Within the Ontario pork production industry, there are gaps in the capacity to wash pig transport vehicles. As well, there are costs associated with trailer washing, disinfecting and drying. With the current outbreak of Porcine Epidemic Diarrhea (PED) and continued challenges with other diseases such as Porcine Reproductive and Respiratory Syndrome (PRRS), it is critical to make the best decision when selecting transport options. To do this, we must understand the disease transmission risks at each stage of pork production and the benefits of minimizing those risks. The figure below depicts the pork production pyramid. The higher up the pyramid the barn is positioned, the larger the number of pigs that are affected by a change in health status at that barn. This is because the barns at the top of the pyramid (in the red and yellow zones) supply multiple other barns.

As well, all of the barns in the red zone and some of those in the yellow zone operate on a continuous flow basis. If a continuous flow operation becomes infected with disease, the effort to rid those barns of disease is substantially higher than for the barns that operate with an all in/all out flow.

The Pork Production Pyramid

Reducing the disease transmission risks associated with the transport of pigs.
Making Decisions Based on Risk

The only way to eliminate the risk of disease transmission during the transportation of pigs is to start with a properly cleaned, disinfected and dried truck and trailer. The trailer must also not become contaminated during the loading and unloading processes so the people involved and all equipment must be controlled for. It should be noted that these procedures do not control for aerosol transmission or for pig to pig transmission.

It is very important that the reader understands that reduced risk is only that. If the recommendations that reduce risk are followed, transmission of disease during the transport of pigs is reduced, but is not eliminated and will with some kind of frequency occur.

There are two risks associated with the transport of pigs:

1. The pigs that are loaded on a dirty truck (or improperly washed truck) become infected with the diseases on the truck.
2. The diseases left on a dirty truck end up contaminating the barn during loading of the pigs.

Disease Transmission Control for the Pigs on the Truck

If we are trying to prevent the pigs on the truck from the possibility of contracting diseases such as PED and PRRS, then the truck and trailer must be properly washed, disinfected and dried. There is no other option. The focus of transport operations within the red and yellow zones would be to prevent transmission of disease to pigs on the truck.

PRRSV Transmission Control for the Pigs in the Barn

If a trailer backs up to the barn and it is still dirty with manure and bedding, that may be positive for PEDV or PRRSV, the material and therefore the virus still have to get into the barn and come in contact with susceptible pigs. It can get into the barn by three primary ways:

1. It gets kicked off the trailer by pigs being loaded on the trailer.
2. It gets tracked into the barn on pig and or people feet and or other fomites.
3. It gets blown or sucked into the barn.

If we are trying to reduce risk for the pigs in the barn then we have some options. It may be possible for transport events out of the green zone to control these risks as noted below.
A. The Trailer

Risk reduction is proportional to the amount of infective material on the trailer. The following are recommendations to reduce this risk. For example, if the trailer has been scraped out and a high volume wash has removed all the loose manure and bedding then risks are significantly reduced. Pig and people feet as well as other fomites still pose a risk, but overall risk is reduced. If one adds disinfectants then risk is further reduced.

Recommendations:

1. A scraped high volume washed trailer is less risk than a dirty trailer.
2. Create a buffer zone between the contaminated trailer and the load out facility. Generously apply a dry disinfectant such as lime prior to loading in the back 10 feet of the trailer to reduce risk of disease transmission into the barn.
3. A dry disinfectant applied generously to the loading chute would take the concept of risk reduction further.
4. High pressure wash and disinfect of the trailer goes one step farther in risk reduction. The only difference here is the trailer is not dried. When certain products such as Synergise® were used as the disinfectant in one experiment conducted by Dee et al, PRRSV could not be isolated even if the trailer was wet. This research should be repeated. It should be noted this is not the case for all swine pathogens. In the event drying is not an option having a clean, disinfected trailer is far less risk than a dirty trailer and significantly less risk than a high volume wash alone.

B. The Barn

Controlling for a contaminated truck at the level of the farm is another potential approach to risk reduction for barns from the green zone of the production pyramid. If shipping areas are designed with strict one way pig flow and a “clean / dirty” area is clearly separated, ideally with the addition of positive pressure, the risk of a dirty truck can be eliminated.
Recommendations:

Risk reducing options to consider:

1. Use of a **transfer platform** with a clean and disinfect of this platform between loads provides another buffer to reduce the risks associated with a potentially infected trailer. This low tech option can be used truck to truck or truck to barn, on or off site, mobile or stationary with the goal of keeping the clean area clean and isolated from the dirty area.

2. Use of a **transfer station** – usually designed as building at a separate location with separate incoming and outgoing chutes which can be washed and disinfected between loads. This option can significantly reduce risk to the barn, but requires access to an appropriate location.
3. **Chute extensions** may be particularly valuable at finishing sites. This design provides a buffer in the form of a chute extension which can be cleaned and disinfected between loads and allows the trucker to enter the truck in a biosecure, safe fashion via a Danish Entry addition.

4. The addition of a positive pressure load out can also reduce your risk. Most barns are negative pressure ventilated so when the loading chute door opens air from the outside is sucked into the barn. External material such as shavings are also sucked into the barn. One of the primary rules of biosecurity is to keep outside stuff outside of the barn. Implementation of a positive pressure load-out reduces this risk by blowing air out of the barn during loading.
5. All of these risk reduction strategies rely on good biosecurity practices such as ensuring one way pig flow.

6. The most significant opportunity to reduce the risk of disease spread is know the health status of the pigs about to be loaded on the truck. If known PEDV or PRRSV negative pigs are loaded on a clean truck then the main risk left is the unload procedure. If we combine known health status with excellent unload biosecurity protocols, using dry disinfectant where appropriate, we can significantly reduce the risk of disease transmission i.e. loading negative pigs on a negative truck means the status of the truck is negative for the next load, assuming appropriate load/unload procedure have been followed. Multi-site systems use known health status to reduce transport cost all the time. For example, weaned pigs are transported to the nursery site and the same truck moves feeder pigs to the finishing barns. Defining health status in real time is challenging because populations of pigs can be exposed to diseases in multiple ways and at different times, however monitoring options are continuing to improve and are becoming more cost effective.

Wash/Disinfect/Dry Recommendations Summary

<table>
<thead>
<tr>
<th>Loads From</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>Sow Barns/Isolation Units</td>
<td>Never allow a dirty truck to back up to the sow barn Options – WDD or transfer truck – consider transfer platform or station</td>
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<tr>
<td>Nursery</td>
<td>Never move feeder pigs from the nursery to finishing barns with a dirty truck. Options – WDD or transfer truck consider transfer platform, drop off weaned pigs/load feeder pigs</td>
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<tr>
<td>Finisher</td>
<td>Continuous flow – WDD All In/All Out flow - scrape, high volume wash/disinfectant Consider chute extension</td>
</tr>
</tbody>
</table>

References

1. Original Study from AASV 2012 proceedings. An evaluation of Stalosan F® powder for deactivation of PRRSV Casey Rabbe¹; Deb Murray, DVM²; Amanda Sponheim³, DVM ¹University of Minnesota, St. Paul, Minnesota; ²New Fashion Pork, Jackson, Minnesota; ³Boehringer Ingelheim Vetmedica Inc., St. Joseph, Missouri.