USDA Influenza A Virus Surveillance Program in Swine

Presented to:

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Sabrina Swenson DVM, PhD
USDA-APHIS-VS-NVSL
Diagnostic Virology Laboratory
&
John Korslund DVM
USDA-APHIS-VS-CEAH
National Surveillance Unit

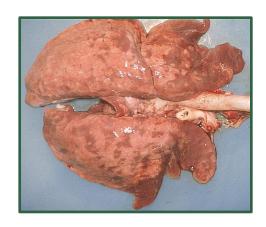


Safeguarding Animal Health



3 Streams:

- 1. Sick pig submissions NAHLN system 99+%
- 2. Pigs related to PH investigations of novel flu cases
- 3. Swine exhibiting ILI at commingling events such as auctions, markets, fairs, or other swine exhibition events.





Veterinary Services

Safeguarding Animal Health

Swine Influenza Virus Testing Algorithm for NAHLN Laboratories Complete Matrix PCR within 2 Appropriate Sample¹ business days of receipt of the accession. Run Matrix on up to 10 samples per accession Matrix PCR Report matrix PCR results weekly on provided spreadsheet 6 Complete subtyping PCRs on up to Stop banking negative 2 samples with the lowest CT values samples unless PH case (which should go directly per accession within 1 business day top Testing to NVSL) of matrix PCR positive results Report subtyping PCR results Subtyping PCR 3 weekly on spreadsheet 6 (2 samples max.) Begin VI on up to 2 samples with lowest CT values within 1 week Virus Isolation of sample receipt; isolate (2 samples max.) obtained within 14 days Report completed VI results on weekly spreadsheet 6 (+)SIV isolates derived Ship aliquot or entire isolate to Stop Testing from alternative Dx NVSL 1st and 3rd Tuesdays of methodology 5 each month 4 Complete 3 gene sequencing within 2 weeks of obtaining virus Sequence hemagglutinin, neuraminidase, and matrix Report sequences to genes - up to 2 samples per GenBank, submission accession if multiple subtyping contractor or NVSL per agreed results received protocols within 1 week of completing sequencing 6 Total time from sample receipt to sequence reporting: 45 Days

Appendix C: Testing Guidelines, Forms, Submission Instructions



Sample Submission Options:

- 1. Identified (6.3%):
 - Only with written permission by swine owner
 - Participating NAHLN lab will record producer and submitting veterinarian identifiers
 - Can be shared with APHIS-VS
- 2. Anonymous (93.7%):
 - Only state of accession origin is shared with APHIS-VS
 - Dataset is blinded to producer information, submitting vet, testing lab

Under both options - capture reason for submission, age of swine, sample type, clinical severity (if shared)



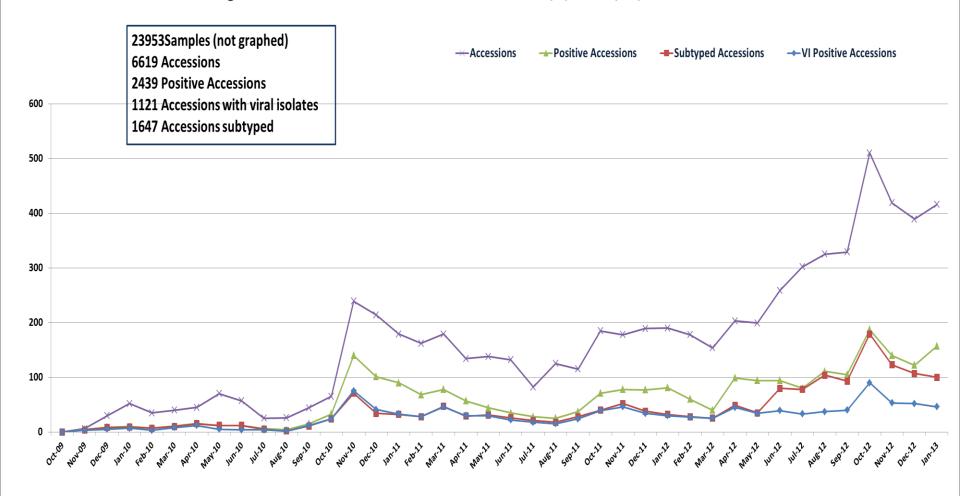
Data Disclaimers:



- 1. Surveillance is voluntary, passive, and anonymous
- 2. Does not indicate disease prevalence by
 - a. time
 - b. location
 - c. subtype
- 3. State-level data summaries are not disclosed externally (internal state stakeholders may get state-specific data)



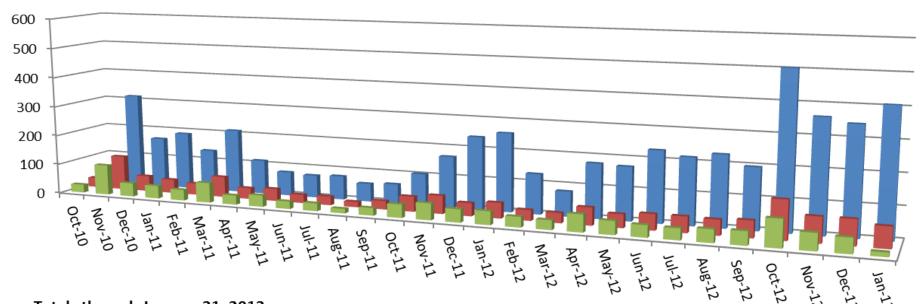
USDA SIV Surveillance Program Isolation and Characterization Activities - 10/1/2009-1/31/2013





USDA Influenza A Virus in Swine Surveillance Program GenBank Accessions by Month

- Number of samples sequenced- to GenBank
- Number of VI-positive samples
- Matrix PCR-positive samples



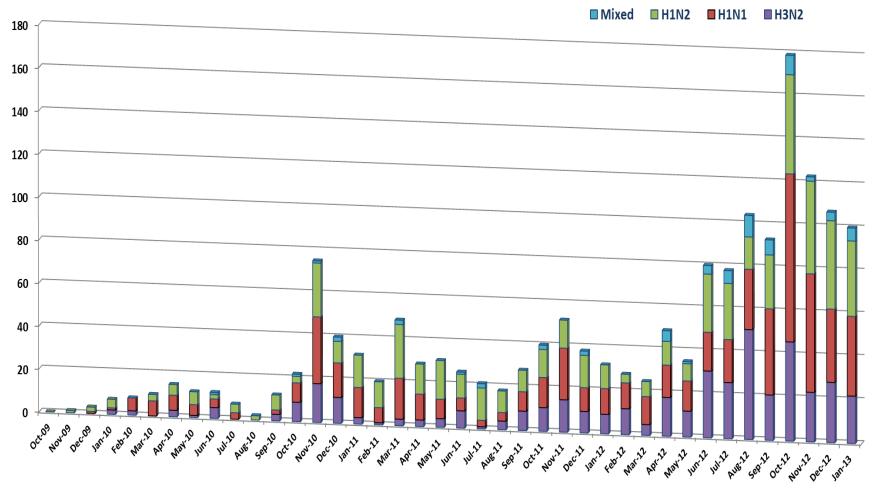
Totals through January 31, 2013:

Matrix Positive Samples: 5498

VI Positive Samples: 1540 28.0% Sequenced Samples: 1304 84.7%









NVSL Roles

Repository

- ~1600 viruses
- Shipped-international, biologics companies, research, PH

Full genome sequencing

- Random viruses received
- Representatives of each subtype (H1N1, H3N2, H1N2)
- Representatives from each submitted state

Confirmatory testing

Public health investigations



Influenza at the Human-Animal Interface-2012 Fairs

PCR screening

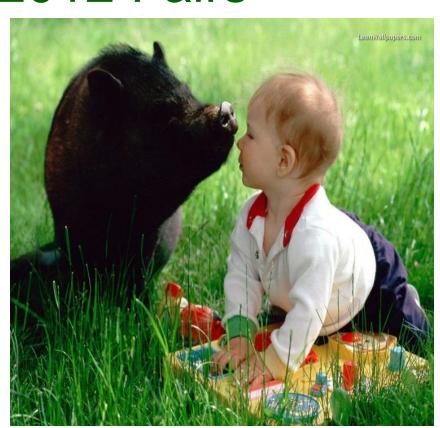
- Matrix
- Pandemic matrix
- Subtyping
- H3N2pM

Sequencing via ion torrent

- Direct from nasal swabs
- Virus

Shared information

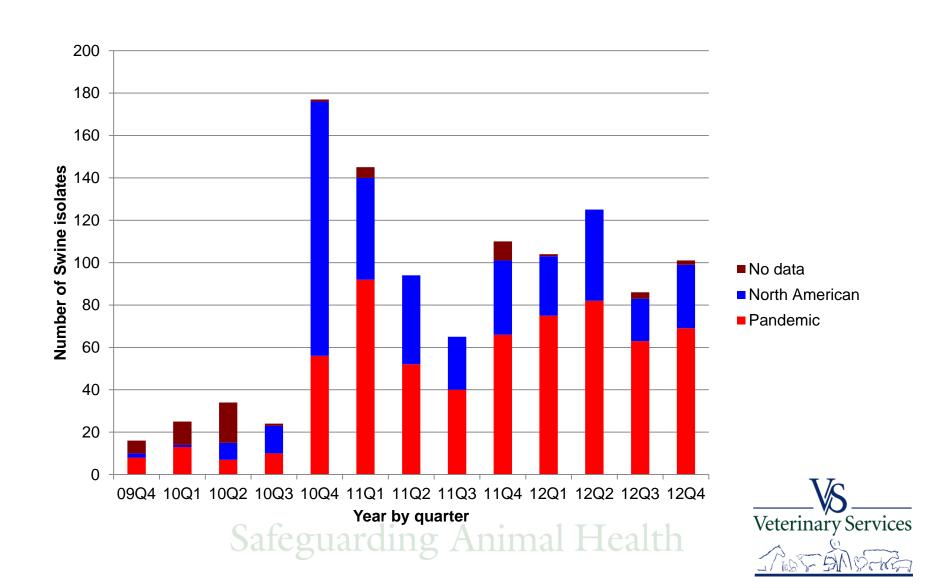
- State/Federal animal health
- State/Federal public health







Matrix lineage 2009-2012



Case Count: Detected U.S. Human Infections with H3N2v by State since August 2011

http://www.cdc.gov/flu/swineflu/h3n2v-case-count.htm

Current as of March 30, 2013

* Case in Utah occurred in April 2012

States Reporting H3N2v 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

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Veterinary Services

Gaps in Current Effort



- Data representativeness
 - By geography farm-state-U.S.
 - By veterinary clinic
 - By production system (interstate movement not tracked)
- Isolated data cannot observe changes over time within populations
- Many sequences still not shared autogenous vaccines, non-participants



Summary:

- Influenza A in swine currently very dynamic
- Multiple insertions of human-origin strains into the U.S. swine IAV population since 1998
- Intact human viruses not recovered from swine
- Widespread reassortment documented
- The USDA IAV-S Surveillance Program is an opportunity to monitor changes nationally
- Genomic analysis of collected data is intensifying
- Better understanding of within herd and area IAV ecology needed but is not a current function of this program

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It Takes A Village.....Thank You!

- Producers, practitioners, NAHLN labs for supporting the surveillance and fair investigations
- State Animal Health Officials
- Local, State, and Federal Public Health
- Veterinary Services personnel
- Agricultural Research Services personnel

