Virulent Newcastle Disease (vND) Outbreak, 2018-2019

Amy Delgado, DVM, PhD
Foreign and Emerging Diseases
Veterinary Services
USDA, APHIS
History of vND in Poultry in the U.S.

**First Identification**
New Jersey - Further studies revealed that the virus may have been in the Eastern U.S. since 1938

**1944**
- **Live Attenuated Vaccines**
  Implementation of vaccine in combination with mass application methods decreased the prevalence of ND and allowed for eradication of the neurotropic strains (vNDV of genotype II)

**1950’s**

**1971**
- **Outbreak**
  Virus was introduced through the importation of infected parrots to multiple states, but only transmitted among commercial poultry in S. California.
  - **Eradication**: 3 years
  - **Cost**: 56 million
  - **Losses**: 11.9 million birds

**2002**
- **Outbreak**
  This outbreak was first detected in Los Angeles among privately owned game fowl during early October 2002, with spillover into commercial poultry during December 2002.
  - **Eradication**: 2 years
  - **Cost**: 160 million
  - **Losses**: 3.21 million birds

**2018**
- **Outbreak**
  May 2018, vNDV was detected in backyard chickens in Southern CA.
  As of Oct 2019, 471 infected premises have been identified.

**2019**
- **Outbreak**
  New Jersey - Further studies revealed that the virus may have been in the Eastern U.S. since 1938
vND Positive Premises

- 2002-2003
Infected Overview
<table>
<thead>
<tr>
<th>Last Infected Premises Detected</th>
<th>Fallow Ends for Last Infected Premises</th>
<th>Release RQA Declare Freedom (if no new positives)</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>September</td>
<td>October</td>
</tr>
<tr>
<td></td>
<td>November</td>
<td>December</td>
</tr>
<tr>
<td></td>
<td>January</td>
<td></td>
</tr>
</tbody>
</table>

- **All Control Areas Released**

- **Respond to Sick bird calls**

- **Enhanced educational outreach efforts**

- **Statistical Sampling for Control Area release**
  - (higher level of detection in Perris01, Mira Loma, Muscoy, and Compton presence through RQA release)

- **Disease freedom testing over 90 days**
  - (n=315 Samples)

- **RQA Surveillance**
  - Nested Risk-Based Surveillance

- **Fallow Checks/Restock Violations**

- **Commercial / Independent and Live Bird Market Surveillance**

---

* Control Area Release Testing can begin 21 days after E&D of last infected premises in Control Area.

** 95% CI and 1% prevalence

9/22/2019

U.S. Department of Agriculture

Veterinary Services Animal and Plant Health Inspection Service
The Virus
Information technology tools supporting data-driven decision support

Virulent Newcastle disease data flows for decision support

Field surveys
- Epidemiologic surveys, field and GIS intelligence

Electronic and Mobile devices
- EMRS2Go, EMRS Backyard App

Online media
- Social media and internet-based data

Other indicator data sources
- Climate and environmental data, historical outbreak data

Monitoring and Analysis
- Data analysis, information technology dashboards

Laboratory data
- Electronic messaging, genetic data analysis

Remote Data Collection

Data Integration, Investigation and Intelligence

Data-driven decision making

Information feedback and dissemination
vND data-driven decision support products

- Population at risk
- Epidemiologic risk
- Surveillance
- Genetic analysis and diagnostics
vND data-driven decision support products

Population at risk
- Predicted backyard poultry ownership
- Spatial-temporal analysis

Surveillance
- Identifying control areas
- Monitoring progress
- Surveillance design
- Depopulation strategy

Epidemiologic risk
- Rapid risk assessments
- Case-control/risk factors
- vND transmission risk
- Estimating disease spread

Genetic analysis and diagnostics
- Phylogenetic analysis
- Population coverage
- Prevalence/epi curve
Risk Factors: Backyard Flocks

Adjusted Odds Ratios

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult birds &gt;50% roosters</td>
<td>-</td>
</tr>
<tr>
<td>Game fowl on premises</td>
<td>-</td>
</tr>
<tr>
<td>Neighbors have birds</td>
<td>-</td>
</tr>
<tr>
<td>Number of birds</td>
<td></td>
</tr>
<tr>
<td>1-19 birds</td>
<td>2</td>
</tr>
<tr>
<td>20-99 birds</td>
<td>3</td>
</tr>
<tr>
<td>100+ birds</td>
<td>5</td>
</tr>
<tr>
<td>Wild birds have contact with domestic birds</td>
<td>-</td>
</tr>
</tbody>
</table>
Integrating Phylogenetics & Epidemiology

Map of premises locations by virus group

Number of premises by collection date and virus group

Veterinary Services  Animal and Plant Health Inspection Service
Spatial Dependence of Transmission Risk

342 infected vND premises detected between 16 May 2018 and 1 May 2019 within the California Regional Quarantine Area.
vND Disease Freedom Testing: Surveillance Design

- Spatial Distribution of Risk Factors
- Disease Transmission Risk
- Disease Prevalence
- EMRS
- Population at Risk

Risk-Based

- High Risk Sampling
- Low Risk Sampling
- Control Areas
- Regional Quarantine Area
More Information

Third, updated vND epidemiologic report is available online at:

Other presentations at the Committee on Poultry and Other Avian Species, Tues, Oct 29th.
Thank you

Amy Delgado, DVM, PhD
Foreign and Emerging Diseases
Veterinary Services
USDA, APHIS