Animal Disease Biosecurity
Coordinated Agricultural Project

Title:	A human behavioral approach to reducing the impact of livestock pest or disease incursions of socio-economic importance

Sponsoring Agency Funding Source	NIFA Non-Formula	**Project Status** **Reporting Frequency**	ACTIVE Annual
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Program Code: A5152

Project Director
Julia Smith
802-656-4496
julie.m.smith@uvm.edu

Recipient Organization
UNIVERSITY OF VERMONT & STATE AGRICULTURAL COLLEGE
85 S PROSPECT ST
Burlington, VT 054051704

DUNS No.   066811191

Program Name:
Global Food Security: Minimizing Losses

Performing Department
Animal and Veterinary Sciences

Co-Project Directors	**Departments**
Koliba, Christopher	Department of Public Administration
Littlefield, Robert	Communications
Bass, Thomas	{NO DATA ENTERED}
Kerr, Susan	CAHNRS-Extension
Parker, Jason	SENR
Schulz, Lee	Economics
Zia, Asim	CDAE
Tonsor, Glynn	Agricultural Economics
Merrill, Scott	Plant and Soil Science
McDonald, Jeannette	
Sellnow, Timothy	Nicholson School of Communication

Non-Technical Summary

Emerging diseases of socio-economic importance have food security, perceived food safety, and domestic and international trade implications for the marketing of animals or animal products. Understanding the human behavioral dimensions of the introduction, spread, identification, reporting, and containment of new, emerging, and foreign pests and diseases of livestock is critically important for developing effective strategies to sustain a productive, profitable, and secure food animal sector. Experts in animal science and veterinary medicine, agricultural economics, public policy, anthropology, adult education, and risk communication come together to lead this inter-disciplinary applied research and outreach project focused on enhancing biosecurity practices and strategies to reduce the impact of incursions of new, emerging, or foreign pests or diseases of dairy, beef, and swine. Through engagement with project activities, stakeholders in U.S. dairy, beef, and pork production will be encouraged to implement practices and policies that collectively reduce the impact and threat of new, emerging, and foreign pests and diseases to the nation's meat and milk supply. This proposal directly addresses **Priority Area A5152 within the Food Security Challenge Area--Animal Health and Production and Animal Products.** Educational resources, "games", and messages developed and tested during the project will be made available beyond the end of the funding period through learning object repositories and an innovative web portal.

Accomplishments
Major goals of the project

Overall Goal: The activities and outputs of this project will facilitate the development and adoption of practices and policies that collectively reduce the impact of new, emerging and foreign pests and diseases to domestic production of cattle, swine and small ruminant foods and byproducts.

The following objectives will guide the activities of this CAP:
Objective 1: Characterize determinants of behavior of stakeholders at critical control points where application of practices or protocols can prevent (or reduce the impact of) incursions of pests and diseases of cattle, pigs and small ruminants.
Objective 2. Determine economic attractiveness of solutions that enhance biosecurity.
Objective 3. Determine most effective communication strategies (message tactic and wording, channels, and sources).
Objective 4. Integrate disease characteristics, human risk perception and socio-economic influences on behavior in a simulated "game" environment.
Objective 5. Develop educational and outreach materials and methods that lead to measurable changes in attitude and behaviors at critical control points in cattle, swine and small ruminant production systems.

What was accomplished under these goals?

Overall Goal: Roughly $140 billion per year of economic activity in the United States is generated by food animal production, not counting poultry. Mitigating the consequences of diseases and pests with potentially severe social and economic ramifications is a vital aspect of sustaining a profitable and productive food animal sector. Protecting food animal health from new, emerging and foreign diseases and pests requires both the knowledge of, and routine performance of, behaviors that reduce the likelihood of entry of diseases and pests into an animal facility. We need better understanding of the motivational drivers of behavior and better tools to nudge behavior in the right direction. Innovative research platforms, stakeholder surveys and interactive delivery of educational materials are helping facilitate the development and adoption of practices and policies that collectively reduce the impact of new, emerging and foreign pests and diseases, particularly to domestic production of cattle, swine and small ruminant foods and byproducts.

The team's effort is organized around five objectives, which define the major thrust of effort planned over the course of the project. Their execution has been simultaneous not consecutive. Stakeholder input, cross-disciplinary linkages and synergies have informed project direction and refinement of objectives over the five-year project.

Overall Accomplishments

At the project team meeting held in Burlington, Vt, in June, we shared progress, gathered input from stakeholders and outlined plans for the year ahead. In addition to reviewing progress within the current grant, we also discussed future grant opportunities.
A major milestone has been reached by identifying a web marketing firm to build a website focused on getting visitors to take action related to biosecurity. Related to this work, we anticipate expanding the role of Joel Iverson, communications consultant, as we focus on building an online community of practice in the area of agricultural biosecurity.

Objective 1. Characterize determinants of behavior of stakeholders at critical control points where application of practices or protocols can prevent (or reduce the impact of) incursions of pests and diseases of cattle and pigs.

Data from research efforts supporting objectives 2 and 3 are factoring into understanding what characteristics of stakeholders are or are not important in their approach to disease risk management and our efforts to communicate with them or develop other incentives to motivate behaviors that protect animal health.

Objective 2. Determine economic attractiveness of solutions that enhance biosecurity.

Analyses of data from the completed swine producer and feedlot operator surveys are underway. We are estimating the economic "carrot" needed, in the form of higher market hog prices, to encourage producers to adopt costly biosecurity practices they otherwise may avoid. We are also exploring the role of making indemnity conditional on biosecurity effort. Indemnity is money paid by the government as compensation for animals depopulated as part of a disease eradication campaign. With the data from feedlot producers, we are exploring to what extent they view and manage output price risk and animal health risk as two separate and independent risks versus considering them jointly. In addition, data from interviews to assess demand for biosecurity assurance

certification in downstream processor, retail, export and consumer markets is being analyzed. Manuscripts are anticipated from these studies.

Producer surveys are being designed to (1) explore willingness to participate in information sharing around animal health and (2) examine relationships among biosecurity perceptions and efforts. Surveys will likely include contingent valuation and choice experiment questions similar to the completed swine industry survey allowing comparisons of how willingness to invest or adopt additional biosecurity varies across species.

Objective 3. Determine, develop and apply most effective communication strategies (message tactic and wording, channels, and sources).

Unanticipated in the original proposal, the incursion of Highly Pathogenic Avian Influenza (HPAI) into the poultry industries in 2015 and 2016, provided an opportunity for us to compare the response to this disease, which triggered eradication under USDA authority, with the response to PEDv, which did not trigger eradication. We will assess the utility of our work through our ongoing interaction with industry representatives and peer reviewers for relevant journals and conferences.

In collaboration with the SEGS team, data collection with digital field experiments (aka serious games) to test message design continues. We have shared results with industry stakeholders in this and previous years and anticipate further interactions.
An outreach workshop designed to help swine producers improve messaging was conducted for about 30 participants in Minnesota in August.

To enhance the outreach efforts of the project to those who contact animals on farms or at fairs or exhibitions, we have produced initial video public service announcements about agricultural biosecurity in English and will be translating these into Spanish.

Objective 4. Integrate disease characteristics, human risk perception and socio-economic influences on behavior in a simulated "game" environment.

Led by the project team members affiliated with the SEGS Laboratory at the University of Vermont, we continue to integrate disease characteristics, human risk perception and socio-economic influences on behavior in a simulated environment. Both Agent Based Models and experimental games continue to be developed to fulfill this objective.

Objective 5. Develop educational and outreach materials and methods that lead to measurable changes in attitude and behaviors at critical control points in cattle, swine and small ruminant production systems.

The first two learning objects are ready to publish for use by 4-H and FFA students. Final editing of the third and fourth learning objects is underway. Learning object five, a risk communication education module, is in the works. Peer-review and final edits are expected to be completed this year. Learning objects have been demonstrated at several venues reaching 4-H leaders and other agricultural educators.

We are also exploring the applicability of products developed by the SEGS team for use in veterinary curriculums. Veterinary epidemiology professors are reviewing the games and will provide feedback as to the usability, with possible adaptation, with veterinary students. Based on their reviews, we will make reasonable edits and pilot test the products in the coming year.
What opportunities for training and professional development has the project provided?

Through this project, training opportunities for three undergraduates, seven graduate students, two post-doctoral research associate, and two program staff are being provided in year 4. In addition, faculty collaborators have gained better understanding of different disciplinary perspectives and explored cross-disciplinary initiatives.

Undergraduates

Evan Reilly at the University of Vermont has continued to work under Scott Merrill's supervision to learn and apply programming skills to developing experimental games for the project.
Gemma Del Rossi has assisted with data presentation and literature reviews to support manuscript development under the supervision of Asim Zia.

Luke Trinity, who programs data collection scenarios, graduated in May and enrolled in a masters program in complex systems at the University of Vermont. He continues to work with the project.

Graduate students

Ollin Demian Langle Chimal recently joined the project as a PhD candidate in Complex Systems and Data Science at the University of Vermont, working under Nick Cheney.

Emily Helsel, MA candidate in Communication at the University of Central Florida since January 2017, started working with the project as an undergraduate and assisted with data analysis from the PEDv case study interviews and subsequent manuscript preparation.

Maxwell Kuchenreuther, MA candidate at the University of Central Florida, is assisting with the production of public service video announcements and the project website. He also helps manage the software and hardware needed for data collection. Serge

Wiltshire, PhD candidate in Food Systems, received his Certificate in Complex Systems at the University of Vermont, and expects to graduate in 2018. He submitted a manuscript on his work with agent-based models earlier this year.

Eric Clark, PhD candidate in Math and Statistics at the University of Vermont, came on board in August 2016 and defended his dissertation in early November 2018. He has most recently collaborated in the development of agent-based models and analysis of the associated data and plans to work on the project as a post-doctoral assistant.

James Mitchell, PhD candidate in Agricultural Economics at Kansas State University, has been supported by the project since August 2016. He has assisted with building an equilibrium displacement model for estimating market-level effects of various biosecurity investments and scenarios, which will be instrumental for objective 2.

Christopher Pudenz, PhD student in Economics at Iowa State University, came on board in August 2017 and is lead author on an extension publication and lead author on a manuscript under review at Frontiers in Veterinary Medicine.

Post-doctoral researchers

Gabriela Bucini, (80% FTE) post-doctoral assistant at the University of Vermont, has been employed by the project since September 2016. She is using AnyLogic to program agent-based models and is excited to have deployed the model in an interactive manner online.

A second post-doctoral researcher with expertise in behavioral science and computer science or epidemiology is expected to be hired this year.

Staff

Eileen Kristiansen, (100% FTE) project budget manager at the University of Vermont, as a benefit of employment is completing her doctoral program in educational leadership.

Susan Moegenburg, (85%) project manager with the Social Ecological Gaming and Simulation laboratory at the University of Vermont, has been employed by the project since December 2015. She keeps up with the literature and the progress of collaborating faculty and students in the laboratory.

Eileen and Susan have both attended project team meetings to strengthen relationships with others on the project and gain relevant knowledge. Susan created and staffed a booth at the World Pork Expo (with the assistance of Eric Clark and Christopher Pudenz) where about 50 producers played serious games and Susan gathered more information on biosecurity implementation in swine production units.

How have the results been disseminated to communities of interest?

Four manuscripts have been published and one accepted for publication in 2018. Fourteen conference presentations (one poster) were presented to international conferences of animal and social scientists. Seminars, webinars, workshops, and trade shows were used to further disseminate our work as detailed in the other products listing.

What do you plan to do during the next reporting period to accomplish the goals?

The team seeks opportunities to present as a panel, symposium, or workshop to various groups of stakeholders to share the outputs of our project and discuss applications and extensions of the work. The project team is planning a symposium to highlight team outputs and make connections with related efforts. In addition, team members will present at a variety of national and international meetings, including the International Crisis and Risk Communication Conference in Orlando and the International Society for Economics and Social Sciences of Animal Health. As required, the project director will attend the USDA project director's meeting.

We plan to submit a request for a no-cost extension at the end of year 5.

Objective 1. Characterize determinants of behavior of stakeholders at critical control points where application of practices or protocols can prevent (or reduce the impact of) incursions of pests and diseases of cattle and pigs.

What we have learned about determinants of behavior from economic surveys, communication interviews, and digital field experiments will be disseminated in workshops, presentations, proceedings, and publications as well as being incorporated into the design of our website.

Objective 2. Determine economic attractiveness of solutions that enhance biosecurity.

Data from previous surveys of swine producers, feedlot operators, and meat packers are being used to understand the effects of contracting on biosecurity effort, swine producers' willingness to pay for Tier 1 diseases risk mitigation under ambiguity, management of multiple sources of risk in livestock production, packer preferences for sourcing livestock. Three beef industry surveys are currently active that were designed to understand producer decisions to report suspected diseases, producer decisions to adopt individual ID and share animal health information, and feedlot producer willingness to pay for individual ID and animal health information on procured feeder cattle. Manuscripts for referred journals, presentations, and extension articles are expected. The collective survey data will also allow us to generate partial budgets tailored to guiding decision- making on key biosecurity practices. This work and our previous work provide policy makers with important information to consider when developing legislation or rules related to animal health protection.

Objective 3. Determine, develop and apply most effective communication strategies (message tactic and wording, channels, and sources).

Following on trainings conducted in 2018, we will continue to develop training materials that translate our research to fit the needs of producers and industry leaders. This translation will focus on strategies for developing messages that include the principles identified in our case study and experimental research.

If the book proposal is accepted as anticipated, the communications experts will contribute a book on risk communication challenges and opportunities in the context of animal agricultural biosecurity to the literature. This will change knowledge and--we anticipate--practices of sharing and applying knowledge in this area as well as community connections.

Objective 4. Integrate disease characteristics, human risk perception and socio-economic influences on behavior in a simulated "game" environment.

We have demonstrated that digital field experiments can elucidate how people process and act on disease characteristics, completeness of situational awareness, and message characteristics. These results enable the programming of human decisions into agent-based models of disease spread through production systems. While our work has focused on particular diseases in the swine production system, the serious games and models can be adapted to other diseases and production systems. We anticipate adoption of customized models by production systems within the industry and possibly by regulatory decision-makers or policy makers. In addition, we anticipate continued efforts to disseminate results through stakeholder workshops, symposiums, conferences and peer-reviewed publications, as well as publishing our models and serious games on our website.

Objective 5. Develop educational and outreach materials and methods that lead to measurable changes in attitude and behaviors at critical control points in cattle, swine and small ruminant production systems.

A teaching manual for all learning objects will link our learning objectives with STEM and FFA educational standards and suggest ways to use the online learning objects both independently and for face-to-face meetings. FFA, 4-H and other youth who interact with our learning objects are expected to be more likely to implement animal health protective behaviors and protocols, which will decrease animal illness and increase productivity (and profitability).

We anticipate presenting abstracts at the International Society for Technology in Education, Educause, the 2019 Distance Teaching and Learning Conference, and Sloan-Conferences. We will also make our learning objects available to junior colleges and technical schools. We anticipate finding ways to incorporate the agent- based model simulation into veterinary curriculums. We are discussing producing a training module for feed mills.

Our website will be a portal to education and action in the area of food animal health protection and will be a platform for collaboration among stakeholders of agricultural biosecurity. In addition, we have been actively seeking opportunities to present our methods and findings through or in conjunction with other conferences. Our goal is to reach a multi-disciplinary audience, including academic researchers, veterinarians, producers, extension agents, educators and economists.

Participants

Actual FTE's for this Reporting Period

Role	Non-Students or faculty	Students with Staffing Roles			Computed Total by Role
		Undergraduate	Graduate	Post-Doctorate	
Scientist	3.2	0	0	1	4.2
Professional	0.7	0	1.3	0	2
Technical	1.1	0.9	1.1	0	3.1
Administrative	1	0	0	0	1
Other	0	0	0	0	0
Computed Total	6.0	0.9	2.4	1	10.3

Student Count by Classification of Instructional Programs (CIP) Code

Undergraduate	Graduate	Post-Doctorate	CIP Code
	3		45.06 Economics.
	1	1	11.08 Computer Software and Media Applications.
		1	11.03 Data Processing.
	2		09.09 Public Relations, Advertising, and Applied Communication.
	3		11.01 Computer and Information Sciences, General.
4			11.02 Computer Programming.
1			01.03 Agricultural Production Operations.

Target Audience

Team members have presented project-related work to risk communication practitioners (Technical University of Ilmenau, Germany), public administration researchers (International Research Society for Public Management Conference, Scotland), epidemiologists and animal health experts (International Society for Economics and Social Sciences of Animal Health, France), as well as animal scientists and producers (American Society of Animal Science, Leman Swine Conference, various extension meetings and seminars). Additionally, stakeholders have engaged in project activities in the following ways:

- Swine system managers participated in a communication workshop about improving biosecurity compliance.
- Students and "turkers" (via Amazon Mechanical Turk platform) have played experimental games.
- Team members and advisors have participated in team meetings and received project newsletters.

Products

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Accepted	2018	YES

Citation

Wiltshire, S., A. Zia, C. Koliba, G. Bucini, E. Clark, S. Merrill, J. Smith, and S. Moegenburg. (accepted) Network meta- metrics: Using evolutionary computation to identify effective indicators of epidemiological vulnerability in a livestock production system model. Journal of Artificial Societies and Social Simulation.

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Published	2018	YES

Citation

Wiltshire, S.W. 2018. Using an agent-based model to evaluate the effect of producer specialization on the epidemiological resilience of livestock production networks. PLoS ONE 13(3): 30194013. https://doi.org/10.1371/journal.pone.0194013

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Published	2018	YES

Citation

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. https://doi.org/10.1080/13669877.2017.1422787

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Published	2018	YES

Citation

Tonsor, G.T. 2018. Public animal welfare discussions in the United States: perspectives from a Missouri farm boy turned economist. Animal Frontiers 8(1):4-7.

Type	Status	Year Published	NIFA Support Acknowledged
Journal Articles	Published	2018	YES

Citation

Thompson, J.M., G.T. Tonsor, D.L. Pendell, and W. Preston. 2018. United States feedlot operator willingness to pay for disposal capacity to address foreign animal disease risk. Transboundary and Emerging Diseases 65:1951-1958 doi: 10.1111/tbed.12976

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Bucini G., E. Clark, S. Wiltshire, S.C. Merrill, C. Koliba, A. Zia, L. Trinity, S. Moegenburg and J. M. Smith. January 11, 2018. Hog production chain biosecurity model. Animal Disease Biosecurity Coordinated Agricultural Project (ADB CAP) Team Meeting, Orlando, FL.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2017	YES

Citation

Sellnow, T. October 20, 2017. Composing and communicating effective risk messages: advice from the most current research. Symposium of Food and Drug Safety Emergency Response, Seoul, South Korea.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Sellnow, T., and D. Sellnow. May 8, 2018. Gamification of risk communication research. Technical University of Ilmenau, Ilmenau, Germany.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Sellnow, D., and T. Sellnow. May 4, 2018. Preventing crises with effective risk communication. Technical University of Ilmenau, Ilmenau, Germany.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Sellnow, T., and D. Sellnow. May 7, 2018. Risk and crisis communication as a profession: research, professional profiles, and fields of application. Technical University of Ilmenau, Ilmenau, Germany.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Koliba, C., A. Zia, and S. Merrill. April 13, 2018. Using agent-based models to prototype governance and policy decisions. XXII International Research Society for Public Management Conference. Edinburgh, Scotland.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Koliba, C, S. Merrill, and A. Zia. April 13, 2018. Influence of risk communication on livestock biosecurity protocol adoption across two gaming platforms: Implications for tactical and operational decision making. XXII International Research Society for Public Management Conference. Edinburgh, Scotland.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Zia, A., and Koliba, C. April 12, 2018. Designing intergovernmental networks and hierarchies: harnessing agent-based models as governance and policy analytics platforms. XXII International Research Society for Public Management Conference. Edinburgh, Scotland.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Bucini G., S. Wiltshire, E. Clark, S.C. Merrill, C. Koliba, A. Zia, L. Trinity, S. Moegenburg and J. M. Smith. May 14, 2018. Interactive model-based tools for animal disease simulation and intervention strategies. ISESSAH-InnovSur 2018 Conference, Montpellier, France.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Pudenz, C. May 15, 2018. Adoption of secure pork supply plan biosecurity by U.S. Swine Producers. ISESSAH-InnovSur 2018 Conference, Montpellier, France.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Paper	Published	2018	YES

Citation

Tonsor, G. May 14, 2018. Role of upstream packers, processors, and retailers in producer biosecurity effort. ISESSAH- InnovSur 2018 Conference, Montpellier, France.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Tonsor, G. May 15, 2018. Impact of indemnity expectations on producer biosecurity effort. ISESSAH-InnovSur 2018 Conference, Montpellier, France.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Moegenburg, S. May 14, 2018. Effects of disease risk, information certainty, and messaging on biosecurity compliance on livestock facilities: evidence from experimental simulations. ISESSAH-InnovSur 2018 Conference, Montpellier, France.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Smith, J.M., J. McDonald, S. Kerr, J.M. Rankin, and R. Sero. July 11, 2018. (Poster) Evaluation of online modules designed for youth to learn about biosecurity. American Society of Animal Science, Vancouver, Canada.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Bucini G., E. Clark, S. C. Merrill, S. M. Moegenburg, S. Wiltshire, A. Zia, C. J. Koliba and J. M. Smith. September 17, 2018. Perceptions and risk attitudes affect biosecurity investment and compliance decisions with ramifications for disease control and economics at the hog production supply chain level. (Listed in program as "The role of human behavior in biosecurity adoption: interactive tools for intervention strategies".) Allen D. Leman Swine Conference, Saint Paul, MN. Available at: https://www.youtube.com/watch?v=toA1BduEqLA

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Bucini G., E. Clark, S. C. Merrill, C. J. Koliba, A. Zia, S. Wiltshire, L. Trinity, S. M. Moegenburg, and J. M. Smith. November 28, 2018. The role of human behavior in biosecurity adoption: interactive tools for intervention strategies. PIC Health Assurance Annual Fall Meeting, Cerdanyola del Vallés, Spain.

Type	Status	Year Published	NIFA Support Acknowledged
Conference Papers	Published	2018	YES

Citation

Merrill, S., T. Sellnow, G. Tonsor, C. Koliba, A. Zia, G. Bucini, L. Schulz, L. Trinity, C. Pudenz, E. Clark, S. Moegenburg, and J. M. Smith. December 3, 2018. (Poster) Modeling risk perception and biosecurity adoption in the swine industry. Conference for Research Workers in Animal Disease, Chicago, IL.

Other Products Product Type
Other

Description

Newsletters: Animal Disease Biosecurity Coordinated Agricultural Project newsletter, May and December 2018, available at: http://blog.uvm.edu/jmsmith/smith-leads-usda-nifa-cap-protection-animal-health/project-newsletters/

Product Type
Other

Description
Department Seminar: Bucini G., E. Clark, J. M. Smith, S.C. Merrill, A. Zia, C. Koliba, S. Moegenburg, S. Wiltshire, L. Trinity, and E. Reilly. February 16, 2018. Interactive tools for simulation of biosecurity adoption and animal disease control. Department of Animal and Veterinary Sciences, University of Vermont, Burlington, VT.

Product Type
Other

Description
Extension Workshop: Presented biosecurity sessions at Washington State University Extension's SW WA Lambing Schools on May 11-12, 2018. Thirty-three adult and youth small ruminant producers were instructed on biosecurity protocols and introduced to the ADB-CAP biosecurity modules. NIFA funding support was acknowledged. Collaborators included Patrick Beech-McKay (host farmer), Dr. Scot Lubers (local veterinary practitioner), and Kari Kandoll (local volunteer Extension program coordinator).

Product Type
Other

Description
Team meeting: Animal Disease Biosecurity Coordinated Agricultural Project team meeting, June 4-6, 2018, Burlington, VT. Conducted planning discussions among team members with input from two external advisors.

Product Type
Other

Description
Trade show booth: Project team members (S. Moegenburg, E. Clark, and C. Pudenz) created and staffed a booth at the World Pork Expo June 6-8, 2018. Data was collected from about 50 producers who played serious games. Additional information on biosecurity implementation was gathered.

Product Type
Other

Description
Workshop: Project team members (G. Bucini, S. Dritz, S. Merrill, D. Sellnow, and T. Sellnow) conducted an industry workshop, "Effective messaging and communication of disease risk improving biosecurity compliance-- lessons learned from PEDv," for 30 participants to improve workplace compliance in a swine production system on August 1, 2018 in Minnesota. For more information, contact S. Moegenburg.

Product Type
Other

Description
Guest lecture: Gabriela Bucini (post-doc) and Eric Clark (doctoral candidate) presented "Biosecurity and herd health: digital tools for studying risk mitigation" to 100 undergraduates in University of Vermont Introductory Animal Sciences (ASCI 001) class on September 13, 2018.

Product Type
Other

Description
Webinar: Project team members (T. Bass, G. Bucini, E. Clark, and S. Merrill) presented "Intersections of environmental management and biosecurity in animal agriculture" as part of the eXtension Livestock and Poultry Environmental Learning Community Webinar Series on December 14, 2018. The archived 70-minute webinar is available at: https://learn.extension.org/events/3566

United States Department of Agriculture Progress Report
Accession No. 1005877 | Project No. VT-0071CG

Product Type
Educational Aids or Curricula

Description
Learning Object: Routes of infection and means of transmission. Created for use with 6th - 12th grade students as the second in a series of modules about biosecurity. Available at http://dev.wisconline.org/prototypes/Biosecurity_02/story_html5.html

Product Type
Educational Aids or Curricula

Description
Learning Object: Finding sources of disease transmission risk. Created for use with 6th - 12th grade students as the third in series of modules about biosecurity. Currently undergoing final edits.

Product Type
Educational Aids or Curricula

Description
Learning Object: Biosecurity strategies. Created for use with 6th - 12th grade students as the fourth in a series of modules about biosecurity. Currently undergoing final edits.

Changes/Problems

A major change has been the discontinuation of mental models work under Dr. Jason Parker's leadership as a result of his move to the Ohio State University. We added a new faculty member at the University of Vermont (UVM), Dr. Nick Cheney, to the project to support the efforts of the Social Ecological Gaming and Simulation (SEGS) team. We hired a former graduate student on the project into a post-doc position and are recruiting another new faculty member at UVM with expertise in behavioral science to assist the project team.

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