NVSL Salmonella Update

Brenda Morningstar-Shaw
Microbiologist

U.S. Department of Agriculture
Animal and Plant Health Inspection Service
Veterinary Services
Science, Technology and Services
Salmonella Group D Proficiency Test

- 106 PT’s shipped to 85 laboratories
- All NPIP authorized laboratories participated
- 2 NPIP labs did not report test results on approved NPIP *Salmonella* tests
Salmonella Serotyping

• 13,037 isolates submitted in 2017
  – 5,334 Clinical
  – 5,511 Non-Clinical
  – 2,192 Research and other
• 5,616 (43%) Chicken/Turkey
## 5 Year Serotyping Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Isolates</th>
<th>Total Clinical Isolates</th>
<th>Total Poultry Clinical Isolates</th>
<th>Total Non-Clinical Isolates</th>
<th>Total Poultry Non-Clinical Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>15,353</td>
<td>4,897</td>
<td>525</td>
<td>6,687</td>
<td>5,351</td>
</tr>
<tr>
<td>2015</td>
<td>13,880</td>
<td>4,976</td>
<td>498</td>
<td>6,396</td>
<td>5,038</td>
</tr>
<tr>
<td>2016</td>
<td>13,295</td>
<td>5,258</td>
<td>546</td>
<td>5,727</td>
<td>4,408</td>
</tr>
<tr>
<td>2017</td>
<td>13,103</td>
<td>5,479</td>
<td>679</td>
<td>5,489</td>
<td>4,802</td>
</tr>
<tr>
<td>2018</td>
<td>13,037</td>
<td>5,334</td>
<td>657</td>
<td>5,511</td>
<td>4,959</td>
</tr>
</tbody>
</table>
Isolates Received
2014-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Poultry</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>16000</td>
<td>6000</td>
</tr>
<tr>
<td>2015</td>
<td>14000</td>
<td>6000</td>
</tr>
<tr>
<td>2016</td>
<td>13000</td>
<td>6000</td>
</tr>
<tr>
<td>2017</td>
<td>12000</td>
<td>6000</td>
</tr>
<tr>
<td>2018</td>
<td>11000</td>
<td>6000</td>
</tr>
</tbody>
</table>
## Most Common Serotypes – Chickens 2018

<table>
<thead>
<tr>
<th>Rank</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Enteritidis</td>
<td>Kentucky</td>
</tr>
<tr>
<td>2</td>
<td>Typhimurium</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>3</td>
<td>Kentucky</td>
<td>Montevideo</td>
</tr>
<tr>
<td>4</td>
<td>Infantis</td>
<td>Mbandaka</td>
</tr>
<tr>
<td>5</td>
<td>Braenderup</td>
<td>Enteritidis</td>
</tr>
</tbody>
</table>
Salmonella Group D

- Poultry submissions, clinical + non-clinical
- 493 Group D isolates
- 420 (85%) were SE
- Other 15%: Javiana, Berta, Ouakam
Top 5 Serovars Clinical Isolates from Chickens 2013-2018

- Enteritidis
- Kentucky
- Typhimurium
- Heidelberg
- Mbandaka
- Infantis
- Braenderup
- Senftenberg

Years Observed
Top 5 Serovars Non-Clinical Isolates from Chickens 2013-2018

- Senftenberg
- Kentucky
- Mbandaka
- Worthington
- Montevideo
- Heidelberg
- Braenderup
- Thompson

Years observed
## Most Common Serotypes – Turkeys 2018

<table>
<thead>
<tr>
<th>Rank</th>
<th>Clinical</th>
<th>Non-Clinical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Albany</td>
<td>Senftenberg</td>
</tr>
<tr>
<td>2</td>
<td>Reading</td>
<td>London</td>
</tr>
<tr>
<td>3</td>
<td>Senftenberg</td>
<td>Bredeney</td>
</tr>
<tr>
<td>4</td>
<td>Uganda</td>
<td>Schwarzengrund</td>
</tr>
<tr>
<td>5</td>
<td>Anatum</td>
<td>Agona</td>
</tr>
</tbody>
</table>
Top 5 Serovars Clinical Isolates from Turkeys 2013-2018

Years observed
Top 5 Serovars Non-clinical Isolates from Turkeys 2013-2018
Human Outbreaks Associated with Poultry 2013-2019

- Shell eggs
  - *Salmonella* ser. Braenderup
  - *Salmonella* ser. Oranienburg

- Various food products containing poultry meat
  - *Salmonella* ser. Typhimurium*
  - *Salmonella* I 4,[5],12:i:-
  - *Salmonella* ser. Enteritidis
  - *Salmonella* ser. Heidelberg*
  - *Salmonella* ser. Reading
  - *Salmonella* ser. Infantis
Human Outbreaks Associated with Poultry 2013-2019

• Outbreaks associated with live poultry
  – *Salmonella* ser. Braenderup (x3)
  – *Salmonella* ser. Enteritidis (x4)
  – *Salmonella* ser. Indiana (x4)
  – *Salmonella* ser. Infantis (x5)
  – *Salmonella* ser. Hadar (x3)*
  – *Salmonella* ser. Lille
  – *Salmonella* ser. Litchfield (x2)
  – *Salmonella* ser. Mbandaka (x3)
  – *Salmonella* ser. Montevideo (x2)
  – *Salmonella* ser. Muenchen (x2)
  – *Salmonella* ser. Muenster*
  – *Salmonella* ser. Newport (x2)
  – *Salmonella* ser. Senftenberg
  – *Salmonella* ser. Typhimurium (x2)
  – *Salmonella I 4,[5],12:i:-*
VS Electronic Submission Forms are Available

- NCAH Portal is used for electronic sample submissions
- Create an eAuthentication account prior to access
- Once submission has been made & samples received at the NVSL, future submitter information will auto populate
- Additional email & fax numbers are easily added
- Ability to clone past submissions with similar data
- Reports remain in the system for one year

Pullorum Disease/Fowl Typhoid

- Macroscopic tube agglutination test developed in 1913 for detection of carriers
- Modified whole-blood method developed in 1931 by Schaffer *et al.*
- USDA developed the NPIP to control and eradicate Pullorum in 1941
Standard Tube Agglutination

• 1\textsuperscript{st} test developed for detection of S. Gallinarum var. Gallinarum and S. Gallinarum var. Pullorum antibodies
• Serum incubated with standard antigen for 20-24 hours at 37 °C
• Serum cannot be tested in the field
• Additional time & expense
Microtiter Test

- Serum serially diluted in microtiter plate
- Antigen added to each well
- Plate sealed and incubated 20-24 hours at 37 °C
- Serum cannot be tested in the field
- Additional time & expense
SALMONELLA SEROTYPING

Brenda Morningstar-Shaw
Tonya Mackie
Dana Ludwick
Edward Palmer
Andrew Ludvig
Brenda Wyckoff

Brenda.R.Morningstar@usda.gov
515-337-7962