AVIAN AND SWINE INFLUENZA: WHAT’S THE LATEST?

Wade A. Northington, DVM, MPA
Director, Associate Professor
Breathitt Veterinary Center
Murray State University

CLASSIFICATION SYSTEM

- Surface glycoproteins: H & N
  - Hemagglutinins 16
  - Neuraminidases 9
- Humans
  - H1
  - H3
- Birds
  - H5
  - H7
  - H9
- Swine
  - H1
  - H3
- Horses & Dogs
  - H3

INFLUENZA VIRUSES

Birds
Humans
Pigs

ANTIGENIC DRIFT

Immune pressure

Courtesy: USDA-APHIS
ANTIGENIC SHIFT

**Gene Reassortment**

- Two or more virus strains infect the same cell and exchange genetic material
- Emergence of a new Strains
  - Genetic reassortment (human and animal viruses)
  - Direct animal (avian) to human transmission

Avian Influenza H5N1

**The Next Pandemic?**

Timeline
- China 1996
- Hong Kong 2002
- Korea, Japan 2002-2003
- Russia, Eastern Europe 2003-2004
- Europe, Middle East, Africa 2005-2006
- Vietnam 2007
- North America??

Spread dependent on migratory bird flyways
AVIAN INFLUENZA: H5N1
WHAT DO WE KNOW?

- Bird to Human Transmission (WHO)
  - 442 Cases worldwide 2003-2009
  - 262 Human deaths
  - 59% Mortality Rate!
- Low morbidity
- High mortality
- Just as likely to have a new strain emerge as for H5N1 to become pandemic.

SWINE INFLUENZA: H1N1

- First recognized in swine in 1930
- Descendant of 1918 pandemic virus
- Pigs
  - Seasonal
  - High morbidity, low mortality
  - Fever, respiratory symptoms
  - Self-limiting

NOVEL H1N1 INFLUENZA

- 1990’s Classical Swine Flu mixed with other avian and human strains and created H3N2.
- 2000 Reassorted into rH1N1 and H1N2
- 2008 Mixed with Eurasian H1N1
- 2009 Pandemic H1N1

NOVEL H1N1 INFLUENZA

- First recognized in USA in March, 2009
- Cases in California linked to influenza cases in Mexico
- Identified by CDC as a new variant in April, 2009
- By June, 2009, all 50 states, Puerto Rico, and the Virgin Islands

Air Travel Density: USA & Mexico
Human to Human Spread
SWINE INFLUENZA: NOVEL H1N1

- 583,587 Human Cases
- 7,225 Deaths
- 1% Mortality Rate
- High morbidity
- Low mortality

WHO Statistics

SWINE INFLUENZA: NOVEL H1N1

- North American confirmed pig cases:
  - Canada—linked to worker from Mexico
  - Minnesota—linked to students visiting state fair
  - Indiana
  - Mexico?
- Mild or no illness in pigs: a human disease
- Does not transmit to humans in pork products
- Consumer confidence
- Illustrates the need to use HN nomenclature, not names such as Avian Flu and Swine Flu

WHAT'S NEXT?

Swine Flu (H1N1)  ??  Seasonal Flu (H3N2)

New Strain

BREATHITT VETERINARY CENTER
INFLUENZA SURVEILLANCE

- USDA National Animal Health Laboratory Network (NAHLN)
- Influenza Surveillance
  - Avian Influenza
    - 30,000 tests/year
  - Swine Influenza
    - 500-1000 tests/year