Influenza A Virus Environmental Contamination in Exhibition Swine Settings



Jacqueline M. Nolting, Sarah E. Lauterbach, Courtney Wright, Alison Martin, and Andrew S. Bowman



THE OHIO STATE UNIVERSITY

COLLEGE OF VETERINARY MEDICINE



Acknowledgements

DEPARTMENT OF VETERINARY PREVENTIVE MEDICINE

Principle Investigator: Dr. Andrew Bowman Student Summer Research Projects Sarah Lauterbach – Weigh-in data Courtney Wright – Tack data Alison Martin – Hand sanitation data Animal Influenza Ecology & Epidemiology Research Program Staff Sarah Nelson

- Michele Zentkovich
- Josh Lorbach
- Amber Kihm
- Lauren Smith
- Alexandra Tweedy
- Nola Bliss
- **Grant Price**
- Nick Bortolani
- **Christie Hammons**





Agricultural Exhibitions



- Non-commercial swine raised in a variety of scenarios
- Pigs may have been shown multiple times
- Only swine contact many individuals have occurs at the fair
- Pigs and people comingled for a prolonged period of time



Exhibitions with Swine Shedding IAV



4

Study 1: Detection of swine-lineage influenza A virus on inanimate environmental surfaces during swine corralling at agricultural fairs



Sarah E. Lauterbach, et al., Emerging Microbes & Infections (2017) 5, e9



Fair 1: Chute Diagram









Fair 2: Chute Diagram



Study 2: Detection of influenza A virus on inanimate fair surfaces



Courtney Wright, AASV Student Poster Competition



Objective:

To document the frequency of IAV contamination of portable fomites at agricultural fairs to identify mitigation strategies for pathogen spread.





Surface	Number tested	PCR positives/No. direct contact surfaces sampled	PCR positives/No. indirect contact surfaces	No. of IAV isolates (All from direct contact surfaces)
Tack Box	80	11/55 (20.4%)	5/25 (20%)	1 (H3N2)
Sort Panel	78	10/43 (23.3%)	2/35 (5.7%)	0
Waterer	82	19/82 (23.2%)	0	3 (H3N2)
Feeder	86	20/86 (23.3%)	0	2 (H3N2) 1 (H1N1)
Chair	65	2/18 (11.1%)	4/47 (8.5%)	0
Feed Container	2	1/1 (100%)	0/1 (0%)	0
Broom	1	1/1 (100%)	0	0
Fan	2	0	0/2 (0%)	0
Cooler	1	0/1 (0%)	0	0
Pick	1	0	0/1 (0%)	0
Wheelbarrow	1	0/1 (0%)	0	0
Watering Can	1	0	0/1 (0%)	0
Total	400	64/288 (22.3%)	11/112 (9.8%)	



Key Findings

- 1. IAV was detected with PCR on 18.75% of inanimate surfaces
 - ≥1 surface tested positive at 50% of the fairs (8 Indiana and 2 Ohio fairs).
 - Within positive fairs, frequency of IAV detection ranged from 5% to 90%
- 2. Viable IAV was recovered from 7 surfaces across 4 fairs
 - 85% of virus isolation positive surfaces were plastic
- 3. Full length genomic sequencing identified H1N1 pdm09 reassortant, human-like H3N2, and cluster IV-A H3N2
 - Nearly identical viruses found in pigs at multiple fairs during 2016
 - H3N2 isolates were ≥ 99% identical to 2016 H3N2v cases found in Ohio and Michigan

Study 3: Adoption of recommended hand hygiene practices to protect public health at agricultural fairs



Alison Martin, Merial Student Poster Competition



Objective 1:

To determine the number of agricultural fairs with working hand hygiene stations

	2013-2015 fairs
Presence	127/162 (78.4%)
Function	94/107 (87.9%)
Risk Signage	119/174 (68.4%)
Wash Procedure	58/134 (43.3%)



Objective 2

To determine the proportion of individuals that utilize hand hygiene stations upon exiting animal barns over a given time

142 of 2,021 (7.03%) observed individuals used the hand wash stations





Objective 3

To determine presence of IAV and/or bacteria on hand hygiene stations



- No IAV was detected on hand hygiene stations, even at fairs with IAV positive exhibition swine.
- Antimicrobial resistant bacterial phenotypes found on hand hygiene stations include:
 - Extended spectrum cephalosporin resistant
 - Fluoroquinolone resistant
- 69.2% of tested stations contained antimicrobial resistant bacteria



Overall Conclusions

- Mitigation procedures, such as disinfecting gates and scales during animal corralling, may decrease virus transmission through this route, potentially lessening IAV prevalence in swine.
- Inanimate objects could be perpetuating the spread of IAV and other microorganisms between exhibitions
- Fairs have followed recommendations to provide risk signage and hand hygiene stations, however fairgoers are not using them



Thank you!

