



2019 Conference of Research Workers in Animal Diseases

Author Index & Presentation Abstracts

100th Conference of Research Workers in Animal Diseases

November 2-5, 2019

**Chicago Marriott, Downtown Magnificent Mile
Chicago, Illinois**



Conference of Research Workers in Animal Diseases 2019 Officers

President

Qijing Zhang, BVSc, MS, PhD
Professor and Associate Dean, Iowa State University

Vice-President

Amelia R Woolums, DVM, MVSc, PhD, DACVIM, DACVM
Professor, Mississippi State University

Council Members

MM Chengappa, BVSc, MVSc, MS, PhD
University Distinguished Professor, Kansas State University

Charles J Czuprynski, PhD
Professor and Director, University of Wisconsin, Madison, WI

Annette O'Connor, BVSc, MVSc, DVSc, FANZCVS
Professor, Iowa State University, Ames, IA

Phil Griebel, DVM, PhD
University of Saskatchewan, Saskatoon, SK, Canada

Immediate Past President

Christopher CL Chase, DVM, MS, PhD, DACVM
Professor, South Dakota State University

Executive Director

David A Benfield, DVM, PhD
Professor and Associate Director, Ohio State University

CRWAD Administration

Jennifer Stalley
Lisa Harsma
Midwest Solutions

Conference of Research Workers in Animal Diseases 2019 Program Committee

Chair

Paul Morley, Texas A&M University and West Texas A&M University

Assistant Chair

Lorraine Sordillo, Michigan State University

Program Committee

Brandy Burgess, University of Georgia

Carol Chitko-McKown, USDA-ARS, USMARC

Ying Fang, University of Illinois

Radhey Kaushik, South Dakota State University

Beatriz Martinez Lopez, University of California, Davis

Bob Rowland, Kansas State University

Orhan Sahin, Iowa State University

Rebecca Smith, University of Illinois

Heather Wilson, Univ of Saskatchewan (VIDO-InterVac)

83 - Spray Irrigation with Animal Wastewater: Modeling Infection Risks and Ammonia Toxicity

J. Mori^{1,2}, T. Nguyen^{1,3}, R.L. Smith⁴. ¹University of Illinois at Urbana-Champaign, ²Department of Pathobiology, ³Department of Civil and Environmental Engineering, ⁴Department of Pathobiology, University of Illinois Champaign-Urbana. brennac2@illinois.edu

Session: Disease Modeling, Nov 4, 9:30 AM

Objective

Quantify the annual risk of infection or ammonia toxicity from irrigation with animal wastewater. Risk of infection with *Legionella pneumophila* or non-tuberculosis Mycobacteria (NTM) was calculated for untreated wastewater and compared to the hazard of ammonia in anaerobically digested wastewater.

Methods

Concentrations of pathogens or ammonia from a previous study were combined with an air dispersion model to determine exposure levels for farmers. The US EPA reference concentration for ammonia was used as a threshold, while dose-response equations were used to calculate the annual probability of bacterial infection.

Results

The results of a “worst case” model showed that the highest predicted ammonia concentration was significantly lower than the reference concentration, suggesting that ammonia toxicity due to inhaled wastewater is unlikely. However, even when parameter uncertainty was considered, the annual probability of infection with *L. pneumophila* and NTM from irrigation with untreated wastewater surpassed the threshold of 10⁻⁴ per year for all scenarios.

Conclusions

The conclusion of this study is that animal wastewater should be anaerobically digested at thermophilic temperatures prior to being used for spray irrigation.

Financial Support

U.S. Environmental Protection Agency

84 - Using dynamic time warping algorithms and spatiotemporal analyses of swine condemnations for syndromic surveillance

K.C. O'Hara^{1,2}, X. Liu^{3,4}, B. Martinez-Lopez^{1,2}. ¹Center for Animal Disease Modeling and Surveillance, University of California-Davis, ²Department of Medicine & Epidemiology, School Veterinary Medicine, University of California -Davis, ³Department of Computer Science, ⁴University of California -Davis. kcohara@ucdavis.edu

Session: Disease Modeling, Nov 4, 9:45 AM

Objective

Slaughterhouse data has recently been used to enhance animal disease surveillance in many countries, however has been largely underused for syndromic surveillance in the United States. We characterize spatiotemporal patterns and system dynamics of whole carcass swine condemnations in the US. We illustrate the value of data mining and machine learning approaches to more cost-effectively identify: emerging trends by condemnation reason, areas and time periods with higher than predicted condemnation rates, and regions or time periods with similar trends.

Methods

Swine slaughter and condemnation data from 2005-2016 were obtained for slaughterhouses inspected by the Food Safety and Inspection Service (FSIS). Time series of condemnation rates by condemnation reason, type of pig, state and month were generated. Data time warping (DTW) and hierarchical clustering methods were used to identify states with similar patterns in the rate of condemnation cases by cause and type of pig. Spatiotemporal scan statistics were used to identify states and months with significantly higher number of condemnation cases than expected. Clusters were compared to historic infectious disease outbreaks in the swine industry.

Results

Between 2005-2016, 1,109,300 whole swine carcasses were condemned. The top causes for condemnation were abscess/pyemia, septicemia, pneumonia, icterus, and peritonitis, respectively. DTW and cluster analysis revealed clear spatiotemporal patterns in the rate of condemnations, many with a strong seasonal component. Several clusters were detected in timeframes where widespread outbreaks had occurred.

Conclusions

Timely evaluation of spatiotemporal patterns in swine condemnations may provide critical information in predicting disease outbreaks. Identification of spatiotemporal hot spots can direct investigation of primary on-farm risk factors contributing to condemnation. Risk mitigation through targeted decision-making and improved management practices can minimize carcass condemnations and animal losses, improving economic efficiency, profitability and sustainability of the US swine industry.

Financial Support

U.S. National Science Foundation