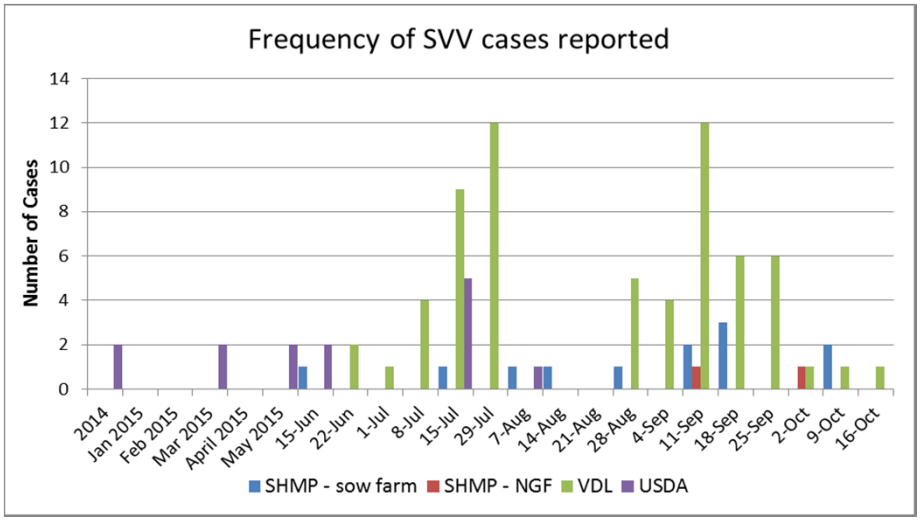
Seneca Valley Virus Update



Frequency of PRRSv detected outside eight sow farms in swine dense regions of Minnesota

(Part 2: Identifying critical farm density)

Steve Tousignant, Peter Davies, Peter Raynor, Albert Rovira, Bob Morrison

Key Points

- Utilized the eight farms in the previous study (discussed in the 10/9/15 SHMP report)
- Of the eight farms, this model predicted only two farms had local density that would support epidemic spread of disease
- Could be used to potentially refine locations for aerosol study

---

In this week's science page, Steve Tousignant, our recent PhD graduate student continues the discussion on the frequency of aerosolized PRRSv detection. Here, he outlines a method used to identify farms that might be at higher risk of disease spread based on the number of and proximity to neighboring farms.

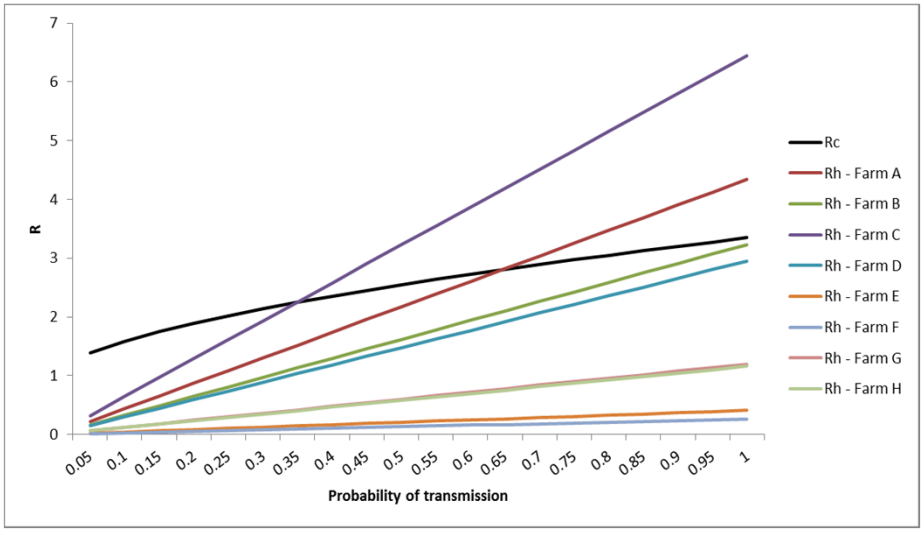
Introduction and Methods

- These methods were described by a group of European epidemiologists working on the 2003 High Path Avian Influenza (HPAI) epidemic in Denmark (Boender et al., 2007).
- The goal was to develop a model that would predict where epidemic spread of the disease would occur as a function of local density of neighboring farms (number of and proximity to within 3 miles), and the probability of transmission of the disease.
- Once the details were worked out, they applied this model to the outbreak data, and found that, it predicted the location of the HPAI infected farms quite well.
- Here, we estimated the value for each of the 8 filtered sow farms in the study.

CONTINUED ON NEXT PAGE

Results

- Of the eight farms in the study, only 2 were identified to have a critical density of farms that might suggest aerosol transmission of diseases
- On the graph below:
- The 8 farms are represented by different colors, and the black line represents a 'critical threshold'
- When the colored line is above the black line, the model suggests the potential for spread of disease
- Here, we see that farms 'A' and 'C' might be at high risk of diseases (such as PRRS) spreading to them if one of their neighbors became infected. Additionally, we can see that in the case of farm 'C', it would only need to be a disease that has a ~35% probability of transmission, whereas for farm 'A' it would need to have a ~65% probability of transmission.



Discussion

- This model suggests a way to quantify local density and risk of disease transmission
- This model could be used to further guide the locations of future research directed at describing the frequency of aerosolized diseases – for example, we may not chose to sample near farms 'D' through 'H' again.
- Additionally, this model could be used during disease outbreaks to guide control programs aimed at minimizing the spread of these epidemics.
- Interestingly, during the spring of 2015 farm 'A' broke with PRRS a few weeks after known PRRS positive pigs were placed in a nursery less than three miles away.

Reference

Boender, G., Meester, R., Gies, E., De Jong, M.C.M., 2007. The local threshold for geographical spread of infectious diseases between farms. Preventive veterinary medicine 82, 90-101.