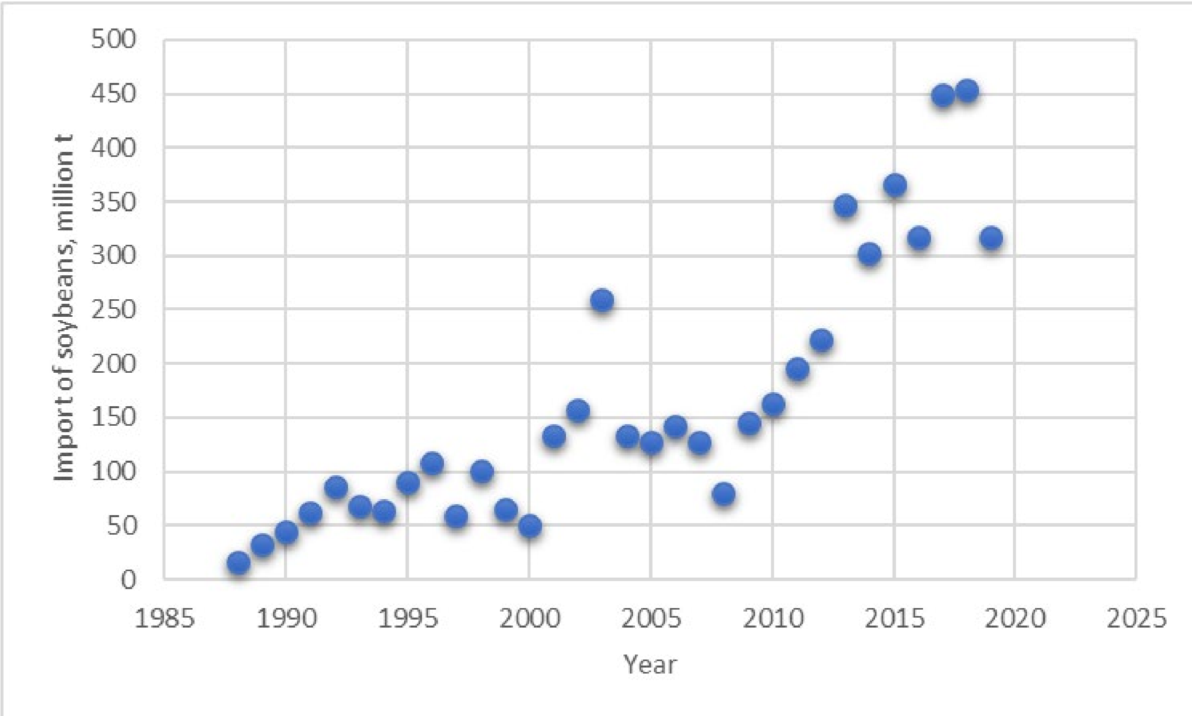

Figure 4. Imports of soybeans into the U.S. (USDA ERS, 2019)

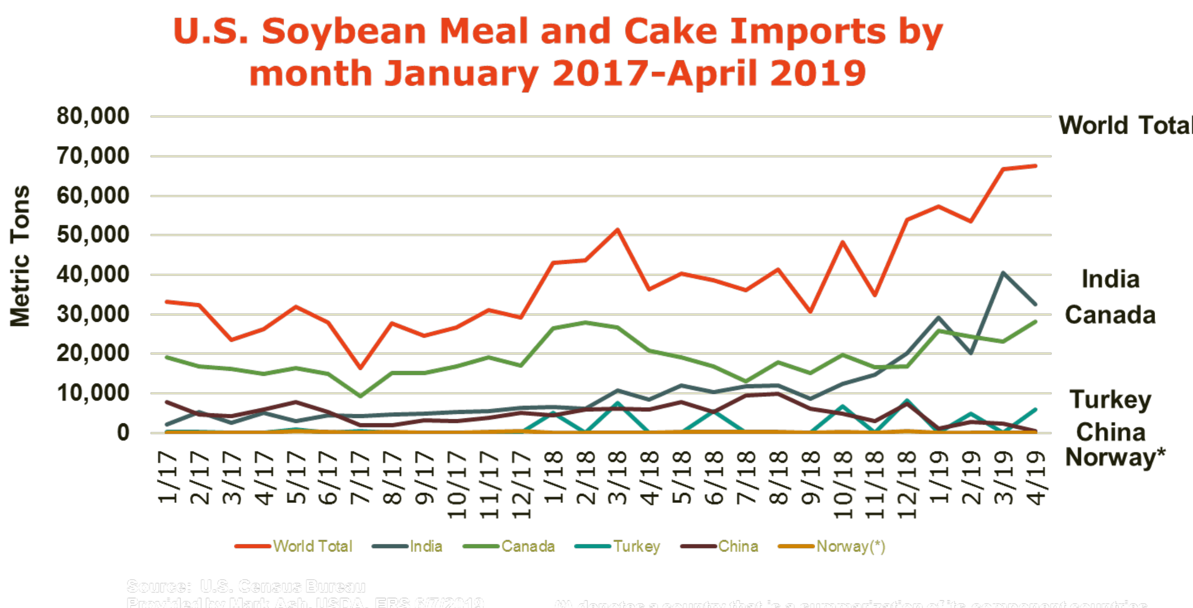

Figure 5. Imports of soybean into the U.S. by month and country of origin

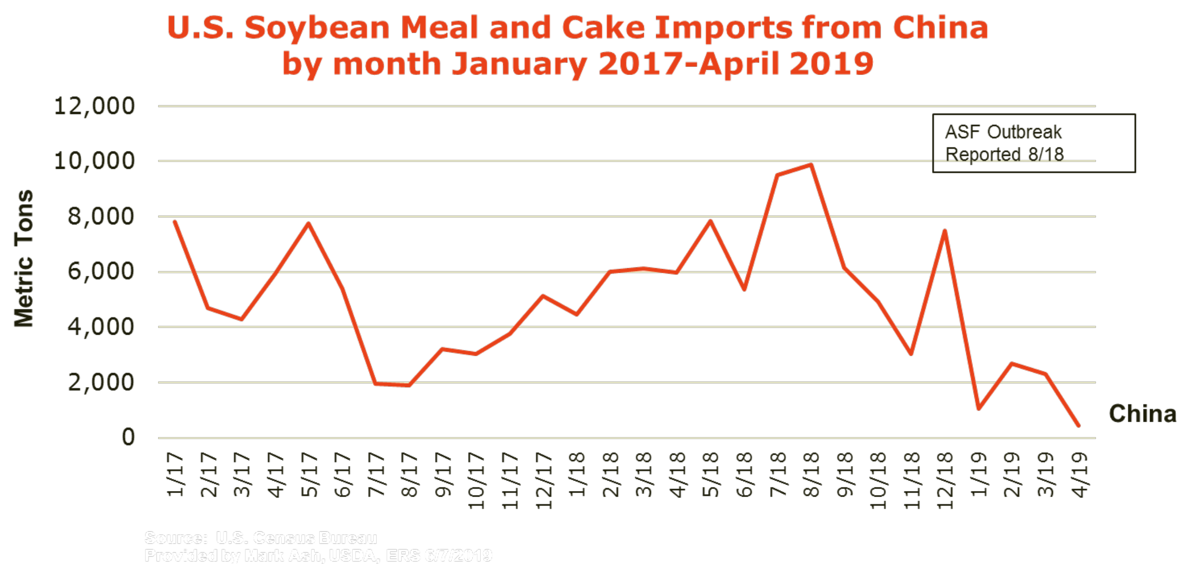

Figure 6. Monthly imports of soybean meal and cake from China during 2017 and 2019 (Source: U.S. Census Bureau)

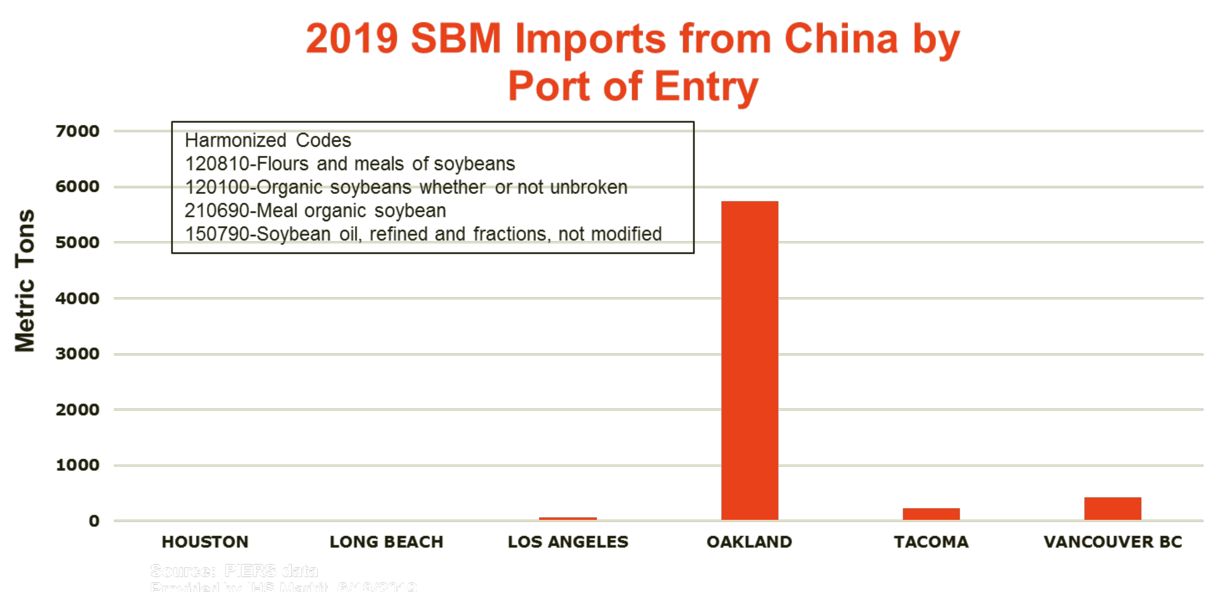

Figure 7. U.S. port of entry of soybean meal imported from China in 2019 (Source: IHS Makit June 18, 2019)

- US soy production: 93.2% → exports 45%
  - Soybean meal that stays in the U.S. = crush 43.4% → solvent extractors 98.9%, vast majority goes to animals (64% to poultry, 24% to swine, 9% dairy, 1% beef, 2.1% other, does not include the hulls)
  - Soybean meal is a high volume but relatively low risk due to the heat and solvent treatment
  - Soybean hull feed utilization = dairy 57%, swine 3%, beef 41%.

- Soybean hulls are lower volume, but may be higher risk because there is minimal heat exposure and no solvent exposure. Soybean hulls are mainly used in sow diets.
- Highest pig density in the U.S. are in MN, IA, and NC.
  - Ports of entry for imported soy products vary from year to year
  - Very few importers are licensed
- **Action item: We need to identify soy product importers and educate them on the risks and concerns. These data are available by PIERS reporting service for a subscription fee.**
- There can be variability in soybean meal processing conditions used in other countries after oil extraction involving toasting time and temperature.
- Soybean oil extraction (process is similar around the world and high probability it is sufficient to kill viruses, but no research has been conducted to verify this and there is some variability in processes around the world)
  - Cleaning
  - Dehulling – reduces meal fiber, increases protein (important part)
  - Conditioning – 150 °F for 15-30 minutes
  - Flaking – additional pressure and heat
  - Extracting – soak in solvent at 145-150 °F for 30-40 minutes
  - Desolventizer/Toaster/Dryer/Cooler (DTDC) – 150-165 °F for 10-15 minutes to recover hexane and then 220 °F for 45-60 minutes
- Soybean extrusion – very different than extraction, different quality assurance tests may be used
  - Cleaning – removes foreign material and stones
  - Dehulling (optional) – reduces meal fiber, increase protein
  - Grinding – coarse/fine, depending upon type of extruder used
  - Extrusion – 130 °C-150 °C depending on extruder (dry/wet)
  - Drying/Cooling – depending upon types of extruder used to process soybeans
- Both extraction and extrusion are effective in inactivating trypsin inhibitors. Retention times are based on the length of the barrel.
- The desolventizing process before these steps it is fairly standard. There is less variability among plants in the U.S.
- Hexane and solvent extraction cannot be used for organic soybean meal.
- **It is assumed that the processing conditions used in manufacturing conventional and extruded soybean meal are adequate for killing the virus, but this has not been confirmed in research studies.**
- **We also need to consider post-processing contamination of ingredients.**
- **It appears that the potential risk factors in the U.S. soy supply chain are soybean hulls, transportation cross-contamination, and manure**
- Points of contamination include manure application (soybean farm), trucks, elevators, processor, or feed mill.
- There is no group or organization to track where all of these ingredients have been.
- The decline in soybean imports in 2019 may be due to tariffs on China (25% on some specific soybean products) rather than concern over ASF virus transmission, but that needs to be confirmed by contacting importers
- The PIERS data seems to be consistent with U.S. data within 50 tons

- Most of the imported soybean meal is currently coming into the Oakland, CA port. This is a different scenario than in previous years. Monitoring major ports of entry may be important in the future.
- The organic market in the U.S. is consuming more organic soybean meal than our ability to produce on certified organic crop land. Very few U.S. soybean farmers are willing to go through the required 5 year transition from conventional to organic production to fill these needs.
- **We need to help organic pork producers with sourcing organic feed ingredients to minimize risk of ASF virus introduction**

Breakout sessions:

Group 1
Task: Feasibility of developing and implementing a biosecurity pre-screening/certification program for sourcing U.S. soybean meal. a. implications for the domestic soybean and pork industries, b. implications for U.S. soy product differentiation in the export market.

- We need to prove that processing decreases the risk of virus transmission in soybean meal and the extent of virus inactivation
- Determine the feasibility of implement biosecurity pre-screening programs during processing because you can't ensure they will be clean coming into receiving. They should leave that processing pathogen-free even though processors can't certify that. This would be a comprehensive biosecurity protocol.
- Include processers in the conversation: Do they already have a plan in place? What can we learn? Cost? Are plant processing modifications required?
- The most that can be offered is that they are doing the best they can and using specific processing conditions that likely inactivates the virus if it is present. There is a risk of cross-contamination as soon as it leaves the warehouse.
- Consider developing protocols that maximizes biosecurity assurances, but no guarantee.
- There are expenses related to developing, implementing, and monitoring a new biosecurity assurance program that soy processors will not be excited about but it could be an opportunity to promote the safety of U.S. soy.
- **Outcome: Develop a comprehensive biosecurity protocol for processed soybean meal**
- We need to identify a lead organization to do this: Pork producers? National Oilseed Processors Association?
- We do not want to create a false sense of security

Group 2
Task: Feasibility of modifying or adopting the Canadian imported feed ingredient program and requirements (e.g. inspection at the port of entry, holding time, or other mitigation strategies).

- Imported volumes of soy products are relatively small, and there is a cost associated with complying with holding times and paperwork. This cost would be higher in the U.S. compared with Canada because of higher volume of imports.
- Process of certification needs to be considered.

- Education and awareness of the potential risk and identify key risk factors with importers. Have a direct conversation with the importers to determine what they are doing, approaches to mitigate risk, and the possible implications. This approach has had the greatest impact in Canada, even more than the regulatory action.
- Conduct a comprehensive risk assessment to avoid false assurances.
- Post-processing contamination is still an issue with this program.
- There is no ASF virus diagnostic test for feed. What happens when we get a false positive? If you test and get a positive result, will you just shut down? Is there panic associated with a positive result?
- Opportunities/risk of retaliatory action in trade relations with China based on protocols put in place?
- Need incentives for change based on customer driven demand.
- Number one concern is false sense of assurance.
- Now that Canada has taken action, they are taking a step back and evaluating the need for additional research and data before moving forward in the future.
- National Emergency Center in Canada was created to assist with preventing ASF introduction and is helping pay for border control services.
- Education of importers and organic livestock and poultry producers is important so that they know why the products are being scrutinized. This may be useful in determining a budget for this, as well as a pre-clearance screen program.
- Canadian feed mills and animal production operations are not allowed to add unprocessed ingredients to processed products, nor are they allowed to mix ingredients complying with holding times with ingredients that have not undergone the required holding period.
- **Logistic feasibility may be a challenge because the U.S. has a larger industry scale compared to Canada, nor a voluntary organization to implement. Regulatory action would also be challenging.**
- **Are we intervening at the right point? Is this a big enough risk to implement these prevention and mitigation strategies?**
- **Canada's process is focused on manufacturing, mitigation step, and post-processing/post-mitigation contamination.**
- **Due to U.S. scale there could be a trade retaliation if we adopt these programs. The biggest thing to adopt would be education.**

Group 3
Task: Feasibility of restricting imports of organic and conventional soy products and other commodity ingredients from other countries.

- Narrow down the scope to the hot spots that need focus (e.g. organic soybean meal, **natural/organic fertilizers and their composition**). To determine the amount of these materials being imported requires the use of HTS codes. Dawn Hunter can ask around to find more answers on how much is imported. The natural/organic fertilizer industry needs further investigation.
- We need a better understanding on what ingredients are coming into the country and where are they coming from.

- Trans-shipment concerns, what are the requirements for soybean meal? In general, with animal products, you can't change the country of origin if they do nothing to the product, and you have to add value to the product to make that change
- **Pork producers need to ask their supplier where their product comes from.**
- The June 11th task force meeting suggested that more soy is coming into the U.S. than what was reported. With a limited number of importers, we should be able to understand the factors contributing to these amounts imported.
- Identify importers and establish communication to learn from them. **Can we influence importers to obtain soybeans from other places? Is there a port we can direct all of the imports to and set up a facility to quarantine and hold ingredients from positive countries?**
- More research is needed for determining the conditions this virus can survive,
- Disclaimer: This is not just about ASF. We need to keep this approach in mind with other FADs.
- We need to include FDA in these conversations because they are the regulating authority, but it does not seem like the FDA is inclined to take regulatory action (this is feedback from the June 11th task force meeting). Regulatory always comes with a cost. Industry response and initiative will be more effective at this point, but the industry expects the government to do something as well.
    - The expertise and research of government officials will be helpful in moving forward, but we need defined ideas of what we want to do.
- We also need to keep other species and organizations involved. Pork and Soy could invite poultry and dairy industries to get involved. Can organic soy used in dairy production be imported from negative countries?
- **How many acres of organic soybeans are needed to fill the US demand for soybeans? What is it going to cost to produce enough of our own organic U.S. soybeans?**
- In Australia, seeds are heat treated at the port. This could be considered for the U.S. situation.
- Consider combining increased biosecurity requirements with existing phytosanitary requirements.
- Is Mexico included in these discussions? Mexico does not have the infrastructure to implement anything like the U.S. and Canada and will remain a risk country.

Group 4
Task: feasibility of developing practical and effective strategies that can be used to inactivate ASF or FAD viruses if present through cross-contamination in soy products.

- Prevention is the top priority
- Supplier verification- responsible importation, supplier verification programs
- 3rd party verification system for biosecurity processes
- **How do we decrease the incentive for importation?**
- Learn more about organic soy
- Once it reaches the U.S. it is already too late. Mitigation needs to occur before this point.
- Similar to mycotoxins, there could be hotspots for ASF in large volumes of ingredients.
- Developing and using a diagnostic test is ideal, but it is unsure how that can be done.

- Many chemical mitigants cannot be used in organic production and there are limited numbers of USDA approved mitigants in feed.

Group 5
Task: Feasibility of developing and implementing strategies to prevent further spread of FAD viruses through soy products and other ingredients is introduced into the U.S.

- Focus on greatest risk factors first.
    - Live animals-USDA shutting down movement for 3-5 days, need to improve tracking system for pigs
    - Product and shipping of animals to processing plants - if there is a large outbreak we can't shut down transport to the processing plant. You would need to ship pigs and carefully monitor transport and contamination at rendering
    - People- change clothes, good biosecurity
- Feed- control dust in feed mill, quarantine to contain, treat with mitigate (cost, approval, and space limitations)
- Mitigant should be applied to the finished feed as close to consumption as possible to prevent recontamination
- Put mitigation in at the site and change the current general production model to do all feed manufacturing on the farm
- How does the free flow of feed in Poland contribute to the idea that feed s spreading the virus?
- China has only 2% of feed samples testing positive for ASF using PCR. Is this reliable information? If it is, how does that contribute to this idea of ASF virus transmission in feed?

Consensus and Next Steps:
note common ideas were present across all three priorities

<u>Top priority:</u>

- Biosecurity of imports: prescreening, guidelines for biosecurity, determine a party to make these protocols and begin this work
- Communication with importers: increase awareness with the brokers and
- Risk analysis: update and evaluate different products including organic soybean
- Adopt Canadian approach including implementing import protocols
- Sampling feed ingredients: how can we do it and when should it be done
- Vaccine research and updates
- Virus survival research and research using surrogate virus

<u>Second priority:</u>

- Understanding what importers do and also communicate the risk
- Supply chain and processes
- Risk of virus survival and inactivation of virus
- Biosecurity criteria to approve a supplier
- Current feed safety procedures

Third priority:

- Risk assessment
- Biosecurity
- Importing organic fertilizers
- Alignment with other animal industries
- Alignment with other countries
- Jones Act on regulation of moving U.S. soy product around by ocean vessel

Key Messages/Take Away

- Everybody is concerned about ASF
- Level of risk of ASF needs to be determined before telling/implementing new processes. ASF is a risk we just don't know the level of the risk
- High interest in soybean meal process of inactivating the virus or high interest in whole beans for post process contamination
- Is the virus even in the feed/ feed ingredient in the first place?
- This is very complex and there are still pieces that we need to figure out
- Key relationship between soy and pork producers, as well as other livestock and poultry producers. A lot of the soy producers in the U.S. are also pork producers and this issue is extremely important to them.

At the conclusion of the session, the facilitator asked participants to write down three post-workshop actions they considered a priority and to assign each action a priority of 1, 2 or 3. These actions are transcribed below, with similar actions grouped by topic.

The individual items under each topic were assigned a score based on which priority score they were given, 3 if they were in the highest priority list, 2 if they were in the next priority list and 1 if they were in the last priority list. The topics were then prioritized by their total points and similar items were grouped within the topics and their scores summed.

Mitigation – 40 Total Points

- 14 Determine to what level soy processing, both extracting and expelled mitigate not only ASF virus but other disease/pathogens
    - Fund research/evaluate ASF survival through common soy processing
    - Evaluation of ASF survival through soy extraction and extrusion
        - Verifying processes to inactivate ASF (and other animal diseases)
        - Identify pathways of risk of introduction and contamination of soybeans knowing processing steps
    - Research soy manufacturing process to determine if it kills ASF
        - Focus efforts to define whether manufacturing process for soy and other ingredients results in the mitigation of viral risk. Use this info to prioritize risk hotspots
- 7 Adapt Canadian ingredients import protocol with proper USA improvements and implement tariffs on all imports

    - Feasibility assessment of Canada-like approach for US to also include a scientific assessment of its expected efficacy in reduction (or elimination) of risk
    - Plan and implement a regulatory protocol for the importation of all feed ingredients originating from ASF positive countries
    - 2 Identify soy product importers and implement similar programs as used in Canada
- 4 Stop importation of bulk commodities into the US from ASF positive origins
    - Eliminate importation of soy for animal feed (as it will take too long for government legislation)
- 3 Study effectiveness and physical limitations surrounding mitigants
    - Research cost effective mitigants
    - Development of feed mitigants to reduce post-contamination risk
- 3 Partnership around prevention and mitigation goals/clear actions and assignments
    - Validated mitigation strategies for feed and feed ingredients
- 2 Need to understand what are the "protective" factors allowing viral survival in soybean and other feed ingredients
- 2 Scope mitigation down to areas of higher risk
- 1 Implement a type of guideline for importation of feed ingredients into US (especially SBM, etc)
- 1 Follow hull supply to understand risk/mitigation

Communication/Education/Collaboration – 28 Total Points

- 7 For soy products, a better understanding of logistics/quantities for imported products
    - Clarification of where imports are coming from, for what purpose (i.e. human, organic livestock/poultry) to what parts and in what quantities
    - Still unclear on sources/quantities of imports of soybeans and soybean products
- 6 Comprehensive report to provide to/inform feed risk task force
    - Educate/document and communicate description of supply chain and risk factors in soy supply chain to pork and feed industry
    - Communication of prioritized initiatives, with emphasis on research priorities
- 4 More focus on potential impacts to US pork exports
    - Understanding of risk of leverage points in system
- 3 Increased communication on vaccine progress
- 3 Communication around ASF and soybean supply chain to influence other species about risk of ASF
- 2 Communicate US soy feed/food safety standards
    - More interaction with other livestock/poultry species groups on FAD prevention
- 1 Learn about Jones Act and how it affects imports of SBM
- 1 Alignment around US industry opportunity from global ASF disruption (feed, pork, soy, corn)
- 1 Focus on "keep it out"
    - All FAD's
    - Gain census of all vendors and industry
    - Work together
    - Form "one czar" for all FAD to overlap on all activity

Importer Outreach/Communication – 27 Total Points

- 27 Education of importers on ASF and risks. Program best practices for them to follow
    - Standardized communication and education (e.g. brokers/traders and smaller manufacturers)
    - Mitigate risk virus entry via organic soy products
    - Influence buyers importing from ASF countries
    - Reach out and educate importers
    - Identification of key SBM importers of SBB (?)
        - Focus on educational awareness
        - Know where product is going to and to whom
    - Identify and contact/inform SBM importers
    - Identify and educate soybean importers
    - Engage with the SBM importing industry to gather more information on supply chain, supply chain trends and general engagement on ASF mitigation
    - Narrow focus on imported ingredients
    - Contact importers and discuss their needs, provide other options

Biosecurity Protocols Related to Imports – 17 Total Points

- 11 Biosecurity/pre-screening protocol for importers
    - Biosecurity of imported soybean meal guidelines defines and implemented
    - Third party biosecurity plan/standardization to reduce risk
    - Align on minimum biosecurity criteria to approve a supplier of a feed ingredient evaluated as high risk for ASF
- 5 Identify "champion" organizations for the development of a comprehensive biosecurity protocol for processed meal; begin this work
    - Identify a "champion" for biosecurity code and audit plan
- 1 Biosecurity methods used/practiced by US soybean processors

Virus Testing/Sampling – 11 Total Points

- 8 Development of a validated sampling scheme and test to provide data for risk assessment and (perhaps) screen of imports
    - Ability to sample and test feed products with confidence in results
    - Summarize research gaps needed follow-up
        - Start sampling at ports to determine rate of POs(?)
        - Virus survived
        - Intervening
- 3 Research from field to harvest on virus viability and bioassay
    - Validate testing methods to accurately predict infectivity not just detection

Surrogate Model – 9 Total Points

- 9 Validate surrogate model to speed research on mitigation
    - Use Declan's surrogate virus model to begin understanding ASF virus survival/inactivation in feed ingredients and evaluate various mitigants (e.g. heat, time, chemicals)
    - Fully develop the surrogate virus testing methodology that Declan outlined
    - Develop and implement surrogate virus tool

Risk Assessment – 7 Total Points

- 4 Update US risk assessment to support prioritization of USDA resources
    - Update risk assessment for ASF
- 2 Assess risk of contamination along supply chain
- 1 Understanding of risks associated with importation of organic fertilizers

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