

Wait and see? Biosecurity decision-making under disease risk – Part 2

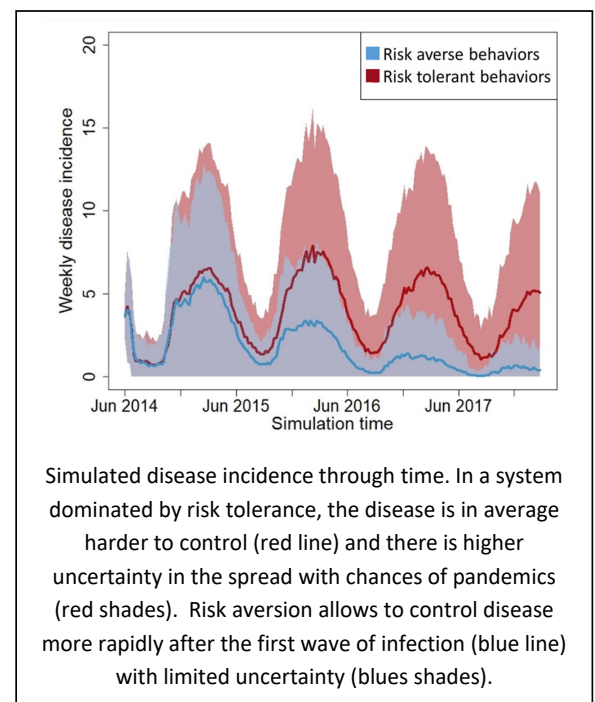
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In the previous science page we shared that the decisions made by the players in different scenarios of disease risk, risk communication strategies, and neighboring farm biosecurity implementation allowed us to identify three prominent behavioral groups. The *risk tolerant* players invested very little in biosecurity in contrast to *risk averse* players who invested consistently throughout the simulation to protect their farms. Our third category, *risk opportunists*, primarily invested in biosecurity during high risk scenarios but limited investments during rounds with lower chance of infection.

Risk tolerant and opportunist behaviors are important to study because they can reduce the efficacy of biosecurity measures in preventing disease spread across the production system. We created an agent-based model to simulate the stakeholders of a swine production system (Bucini et al., 2019). The main stakeholders, our modeled agents, were producers, feed mills and slaughterhouses along with their transportation networks. We designed our simulated stakeholders to implement and invest in biosecurity according to the risk attitudes observed during the experimental computer games. We randomly introduced a disease infection in the modelled system and studied each outbreak's spread under different scenarios of risk behavior (Bucini et al., 2023). This allowed us to ask "What happens when the system is piloted by people who are primarily risk tolerant or opportunist?"

Opportunists invest in biosecurity when risk is getting high whereas risk tolerant individuals wait until the disease has diffused widely and is now at the door of their farm. The simulation of these 'wait and see' behaviors showed that delayed reactions to disease leave the production system exposed to potential pandemics. Larger proportions of risk tolerant and opportunist behaviors increase the probability of catastrophic infections because they delay the protective action of biosecurity. That time delay raises uncertainty and risk for the whole swine production system, not only for the single opportunist or tolerant farm because people, feed, animals and equipment movements connect everyone. Thus, taking biosecurity actions once an emergency has advanced might be too late and cause disruptions at the system scale.

Rather than wait and see, readiness and implementing strong, preventative biosecurity actions reduce future uncertainty and disease spread. These behaviors characterize the attitudes of risk averse decision-making. Our model shows when decisions are made using risk averse attitudes, the disease spread remains limited and more likely can be controlled. Risk averse behaviors not only safeguard the herd from diseases but also build capacity to work with confidence to minimize disease incursions in the whole production system.



References:

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