vvIBDV in California 2008-2014:
What we think we know and where we’re heading

Maurice Pitesky, DVM, MPVM, Dipl. ACVP
Assistant Specialist in Cooperative Extension, University of California
Poultry Health and Food Safety Epidemiology
Poultry Institute, 2014 Program: Puyallup, WA
November 4th 2014

Who am I ??

Areas of Interest
• Application of classical & Spatial Epidemiology in disease surveillance
• Interface of science & policy
• Sustainable Food animal production
• Next Gen food safety

Real Life

What is Cooperative Extension?

Mission Statement: Statewide network of researchers and educators focused on the creation and application of knowledge in agriculture

• UC Extension, UC Davis School of Vet Med
• California Department of Food and Agriculture
• California Council of Science and Technology
• (Science Fellow-California State Senate)
• Small Animal Veterinarian
• Lawrence Livermore National Lab (Chemical And Biological National Security Program)

Commercial & Backyard poultry operations

http://ucanr.edu/

Acknowledgements

Questions?

How did vvIBDV get to California?
How does it spread?
How can we mitigate the spread vvIBDV?
vvIBDV
- Non-enveloped
- Virus is highly resistant to heat and chemicals and can persist in the environment for months and possibly longer
- Predilection for lymphoid tissue, particularly the bursa
- Genome has 2 segments of ds RNA
  - Segment A
  - Segment B
vvIBD
- Acute clinical disease and high (up to 60%) mortality
- Layers affected more than broilers
- Clinical disease typically observed in chickens between 3-8 weeks of age

Transmission
- Fecal – oral
- Virus not egg transmitted
- Infected chickens excrete virus up to 2 weeks after infection
- Mealworms, mosquitoes, rodents and wild birds have all been implicated as reservoirs.

Sensitivity
- Inactivated at pH 12
- Inactivated by 0.5% chloramine in 10 minutes
- Invert soaps
- Iodine and formalin based disinfectants may be effective

Vaccination

Breeder Vaccination
- Moderate level of protection in chicks

Progeny Vaccination
- Provide active immunity when the maternal immunity wanes

Global distribution of vvIBDV

Subtypes of vvIBDV in California

<table>
<thead>
<tr>
<th>Segment A</th>
<th>Segment B</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very virulent</td>
<td>Very virulent</td>
<td>vvIBDV vvIBDV</td>
</tr>
<tr>
<td>Very virulent</td>
<td>Serotype 2</td>
<td>vvIBDV Serotype 2</td>
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<tr>
<td>Very virulent</td>
<td>Standard sequence</td>
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IBDV in California (2008-2013)

- 54% are commercial vs. BY facilities
- 54% are layer or brooder vs. broiler or unknown operations
- 54% are vvIBDV/vvIBDV, 23% are vvIBDV/Serotype 2, and 8% are vvIBDV/standard.
vvIBDV in Washington State

- Spring 2014
- Layer Flock
- Same subtype as in SoCal (vvIBDV/standard)

vvIBDV Subtypes in California

Questions

How did vvIBDV get to California?
How does it spread?
How can we mitigate the spread vvIBDV?

How to it get here?

Questions

How did vvIBDV get to California?
How does it spread?
How can we mitigate the spread vvIBDV?

Following vvIBDV (How does it spread?)
Affected Counties

Number of Cases of vvIBDV and its subtypes between December of 2008 and August of 2013

Temporal Distribution of vvIBDV in Northern CA

Understanding How Diseases Spread via Spatial Statistics

Spatial-Temporal Clustering

Spatial Clustering

Significance of lack of spatial-temporal clustering???
So how does it primarily spread?

If you are really, really interested in the epidemiology of vvIBDV...

Questions

How did vvIBDV get to California?

How does it spread?

How can we mitigate the spread vvIBDV?

Mitigating the Spread of Disease: Using Decision Lens

Recommendations

• Outreach with
  – BY specialty breeders
  – NO trading of poultry with bursas
  – Hatcheries
  – Vaccine (HVT-VP2)
  – Feed stores
  – Small commercial
  – BY producers
• National surveillance in strategic states
  • Antemortem testing
  • Vaccine studies
  • Wildlife testing

Mitigation vs. Elimination of vvIBDV???

Mitigating the Spread of Disease: Using Decision Lens

DL Process

11/6/2014
Creating a ‘stress test’

One of the major advantages of DL based AHP models is the ability to change the model when the facts on the ground have changed.

Scenario A: Containment weight doubled
Scenario B: Containment weight increased 50%
Scenario C: Virus Evolution weight doubled
Scenario D: Virus evolution weight increased 50%
Scenario E: Containment weight and virus evolution increased 20%

Stress Test Results

<table>
<thead>
<tr>
<th>Evaluation</th>
<th>Original</th>
<th>DL Stress Test</th>
<th>DL Stress Test Results</th>
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<tbody>
<tr>
<td>Identification of risk factors for re-emergence or an introduction of afflicted facilities</td>
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<tr>
<td>Development of a laboratory diagnostic test to screen for vvIBD</td>
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<td>Resistance of other potential reservoirs (mealworms, beetles, rodents)</td>
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DL Stress test

A COOPERATIVE APPROACH TO ANIMAL DISEASE RESPONSE ACTIVITIES: ANALYTICAL HIERARCHY PROCESS (AHP) AND vvIBD IN CALIFORNIA POULTRY

EML K. SAIto, SUPHIE SHEA, ANNETTE JONES, GREGORY RAMOS, & MAURICE PITESKY

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