USDA Influenza A Virus Surveillance Program in Swine

Presented to:

OFFLU Swine Influenza Group

Rome

April 16, 2013

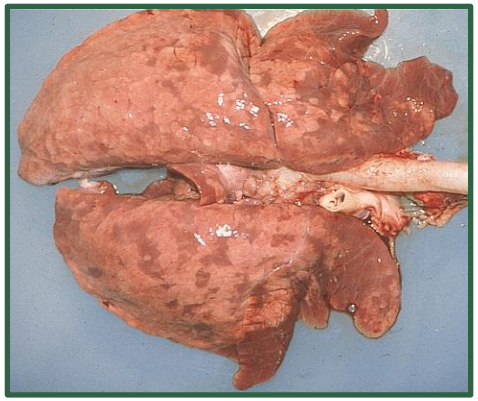
Sabrina Swenson DVM, PhD
USDA-APHIS-VS-NVSL
Diagnostic Virology Laboratory
&
John Korslund DVM
USDA-APHIS-VS-CEAH
National Surveillance Unit

Safeguarding Animal Health

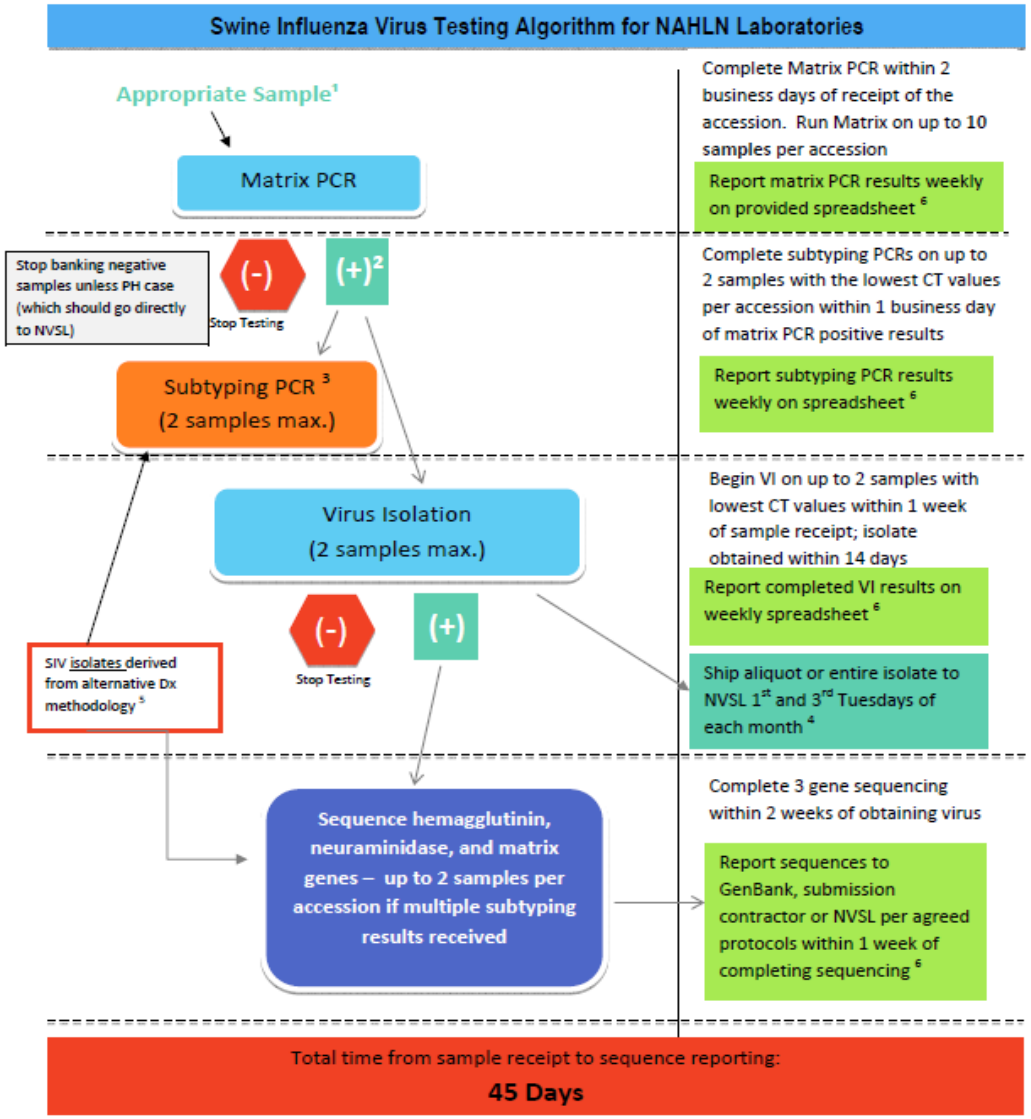
Veterinary Services

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.**



Appendix C: Testing Guidelines, Forms, Submission Instructions



Veterinary Services

Sample Submission Options:

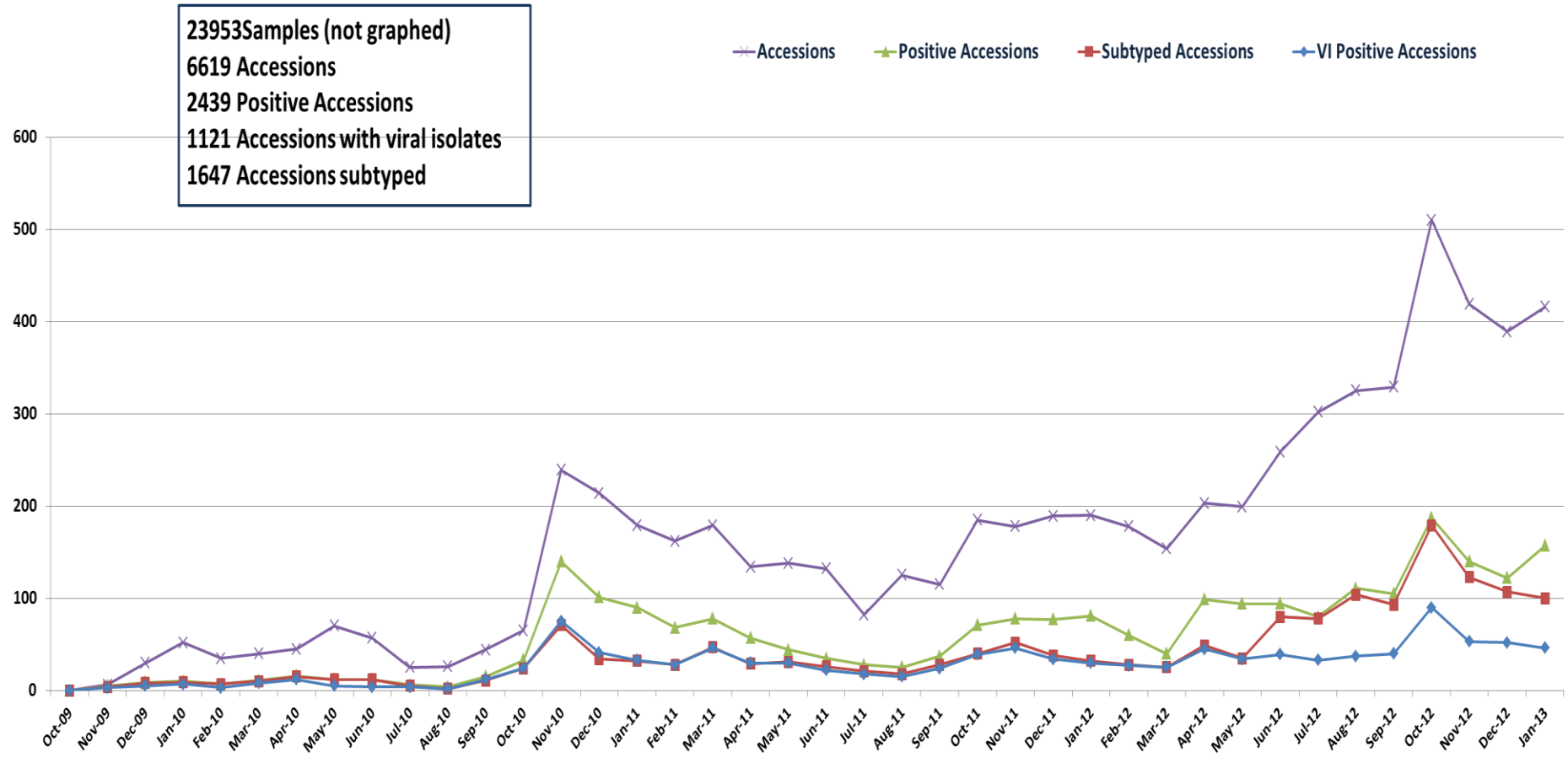
1. Identified (6.3%):
   - Only with written permission by swine owner
   - Participating NAHLN lab will record producer and submitting veterinarian identifiers
   - Can be shared with APHIS-VS
2. Anonymous (93.7%):
   - Only state of accession origin is shared with APHIS-VS
   - Dataset is blinded to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

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

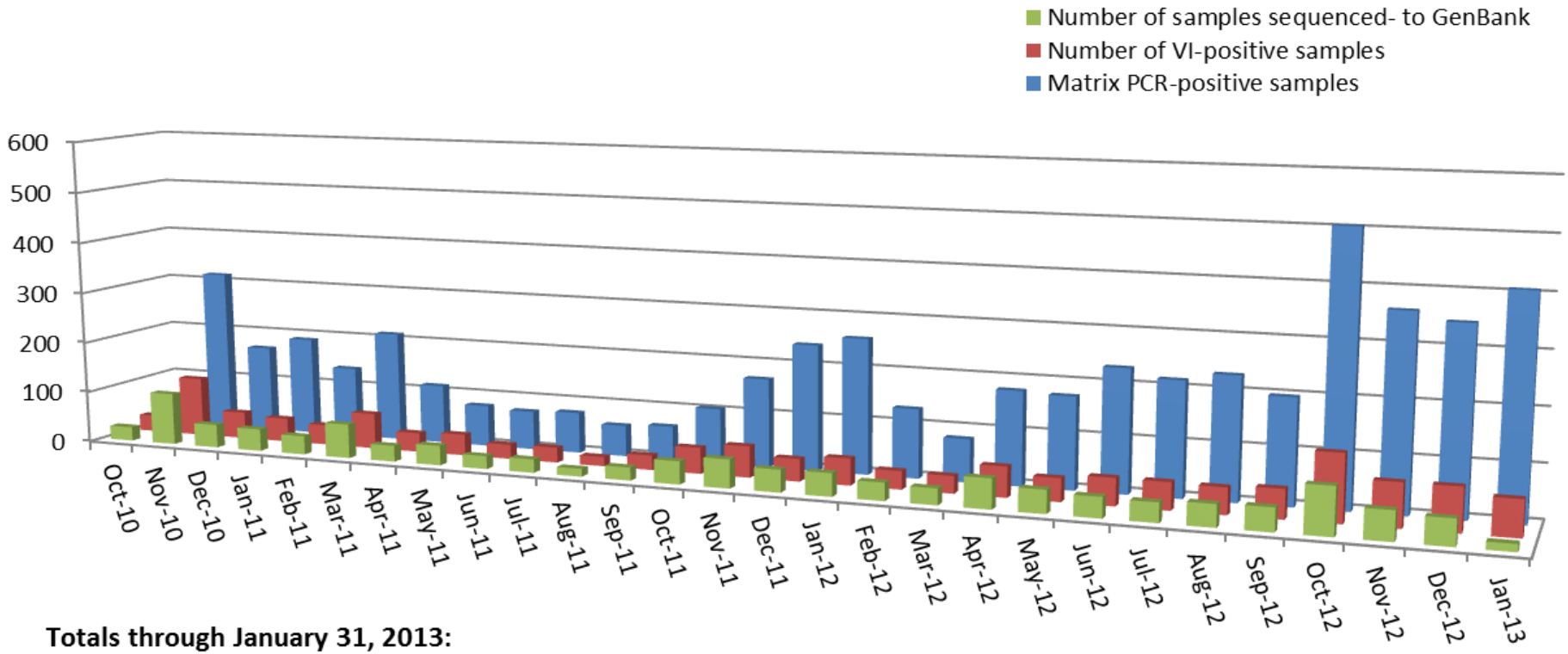
Data Disclaimers:

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

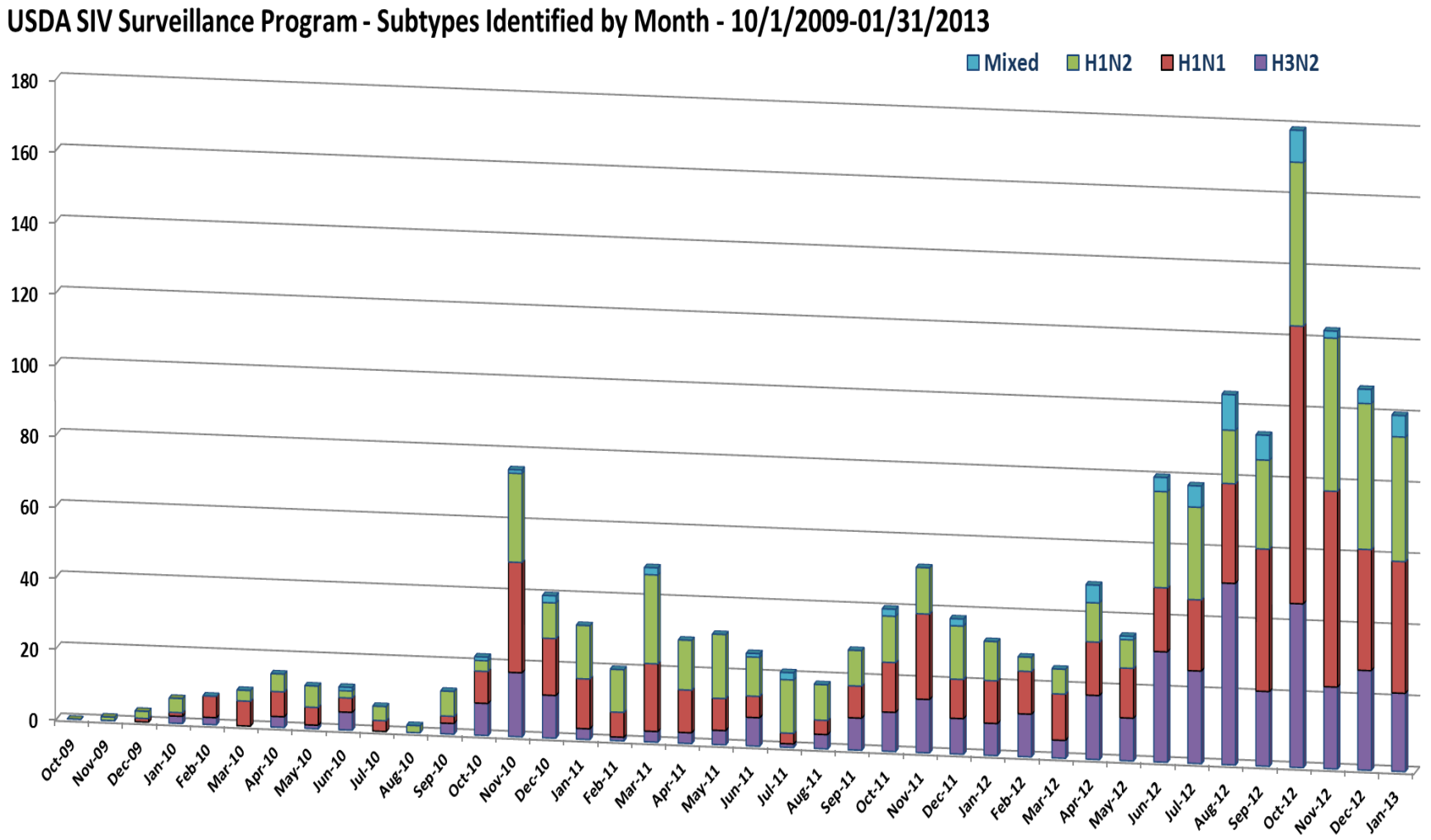


USDA Influenza A Virus in Swine Surveillance Program
GenBank Accessions by Month



Totals through January 31, 2013:

Matrix Positive Samples:	5498	
VI Positive Samples:	1540	28.0%
Sequenced Samples:	1304	84.7%


USDA SIV Surveillance Program - Subtypes Identified by Month - 10/1/2009-01/31/2013
Mixed
H1N2
H1N1
H3N2
180
160
140
120
100
80
60
40
20
0
Oct-09
Nov-09
Dec-09
Jan-10
Feb-10
Mar-10
Apr-10
May-10
Jun-10
Jul-10
Aug-10
Sep-10
Oct-10
Nov-10
Dec-10
Jan-11
Feb-11
Mar-11
Apr-11
May-11
Jun-11
Jul-11
Aug-11
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
May-12
Jun-12
Jul-12
Aug-12
Sep-12
Oct-12
Nov-12
Dec-12
Jan-13

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

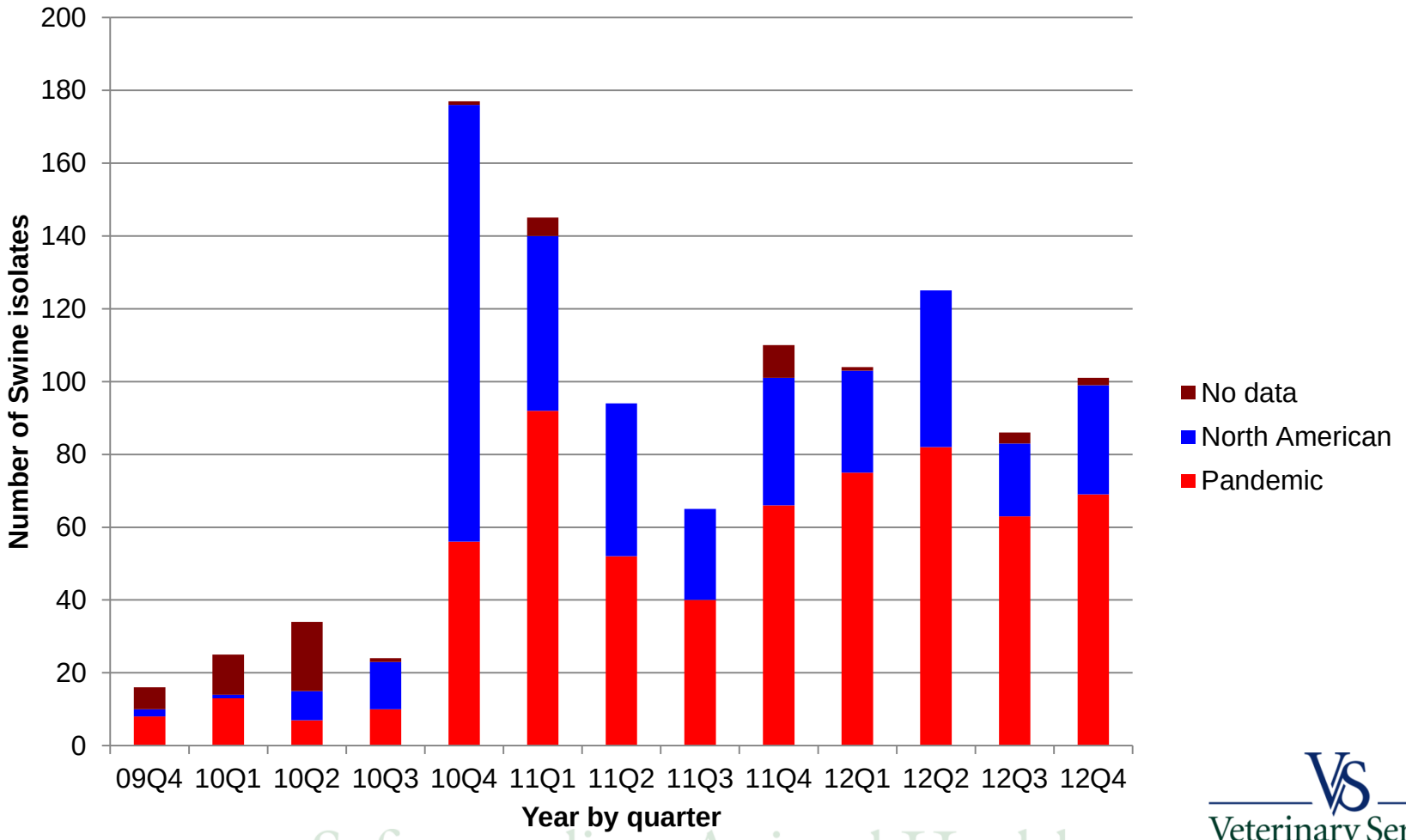
Sequencing via ion torrent

- Direct from nasal swabs
- Virus

Shared information

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

Matrix lineage 2009-2012



Veterinary Services

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

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

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

Veterinary Services