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SDEC Partners Research Update

Project Update: Investigation of land coverage and elevation as risk factors for PRRS breaks

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Background

- Even though there has been substantial PRRS research over the past years, PRRS virus incidence does not appear to be decreasing.
- The Swine Health Monitoring Project (SHMP) is a national volunteer project that aims to monitor and aid in the control and prevention of PRRS and other infectious diseases.
- To date, the SHMP represents over 40% of the sow population of the United States.

Objective

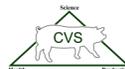
To investigate the association between environmental factors such as land elevation and land coverage and the incidence of PRRS virus breaks using the SHMP database.

Material and methods

- In this study, we enrolled all sow sites participating in the Swine Health Monitoring Project from 2009 to 2016 that shared weekly PRRS outbreak information. Location of the herd, number of PRRS breaks and number of years contributing with data were extracted for each site from the SHMP database.
- Environmental variables of interest considered in the analysis included land coverage (whether the farm was located in areas characterized by trees, shrubs or managed areas; Fig. 1), land altitude (meters above sea level) and land slope (degrees as compared to surrounding areas; Fig. 1). These variables were extracted from publicly available databases.
- Other known PRRS risk factors that were also investigated included farm size, swine density and geographical region. A statistical model was built to investigate if the number of PRRS breaks were associated with the above-mentioned factors, while accounting for the clustering of farms within production systems.



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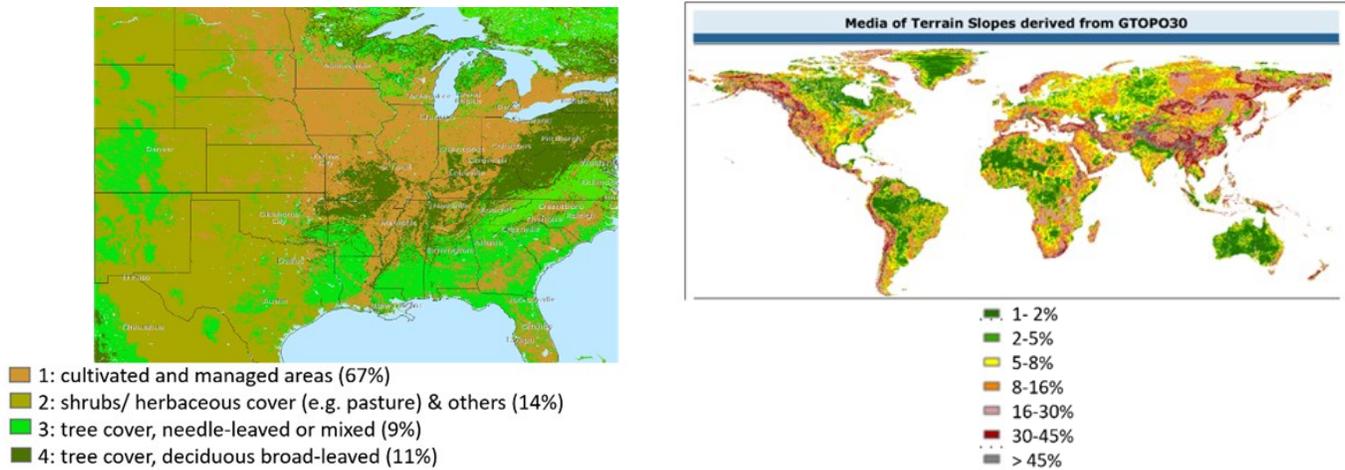


Fig. 1. Left: Land coverage raster (number in brackets represent % participating farms for each category); figure created using ArcMap v.10.2.2. Right: Land slope raster (source: FAO, GeoNetwork)

Results:

- The final model showed that sow farms located in high swine dense areas and that had a larger number of animals had increased rate of PRRS breaks.
- Sow sites located in terrains with a slope of 9% or higher were “protected” from PRRS outbreaks when compared to farms located in terrains with slopes of 1% or lower. For sites located in slopes of such degree, the incidence rate was reduced by about 50%. However, altitude itself (meters above sea level) was not significant in the final model.
- Sow sites located in areas characterized by the presence of shrubs or trees also appeared to be “protected” compared to sites located in managed areas. Being located in such areas reduced the incidence rate by at least 30%.

Conclusions and Implications:

- Being located in highly inclined terrains were associated with fewer PRRS breaks. It could be hypothesized that being in a different elevation level than the neighbors is protecting the sites from airborne particles, but also that being located in inclined terrains is a proxy for being farther away from main roads and traffic.
- Being located in areas with shrubs or trees were likewise associated with fewer PRRS breaks. Trees serving as vegetative filters for odor emissions and airborne pathogens have been explored in the past, but not for PRRS to the knowledge of the authors.
- Prospective studies should be conducted in the future to substantiate these findings, since it is important to keep in mind that the assessment of the nature of the land was taken in a cross-sectional manner.