

# PROTECTING HERD HEALTH

An Animal Disease Biosecurity Coordinated Agricultural Project



## Message from the Project Director

Dr. Julie Smith, DVM, PhD

Our team gathered in Orlando in January, not far from the UCF campus where a number of our key personnel work. Having left sub-freezing temperatures in Vermont, it was shocking to walk outside and find it the same temperature as indoors. But it was quite enjoyable, too! Tim Sellnow gave a few of us a tour as we searched for lunch on Monday. Seeing one of the fastest growing college campuses in the country was a real treat.

We had a lot of give and take at our team meeting. Presentations by team members or groups of team members were interspersed with short presentations by our guests. I want to thank Dave Smith, Tim Goldsmith, Mike Sanderson, Lucas Pantaleon, Mo Salman, Matt Cochran, Michael Costin, Steve Van Wie, and Don Hoenig for joining us, sharing their experiences and perspectives, and giving us additional insights to keep in mind as we go forward with the project. I want to share a few of the take-aways that I felt were especially meaningful.

Some of these revolved around biosecurity and the difficulty in gaining traction in this area of management. Rather than promoting animal health at the production level, promote better production through better health. Assessment of biosecurity level is more complex than having a tool or a protocol on paper. Effective biosecurity is not tied to having a truck wash or shower or Danish entry, but to consistent compliance with their use. Levels of compliance can be categorized as (1) always follow protocol, (2) sometimes follow protocol, and (3) never follow protocol. Explicitly seeing the impact of variation in biosecurity in the agent-based model is novel and valuable. Biosecurity is frequently sidelined

because, although it is important, it is not urgent, and urgent actions rule the day on most farms. Introduction of novel disease gets people's attention.

Some of these were specific advice to keep us grounded in the real world. We were reminded that producers are not veterinarians or youth. We were challenged to anchor our games and simulations in real-world data and networks and even go spend a week with a farmer or veterinarian to gain additional insights to develop the models. We were encouraged to compare models of disease spread and build our agent-based model on the best of what others have done.

At the conclusion of the meeting, project team members had the opportunity to sit in front of the video camera for an interview with the UCF communication folks. I look forward to seeing video clips highlighting our involvement with the ADB-CAP on our project website! Please read on for more project updates and perspectives.

Live well and biosecurely!



Team members embrace biosecurity with the locals.

## Guest Editorial: What are "Turkers" and What do They have to do with this Project?

Eric Clark

"Turkers" are individuals employed through the Amazon Mechanical Turk web platform to perform Human Intelligence Tasks (HITs) contracted by third party developers and researchers. In our case, HITs are linked directly to a web applet running one of our digital field experiments (i.e., gaming simulations). This service allows us to easily recruit hundreds of people who, by playing a game, generate data needed for our research purposes. Our gaming simulations recreate decision-making processes relevant to industry stakeholders. A financial incentive is provided to Turkers for better results; a higher in-game score results in a higher payout.

For example, the Compliance Game tested the decisions related to rule breaking behavior at the operational level of hog production facilities. Individuals were given the choice to comply with a shower protocol when entering or exiting a facility. Players could choose to cheat and choose a "fire exit," which could increase their daily score. However, this risky decision could lead to an infection that decimates their farm and penalizes their pay. Modifying the risk of infection as well as information provided to the player are called game "treatments," or experimental variables. The decisions, scores, and treatments from Turkers' game play are stored and analyzed to help quantify how various types information can affect this decision-making process. We then apply these features to contagion models, which simulate outbreak dynamics among modeled supply chain networks.

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## Learning Objects on Biosecurity will be Published this Summer

Ors. Jeannette McDonald, Susan Kerr, and Jeanne Rankin of the Education Team have completed two more modules, making a total of four biosecurity modules for the target audience of 4-H or FFA youth. The first two modules covered basic information about 1) what biosecurity means and why it's important; and 2) routes of infection and means of transmission. The third focuses on finding sources of disease transmission risk and the fourth on developing biosecurity strategies. In these last two modules the youth is put in the role of a biosecurity investigator. Through exploring the farm and the use of a variety of activities, the user identifies potential sources of disease transmission and then recommends strategies to reduce the risks. Each of the four modules has been peer-reviewed and is currently being pilot tested by 4-H and FFA youths and leaders. They will be published in their final form this summer.

**Biosecurity**  
Biosecurity Strategies

Good job! Now let's go on to the next area.  
Explore the areas for sources of disease transmission risk.  
Remember to think about ways you could reduce the risk as each point is presented.

Select "Next" to move to another area.

Area D

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Biosecurity Strategies list

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**Biosecurity**  
Finding Sources of Disease Transmission Risk

Your Role: Biosecurity Investigator  
Your Mission: Find potential sources of disease transmission risk

There has been an animal disease outbreak in a neighboring state. It seems to be contagious; various types of farm animals are sick and some are dying. It's costing farmers a lot of money due to the loss of sales and the expense of caring for sick animals. This has the agricultural community worried about their animals and businesses.

To learn more about biosecurity, you have volunteered to visit a local dairy and look for ways a contagious disease could enter the farm. You will prepare a report listing the potential sources of disease transmission and why each one is a risk.

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**Biosecurity**  
Biosecurity Strategies

Vaccination Example

Calculate your total costs in each "Cost" column by multiplying the cost per cow for the different expenses and the number of cows in each example. The first two rows have been filled in for you.

Expenses of vaccinating and not vaccinating	Low prevalence		High prevalence		Vaccination	
	#	Cost	#	Cost	#	Cost
Cost of vaccination (\$3/animal)	0	0	0	0	100	300
Cost of Breed Cow Deaths (\$1500/cow)	1	1500	10	15000	0	0
Cost of Wounded Steer Deaths (\$700/calf)	1	700	10	7000	0	0
Cost of Abortions (\$700/calf)	2	1400	20	14000	0	0
<b>Total Costs</b>		<b>\$ 3000</b>		<b>\$ 36000</b>		<b>\$ 300</b>

Let's say you have a herd of beef cattle consisting of 100 cows and 100 calves.

To replace a dead breed cow would cost \$1500 or more.

Wounded steer calves are worth \$700.

A loss of a calf due to abortion equals the amount of one calf at weaning (\$700).

The cost for BVD vaccination is \$3/calf for a total of \$300 for your herd.

Can you afford to vaccinate...?  
Can you afford NOT to??

FYI: While vaccination is not a guarantee of NO disease, it does reduce it!

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Biosecurity Strategies list

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## Evaluator's Viewpoint

*Spring 2018*

Linden Higgins, UVM, M.Ed, PhD



I have been working with the ADB-CAP team as an evaluator since the beginning of the second year of the project. As the evaluator of the entire project, I reflect back to Julie my observations about the team and the project, much as a mirror in a dance studio provides a check on one's movements and position. This is a different kind of evaluation than those focused on the impact of an existing program on a target population. The ADB-CAP was conceived as an interdisciplinary effort to gather baseline data and, from that foundation, develop recommendations and, time permitting, trial programs to help industry, government, and producers make better informed biosecurity decisions. Thus, my evaluation involves a process of tracking and comparing the developing initiatives from year to year.

The most interesting are "emergent" projects, those not originally in the proposal but growing from the interactions among the team members. Over the past year, the diversity of such emergent projects has increased rapidly. Most of these new projects have the concrete objective of influencing human behaviors in a range of positions in industry. There are three I find most exciting.

The first is the result of collaboration between the communication experts and the serious gaming experts on the team. The first objective of ADB-CAP is to collect data around how people make biosecurity decisions. One of the primary approaches used in this project is "serious gaming," where individuals are placed in a virtual environment and asked to make choices based on information they are given, which reflects an underlying treatment matrix of risk and information disclosure. SEGS and the communication team recognized the possibilities of using these "games" to test theories of communication that might guide development of better messages to "nudge" behavior towards greater adoption of biosecurity by individual producers. This led to a series of "exemplification" games.

The second is targeted development of agent-based models based on the networks of a real swine production system. The Social Ecological Gaming and Simulation laboratory members of the ADB-CAP team started putting out feelers to determine how to utilize system information for model development in a way that would benefit the system providing the data. These efforts are generating new insights into how the swine industry works and new versions of the models.

The third is the emergence of a cross-team effort to engage stakeholder and industry members in program development. The goal of these efforts is to gather recommendations for adapting these "serious games" and the ABM models to meet industry needs for risk communication and biosecurity education. The premise is that public versions of these games and simulations will help individual producers better understand how their private decisions affect an entire system. The youth learning objects created by the education team have created much excitement both at focus groups and among the other members of the team, and the plan is to integrate expertise across the team to develop additional educational materials.

The outputs from these collaborations will be programs that can increase participation in prescribed biosecurity measures by what is termed "nudging" behavior. It has been a great pleasure to watch these professionals communicate across disciplinary boundaries to create novel and potentially very important new means of protecting US agriculture.

## Our Work in Print!

Wu, Q., L.L. Schulz, G.T. Tonsor, and J.M. Smith. 2017. "Expert views on effectiveness, feasibility, and implementation of biosecurity measures for mitigating Tier 1 disease risks in the U.S. swine, beef cattle, and dairy industries." *Journal of Veterinary Science and Technology* 8(2):435. doi.org/10.4172/2157-7579.1000435

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Sellnow, T. L., J. S. Parker, D. D. Sellnow, R. S. Littlefield, E. M. Helsel, M. C. Getchell, J. M. Smith, and S. C. Merrill. 2017. "Improving biosecurity through instructional crisis communication: lessons learned from the PEDv outbreak." *Journal of Applied Communications* 101(4) (online). doi.org/10.4148/1051-0834.1298

Sellnow, T. L., D. D. Sellnow, E. M. Helsel, J. M. Martin, and J. S. Parker. 2018. "Risk and crisis communication narratives in response to rapidly emerging diseases." *Journal of Risk Research* (online). <https://doi.org/10.1080/13669877.2017.1422787>

Wu, Q., L.L. Schulz, and G.T. Tonsor. 2018. "Using expert knowledge to understand biosecurity adoption aimed at reducing Tier 1 disease risks in the U.S. livestock industry." *Journal of Agricultural Science* 10:12-26.

### Collaborating Institutions

**Our team is comprised of people from many great universities and organizations!**



This material is based upon work that is supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number 2015-69004-23273. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the view of the U.S. Department of Agriculture.