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Policy questions and possible implications related to use of processed animal proteins in pig diets
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Multidisciplinary Review Team and References available on the FPRC Website.

Summary of Findings:

- Pigs are naturally omnivores and require protein in their diets for health, growth, and productivity.
- A wide variety of proteins can be used in pig diets, including animal by-products.
- The spread of Porcine Epidemic Diarrhea virus (PEDv) has raised concern about the use of porcine by-products in pig feeding programs.
- Feeding porcine by-products to pigs has no known association with human diseases.
- Restriction of feeding porcine products to pigs may increase the cost of production because of higher costs of alternative protein sources, and may have negative environmental consequences.
- The major theoretical concerns of feeding animal by-products back to the species of origin are the potential emergence of a new disease or the horizontal transfer of an existing disease.

Why are animal proteins used in pig feeding programs?
Like all mammals, pigs require amino acids derived from protein in their daily diets. Feed ingredients of animal origin (animal protein by-products) are among the most digestible and economically-competitive protein sources available. Pigs are not the only domestic species that consume ingredients of animal origin, as it is also a common practice for pets, chickens, turkeys, and cattle to consume animal protein by-products. In the United States (US), the most common animal protein feed ingredients include rendered by-products, such as poultry by-product meal, feather meal, meat and bone meal, meat meal, blood meal, spray-dried blood products (including plasma proteins, or SDPP), and hydrolyzed intestinal tissues. These by-products are good sources of amino acids, energy, calcium, phosphorus, and other nutrients. Spray dried porcine plasma (of pig or cattle origin) is highly digestible and has had a specific role in nutrition of weaned pigs. Inclusion of SDPP has been shown to improve growth rate and efficiency of feed utilization by 10% and 40% compared to other protein sources, and provides passive immune protection in newly weaned pigs. A simple replacement of SDPP with other sources of high quality protein (i.e. egg protein, dried whey) does not seem to have the same benefit in animal growth performance or health. In recent years, hydrolyzed proteins made from pig small intestines have been added to piglet diets as a less expensive alternative to other protein sources, such as fish meal and whey protein concentrate.

Why is there a concern about using animal proteins in pig feeding programs?
Concerns related to feeding animal proteins to pigs can be divided into three categories: 1) potential transmission of a devastating animal disease (e.g. Classical or African Swine Fever, Foot and Mouth Disease, PEDv); 2) public health concerns of transmitting a zoonotic disease (e.g. salmonellosis) to humans; or 3) potentiating the emergence of a new disease in animals, humans, or both.
**Transmission of animal disease – the example of PEDv**

In the spring of 2013, PEDv was identified for the first time in the US and caused significant piglet mortality that impacted the entire domestic swine industry. Since its introduction, the virus spread rapidly throughout North America and has now been confirmed in 31 states, as well as in Canada. Contaminated feed has been linked by epidemiology to PEDv transmission, and research has confirmed it is a potential vector. Early cases of PEDv in Canada were linked to feed containing SDPP. Spray dried porcine plasma is produced from the plasma portion of pig or cow blood. However, PEDv is only found in pigs and has no health implications for humans exposed to the virus or who consume pork from PEDv-infected animals. Changes have been made both by industry (extended pre-marketing storage) and government (extended inventory time) to address the potential risk of PEDv transmission via the human food chain.

**Public health and emergence of new disease**

The public health concern of feeding by-products of animal origin to animals is related to risks of transmission of zoonotic diseases. Some of these concerns (e.g. *Salmonella*) have been known and monitored throughout most of the modern era. Others are relatively new, such as the rare but fatal human neurological disease of new variant Creutzfeldt–Jakob disease, which appears to be linked to consumption of infective tissues from Bovine Spongiform Encephalopathy (BSE or ‘Mad Cow’ disease) infected cattle. The BSE agent, which is unusually heat resistant, can be spread by feeding of rendered ruminant by-products to ruminants. As a result, the risk of transmission of BSE through feed is the basis for the current ruminant-to-ruminant feed bans in the US and most of the developed world.

**What are the current animal protein regulations for pig feed in the US?**

- (1997) BSE/Ruminant Feed Ban: banned the inclusion of ruminant animal proteins in feeds provided to ruminant animals, such as cattle, sheep, and goats.
- (2008) BSE/Substances Prohibited from Use in Animal Food or Feed Law: expanded the previous feed regulation to prohibit the use of the highest risk cattle tissues in ALL animal feed. These high risk ruminant materials (HRCM) are the neurological tissue (brain, spinal cord, nerve ganglia) from cattle 30 months of age and older.

**What are the likely outcomes of various policy options to address emerging risks in pig feeding programs?**

1. **No changes in current regulation**
   - The market “self-corrects”, with producers voluntarily electing to use animal-based products based on perceived value and risk tolerance.
   - The feed ingredient industry invests in research and development to assess and manage hazards of potential concern based on market signals.
   - An unregulated market-based response may reduce confidence in US feed in international markets, leading to trade barriers.
   - Negative shift in public opinion toward the meat consumption, as well as the livestock or feed industries if a links to disease spread proven.

2. **A ban on any porcine by-product from being included in pig feeding programs**
   - Species segregated rendering plants will allow for continued by-product use in feeding programs (e.g. pigs could be fed ruminant and poultry by-products).
   - Additional investments to establish feed production facilities that ensure species separation and that no batch-to-batch cross-contamination occurs.
   - Cessation of dead stock rendering in smaller protein by-product processing plants resulting in reduced production of rendered by-products.
   - Greater animal feed costs, leading to increased pork costs to consumers.
   - Possible unintended negative consequence on consumer perceptions regardless of the current science, (eg, “if it’s banned, it must be dangerous”).
   - Additional regulatory and enforcement costs to ensure no cross-contamination, similar to that of a total ban.

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3. A ban of any proteins of mammalian (excludes poultry and fish) origin in pig feeding programs

- A complete permanent ban dictates that a significant proportion of the over 25 million tons of animal by-products produced annually be destroyed if alternative uses can be found or scaled up.
- Greater animal feed costs, leading to increased pork costs to consumers.
- Realignment of current geographic field crop distribution to meet increased demand for plant-based proteins in animal feed, which may increase the negative environmental impact of meat production.
- High government regulatory and enforcement cost.
- Consumer perception that feeding any mammalian proteins to pigs poses unacceptable risk to animal or human health, regardless of available scientific evidence.