

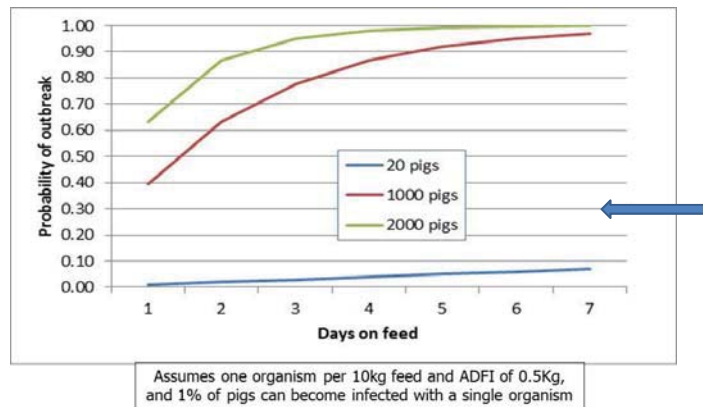
## University of Minnesota Risk Assessment of PEDV in Feed Ingredients of Porcine Origin – Looking for the “Take-Homes”

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After reports from the USA and Canada indicated feed (either from ingredients or cross contamination) is a concern in PEDV transmission, many producers and veterinarians made substantial changes to the way they feed pigs. At the extreme end are recommendations that all national governments “ban the feeding of rendered pigs and pig by-products back to pigs.” (John Harding, Proceedings, 23rd IPVS Congress, Cancun, Mexico, 2014, pp.2-12). This is an example of the precautionary principle, used to support decisions where there is some possibility of harm, but extensive scientific knowledge is lacking. This echoes the BSE era, when a total ban on feeding animal proteins to farmed animals was adopted in Europe in 2001, while other countries (e.g., USA) banned animal protein only from ruminant diets. This week the National Pork Board posted our report from the University of Minnesota of a risk assessment of PEDV survival in selected feed ingredients, being rendered products, spray dried porcine plasma, and hydrolyzed proteins (<http://research.pork.org/Results/ResearchDetail.aspx?id=1812>). The report details the approaches taken to acquire data from multiple sources (industry, scientific literature, experimental studies and industry reports); to document likely limitations of the data sources; and to identify needs for further research. Here are some selected points from the report:

- Based solely on data on heat inactivation and the thermal processes used in the **rendering and hydrolysis**, we deemed the likelihood of PEDV survival to be negligible for those processes.
- **Spray drying** involves shorter exposure times and lower temperatures than rendering or hydrolysis processes, and based solely on the experimental heat inactivation data, we estimated that spray drying represented a low risk of PEDV survival. However, other processes, in addition to heat, have a role in pathogen inactivation during spray drying. Also, the heat inactivation data did not directly mimic the spray drying process and more targeted research of PEDV inactivation under conditions comparable to spray drying was recommended.
- Recently published data on inactivation of PEDV from experiments with laboratory scale spray dryers indicated a substantial reduction of PEDV that resulted in no infection of either laboratory cell cultures or live pigs in two experiments. However, laboratory scale processes may not exactly reflect the range of conditions in commercial scale spray dryers.
- In line with practices recently adopted in industry, we estimated the effect of post-processing storage of spray-dried plasma at room temperature (20-22°C) for two weeks to achieve additional inactivation. Incorporating the post-processing storage, the risk of PEDV survival was estimated to be negligible to low based on heat inactivation alone, and negligible based on the experimental data from laboratory spray drying.
- Overall, the assessments were constrained by the limited availability of specific data. Remaining uncertainty could be addressed with better knowledge of 1) viral inactivation by spray drying, 2) the infectious dose of PEDV, and 3) the relationship between measures of virus RNA (from PCR) and infective dose in both laboratory (cell culture) and animal (bioassay) models.

On February 6, I presented a seminar at the University of Minnesota summarizing the findings, the reservations, and some of the communication challenges. I described the difficulty in communicating that an event of very low risk at an individual level can still have a substantial impact at a population level. One example was that 5,000 Americans die from foodborne disease each year, but the risk per meal is only 1 in 113 million. This is arguably analogous to feedborne risks for pigs, due to the large volume of feed consumed, and particularly for large sites where thousands of pigs are housed. In April last year we showed a Figure (reproduced below) created to reconcile the fact that if feedborne risk is very low, risk of disease in small populations (e.g., bioassay studies) could be relatively low, but would be very high in large herds.



The model assumptions were a ‘low risk’ scenario with one viable organism per 10kg of feed (i.e., practically undetectable) and where only 1% of pigs could be infected by a single organism. The arrow we have added at 0.3 represents the incidence rate in the original outbreak for Canadian herds including plasma at 3-6% (Pascale Aubry, personal communication). The key point here is that the incidence is closer to the ‘20 pig’ prediction than the 1000-pig prediction. This could only happen for 3 reasons (alone or in combination). Either the herds were very small (e.g., 100 pigs for 7 days on feed), less than 1% of pigs can be infected by a single organism, or the contamination was in fact lower than that assumed in the model (1 viable organism per 10kg). **Again, the key point is that a ‘low risk’ at the feed level can translate to a much higher risk at a population level for large herds.**