Salmonella Contamination
Delmarva Produce

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### Previous Delmarva Outbreaks

<table>
<thead>
<tr>
<th>Year</th>
<th>Serovar</th>
<th>Cases/States</th>
<th>Hosp</th>
<th>Vehicle</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td><em>S. Newport</em></td>
<td>333/24</td>
<td>43</td>
<td>red round</td>
</tr>
<tr>
<td>2005</td>
<td><em>S. Newport</em></td>
<td>72/16</td>
<td>8</td>
<td>red round</td>
</tr>
<tr>
<td>2006</td>
<td><em>S. Newport</em></td>
<td>115/19</td>
<td>37</td>
<td>red round</td>
</tr>
<tr>
<td>2007</td>
<td><em>S. Newport</em></td>
<td>65/18</td>
<td>11</td>
<td>red round</td>
</tr>
<tr>
<td>2010</td>
<td><em>S. Newport</em></td>
<td>51</td>
<td></td>
<td>tomato</td>
</tr>
<tr>
<td>2014</td>
<td><em>S. Newport</em></td>
<td>275/29</td>
<td>47</td>
<td>cucumbers</td>
</tr>
<tr>
<td>2015</td>
<td><em>S. Newport</em></td>
<td>83/1</td>
<td>15</td>
<td>tomato</td>
</tr>
</tbody>
</table>

*Same PFGE “pattern 61”
*Linked by PFGE
$Linked by whole-genome sequencing


Multistate foodborne disease outbreaks associated with raw tomatoes, United States, 1990–2010: a recurring public health problem
S. D. Bennett, K. W. Littrell, T. A. Hill, M. Mahovic and C. Barton Behravesh. Epidemiology and Infection
DOI: [http://dx.doi.org/10.1017/S0950268814002167](http://dx.doi.org/10.1017/S0950268814002167)
The Problem of Investigating Fresh Produce Outbreaks

- Widely dispersed, individual patient-cases in many states
- Low attack rates, epidemiology is tedious
- Trace-back investigations are difficult due to complexity of the supply chain
- Intermittent, low-level contamination
- Implicated produce is rarely still available, the crop is no longer in the field
Key Conclusions from VA surveys

- **Sampled Areas:**
  - Virginia Tech Agricultural Research and Education Center (AREC): 2009-2011
  - Roadside stand tomatoes: 2010-2011

- *Salmonella* Pattern 61 and other clinically relevant isolates found consistently in waters and sediments at Virginia Tech Agricultural Research and Education Center and the 6 other locations

- Environmental waters and sediments are potential reservoirs for *Salmonella*

- Unclear mechanism(s) by which *Salmonella* introduced in to or on to crop plants
Next Steps

- Proactive surveillance for cases S. Newport 061 utilizing standardized questionnaire
- Traceback(s) to identify common source/supplier
- WGS clinical/environmental/food isolates
- Environmental Assessment
Preventive Approach

• Collaborate stakeholders:
  – Characterize problem context Delmarva produce landscape
  – Address problem:
    • ensuring stakeholders aware repeated outbreaks; evolving state knowledge/data gaps; need collaborative regional effort to develop suggestions/possible next steps based on solid science