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Swine Disease Eradication Center

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## **SDEC Partners Research Update**

### **Project Update: Detection and quantification of influenza A virus in swine environmental samples**

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#### **Background**

- Influenza A virus (IAV) is endemic in pigs.
- IAV transmission from pigs to people can occur via several different routes. While it is known that IAV transmission can take place with direct pig contact, less is known about the risk of other transmission routes such as aerosols and fomites.
- Assessing the sources of environmental contamination of IAV is important in order to determine risk of exposure to people.

#### **Objective**

**The objective of this study was to evaluate the sources and level of environmental contamination of swine-origin IAV in commercial swine farms and live animal markets in Minnesota.**

## Results

Farm	Inside Air Samples # + / # tested (%)		Exhaust Air Samples # + / # tested (%)		IAV Sub-type
	RRT-PCR	Virus Isolation	RRT-PCR	Virus Isolation	
1	15/15 (100)	6/15 (40)	15/15 (100)	1/15 (7)	H1N2
2	0/15 (0)	0/2 (0)	0/15 (0)	0/2 (0)	H1N1*
3	13/15 (87)	0/5 (0)	20/30 (67)	0/5 (0)	H1N1
4	15/15 (100)	1/5 (20)	26/30 (87)	0/4 (0)	H3N2

**Table 1. IAV RRT-PCR and virus isolation results from air samples collected inside the barn and at the exhaust fan from 4 acutely infected commercial farms.**

\*\*Subtype identified in oral fluid samples

Farm	Inside Air		Exhaust Air	
	Mean	SD	Mean	SD
1	8.54E+05	2.04E+05	6.35E+04	3.30E+04
3	2.20E+04	1.35E+04	1.27E+04	9.63E+03
4	8.32E+04	4.57E+04	1.01E_04	9.04E+03
Total	3.20E+05	4.01E+05	1.79E+04	2.49E+04

**Table 2. Average IAV load and standard deviation (SD) values for air samples (RNA copies/m<sup>3</sup> of air) collected from infected commercial farms.**

Type of Sample	IAV + / # tested (%)
Air, swine pen	30/57 (53)
Railings, swine pen	16/34 (47)
Door, animal holding area	1/25 (4)
Patron sink/faucet	1/24 (4)
Air, processing area	0/25 (0)

**Table 3. RRT-PCR results from environmental samples collected at the live animal markets.**

- Virus isolation was positive for 26 out of 49 air samples and 8 out of 29 environmental samples.
- IAV H and N types detected in the environmental and air samples were H3 H2 N1 N2.

## Conclusions

- Swine origin IAV was readily detected and isolated in air samples from enclosures of both commercial swine barns and live animal markets.
- IAV was also detected and isolated in hand contact surfaces from live animal markets.
- Levels of virus load in the air of swine commercial enclosures averaged 3.20E+05 IAV RNA copies/m<sup>3</sup> of air.

## Implications

- Overall our data provides evidence of environmental contamination of swine origin IAV in commercial farms and live animal markets and provides a better understanding of the routes for potential exposure to pigs and people.