

2012 Influenza A (H3N2)v Outbreak in Indiana: Highlighting Partnerships between Human and Animal Surveillance



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BACKGROUND

The Indiana State Department of Health (ISDH) Laboratories maintains a strong relationship with ISDH Epidemiology for year-round surveillance to detect circulating seasonal and novel influenza. As a result of these enhanced surveillance efforts, Indiana was the first state in 2011 to detect cases of human infection with influenza A(H3N2)v virus. Over the years, the Indiana Board of Animal Health (BOAH) and the ISDH have developed a cooperative partnership for enhanced swine influenza (SIV) surveillance. Though BOAH does not perform routine influenza testing for the purpose of surveillance, they maintain constant communication with swine industry stakeholders, such as Indiana swine veterinarians, in order to be alerted when influenza case numbers are higher than normal or otherwise unusual in clinical presentation.

Purdue University's Animal Disease Diagnostic Laboratory (ADDL) is a member of an SIV surveillance project coordinated through the USDA's National Animal Health Laboratory Network (NAHLN). Swine are automatically and anonymously enrolled in the project and samples collected from these swine are tested for influenza A virus by PCR; additional testing is done on PCR positive samples to further characterize the virus.

The ISDH and BOAH, along with local health departments, develop robust partnerships in order to maintain communication and coordinate their investigations of zoonotic diseases that may result in a public health event. In the summer of 2012, the investigation of influenza A(H3N2)v at Indiana county fairs and the Indiana State Fair underscores the importance of these relationships.

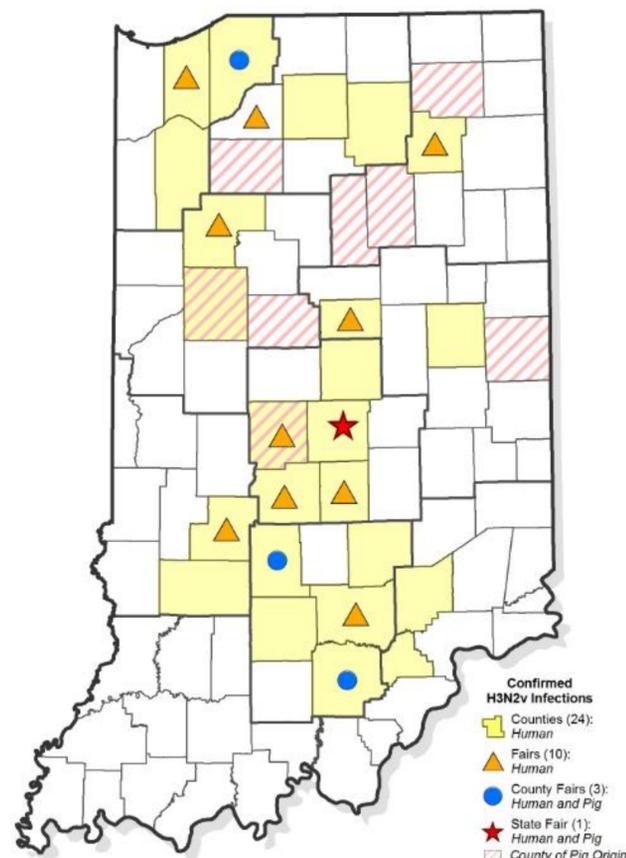
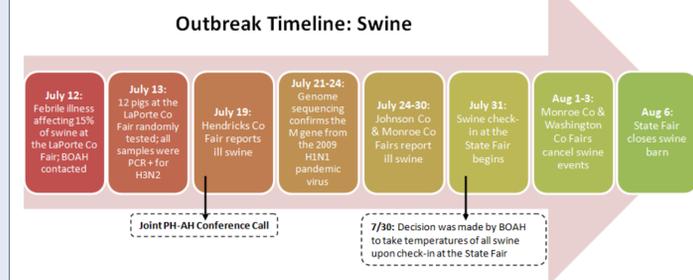


Figure 1: Confirmed H3N2v infections by county in the state of Indiana.

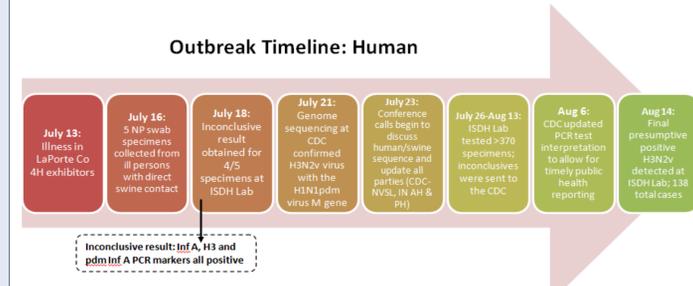
INVESTIGATION & DETECTION OF H3N2v

On July 11, 2012 a fair veterinarian was requested to examine an ill pig in the show barn at the LaPorte County Fair. The following day, additional pigs were reported as listless, anorexic, and febrile (up to 107°F). The Board of Animal Health was notified of the situation. Nasal and oropharyngeal samples were randomly collected from 12 pigs dispersed throughout the swine barn. Testing was performed on both asymptomatic and symptomatic pigs from different herds. Samples were sent to the State Animal Disease Diagnostic Laboratory, where they were tested by matrix rRT-PCR for the presence of influenza A and by H and N subtyping rRT-PCRs. All 12 were identified as H3N2.



On July 19, a joint public health and animal health call was coordinated to discuss both swine and human testing results. Pig samples were forwarded to the National Veterinary Services Laboratories (NVSL) where rRT-PCR testing determined that 12/12 samples contained the matrix (M) gene from the 2009 pandemic H1N1 influenza virus. Samples with the strongest Ct value were sequenced using the Ion Torrent whole genomic sequencer.

At the same time swine testing was being conducted, ISDH, in collaboration with county health departments, was coordinating human testing. Diagnostic specimens were collected from people reporting influenza-like illness (ILI) that had been in contact with pigs at the fair. Real-time RT-PCR testing at the State Department of Health Laboratory indicated a presumptive positive for influenza A(H3N2)v. Specimens were forwarded to the Centers for Disease Control and Prevention (CDC) for rRT-PCR confirmation and genetic sequence analysis.



Sequence data was obtained directly from the clinical specimens. Comparison of the sequence obtained by NVSL on the pig samples and by CDC on the human specimens indicated virtually identical sequences, demonstrating virus transmission between humans and pigs. BOAH and ISDH requested notification of all fairs with swine and human illness.

Together, the ISDH and BOAH obtained close to 400 clinical specimens and 47 swine samples from county fairs across Indiana and the State Fair as part of this dual investigation.

INVESTIGATION & DETECTION OF H3N2v

Influenza PCR results, swine testing

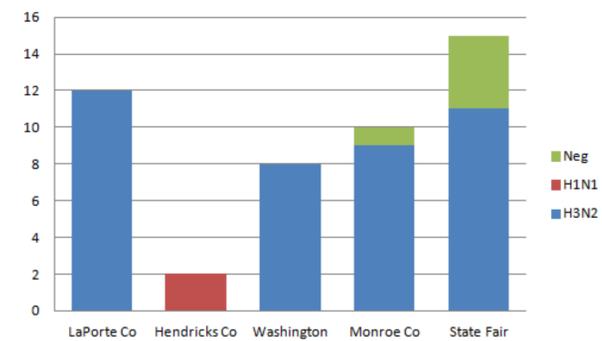


Figure 2: Results of influenza PCR testing conducted at the Purdue University Animal Diagnostic Disease Laboratory.

In addition to PCR testing, BOAH and attending veterinarians, utilized an additional diagnostic tool for exhibition swine at the Indiana State Fair that were showing clinical signs consistent with influenza virus. This new test, Flu DETECT® SWINE, is a 15-minute Rapid Immuno Migration test designed to detect influenza A viral antigen. Because the specificity of the test is 100%, BOAH felt confident in taking the action necessary to mitigate disease spread to protect the health of both swine and humans.

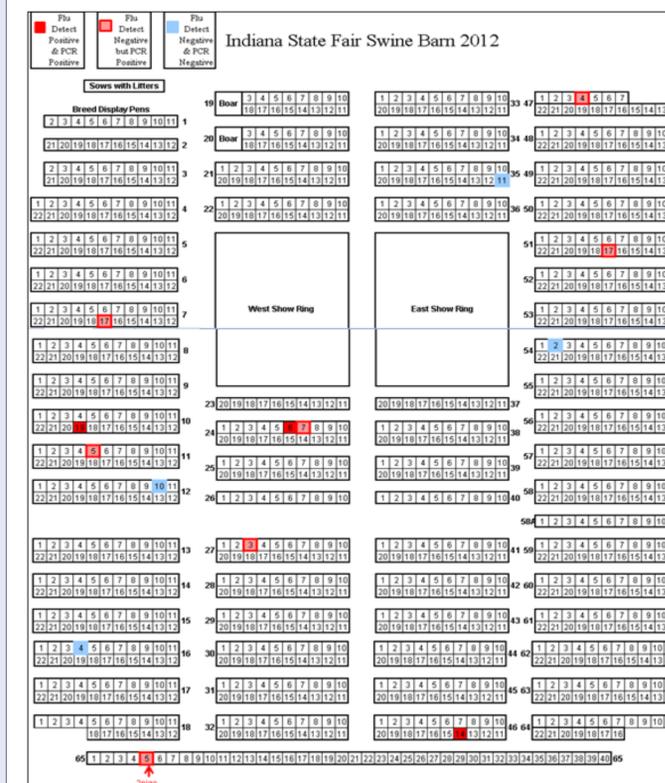


Figure 3: Results of testing conducted by BOAH and ADDL from pigs in the swine barn at the State Fair.

H3N2v CASES IN THE UNITED STATES

States Reporting H3N2 Cases	Cases in 2011	Cases in 2012
Hawaii	--	1
Illinois	--	4
Indiana	2	138
Iowa	3	1
Maine	2	--
Maryland	--	12
Michigan	--	6
Minnesota	--	5
Ohio	--	107
Pennsylvania	3	11
Utah	--	1
West Virginia	2	3
Wisconsin	--	20
Total	12	309

OUTCOMES/RECOMMENDATIONS

Risk Management Practices for Swine Exhibitions

1. Establish a relationship with a veterinarian who is willing to be on-call for the show and work to develop a plan for the identification and response to an influenza-like illness in swine.
2. Exhibition organizers should inform exhibitors and animal caretakers that people experiencing influenza-like symptoms should not be in contact with swine for at least 24 hours after the fever ends.
3. The following should be discouraged within the animal areas: eating, drinking, smoking, sleeping and bringing in pacifiers, baby bottles or eating/drinking utensils.
4. An adequate number of hand washing stations should be maintained during the exhibition. Signage to encourage use of these hand washing stations should be posted.
5. Barn hygiene should be monitored and maintained. Special attention should be paid to areas where the public may have access.

Influenza Risk Management Recommendations for Show Organizers

1. BOAH strongly recommends that all swine should be vaccinated for influenza prior to the opening day of the exhibition.
2. Exhibition organizers should take steps to limit the amount of time swine are congregated on the exhibition grounds; ideally, not more than 72 hours.
3. Swine should be observed daily for signs of disease or infection; if temperature is 105.0°F or higher, remove pig from the exhibition grounds.
4. BOAH recommends that exhibition swine are identified with USDA approved 840 radio frequency identification (RFID) tags.



CONCLUSIONS

The strong relationship between ISDH, BOAH and various local health departments highlights the value of cooperative partnerships at the state level. These partnerships allowed for easy intra-agency communication and facilitated timely collection and testing of samples from both human and swine to minimize the spread of infection. From these partnerships, new recommendations for swine exhibitions were created and approved to decrease the likelihood of zoonotic transmission in the public setting.