Avian Influenza/Newcastle Disease Virus Subcommittee

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Zoonotic Avian Influenza

- Both LPAI and HPAI can infect humans
- Recent LPAI zoonotic reports
  - H7N9 China
  - H9N2 China (6 cases reported in 2016)
- Recent HPAI
  - H5N1 Egypt
  - No H5N6 reported in 2016
### Cumulative number of confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2016

<table>
<thead>
<tr>
<th>Country</th>
<th>2003-2009* cases</th>
<th>deaths</th>
<th>2010-2014** cases</th>
<th>deaths</th>
<th>2015 cases</th>
<th>deaths</th>
<th>2016 cases</th>
<th>deaths</th>
<th>Total cases</th>
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<tr>
<td><strong>Total</strong></td>
<td><strong>468</strong></td>
<td><strong>282</strong></td>
<td><strong>233</strong></td>
<td><strong>125</strong></td>
<td><strong>145</strong></td>
<td><strong>42</strong></td>
<td><strong>10</strong></td>
<td><strong>3</strong></td>
<td><strong>856</strong></td>
<td><strong>452</strong></td>
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* 2003-2009 total figures. Breakdowns by year available on subsequent tables.
** 2010-2014 total figures. Breakdowns by year available on subsequent tables.
Total number of cases includes number of deaths.
WHO reports only laboratory cases.
All dates refer to onset of illness.
Source: WHO/GIP, data in HQ as of 3 October 2016.
Figure 1: Epidemiological curve of avian influenza A(H5N1) cases in humans by week of onset, 2003-2016

Number of Confirmed Human H5N1 Cases by month of onset as of 2016-09-21

- Azerbaijan (8)
- Bangladesh (8)
- Djibouti (1)
- Cambodia (56)
- Egypt (356)
- Indonesia (199)
- Canada (1)
- Iraq (3)
- Laos (2)
- Myanmar (1)
- Pakistan (3)
- Thailand (25)
- Turkey (12)
- Viet Nam (127)
H7N9 China

Source: FAO
H7N9 Human Cases by Month

803 Confirmed Human Cases
315 deaths
8 humans cases reported July-Sept 2016

Source: FAO
HPAI Poultry Outbreaks in 2015-16

- H5N1 continues to dominate
  - China, Vietnam, Bangladesh, Indonesia, Egypt are endemic
  - Virus likely endemic in West Africa and concern about India
  - Poultry outbreaks in, Middle East (Lebanon, and Iraq), Myanmar, Laos
- H5N6 in China, Vietnam, and Hong Kong
- H5N8 in South Korea, Russia, Taiwan
- H7N3 in Mexico continues
- H7N7 in Italy
- H5N1, H5N2, and H5N9 in France
- H5N2 in Taiwan
LPAI of importance

- H9N2 in Asia, Middle East and Africa is widespread
  - Virus is very infectious for chickens and represents a treat if introduced into U.S.
- H9N2 in Germany
  - H9N2 has been present in turkeys in Germany for several years
  - Because not H5 or H7 it isn’t reportable
  - Industry is attempting to deal with it without government support
- H5N2 in Mexico
  - Virus remains endemic
H5N1 HPAI West Africa

- Togo and Cameroon reported first outbreaks in last year
- Nigeria, C’ote D’Ivoire, and Ghana continue to report recent outbreaks
- Nigeria reports most outbreaks with 766 premises to date
H5N1 Clade 2.3.2.1
Closest relatives India, Vietnam and China
Not related to Egyptian viruses
Likely wild bird introduction
France Outbreaks

Outbreaks unrelated to goose/Guangdong lineage
Associated with duck industry
Outbreaks ongoing (most recent report 8-3-16)
India H5N1
2014-15 isolates clade 2.3.2.1c

Jan 16, 2016

May 7, 2016
Taiwan

- H5N2 continuing with Mexican origin H5
- H5N2 outbreak with Asian H5
- H5N8 outbreak similar to U.S. virus
- H5N3 outbreak with unique Asian N3 on H5N8 backbone reported resolved
China

- H5N1 widespread in country despite of vaccination
- H5N6
  - Closely related to H5N8
  - Also reported Vietnam
  - No human infections reported 2016
- H5N2
  - Largest report of poultry affected by outbreak
Newcastle disease (ND) domestic poultry 2015

- 2015 reporting infections with or w/out clinical signs ND, either in zones, or through country in domestic poultry ~56 countries (www.oie.int/wahis_2/public/wahid.php/Diseaseinformation/statuslist)

- 2014 ~61 countries
- 2013 ~68 countries
ND DOMESTIC POULTRY 2016

~13 countries reporting
APMV-1 are diverse and contain distinct lineages and genotypes

Class II, genotypes V, VI, VII, and VIII are the predominant worldwide and contain only virulent viruses

- Class I & Class II, genotype I viruses are predominantly of low virulence and include some used as live vaccines (QV4/66 and Ulster/67)
- Class II, genotype II includes viruses of low virulence, vaccine viruses such as LaSota, B1 and VG/GA, and the neurotropic virulent chicken TX GB/1948
- Other genotypes represent historic viruses no longer detected
  - Class II, genotypes I, II, III, IV and IX represent viruses 1930–1960

Virology 391, 2009, 64-72
Number of NDV Genotypes reported over decades using GenBank complete fusion genes
ND Latin America

F. Perozo 1st reported VII Venezuela in 2012

Problem: Genetic Drift
Case: G VII from Venezuela Continued to Circulate and Change

From Dr. Afonso, USDA
ND Latin America

Diel reported in 2012 VII - Peru (2008)
Re-classified to XII in 2012 (Diel)

**Problem:** Movement to nearby countries
Genotype XII did not stay only in Peru.
A similar virus affected Colombia in 2009

- 2015 - ongoing isolations XII from Peru
- 2016 submitted XII sequence from 2004/Peru

Dr. Afonso, USDA
Acknowledgements

• Dr. Claudio Afonso, Southeast Poultry Research Laboratory