Salmonella Isolate Recovery Project

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Bioinformatics/Metagenomics Team Lead, EDLB

PulseNet/OutbreakNet East Coast Regional Meeting

1/17/19
Our Project Leads/ Collaborators:

- Project Leads: Katie Dillon, Jo Williams, Andrew Huang
- EDLB
- Association of Public Health Laboratories (APHL) Isolate Recovery Subcommittee
- Oak Ridge Institute for Science and Education (ORISE)
- CO Department of Public Health & Environment, Laboratory Services Division
- Los Angeles County Department of Public Health
- MN Department of Health, Public Health Laboratory
- TN Department of Health
- University of IA, State Hygienic Laboratory
Purpose

- The Problem(s)
  - CIDTs do not yield isolates, which are needed for surveillance activities
  - SPHLS burdened with doing isolations

- The Solution
  - Provide recommendations on *Salmonella* isolate recovery from disease-state stools for the SPHLS
Overview

- Background
- Purpose
- Phase 1
  - Phase 1.1 “Hot Truck”
- Phase 2 (preliminary results)
- Next Steps
Phase 1

What transport temperature, transport media, and plating media work best for *Salmonella* recovery?
$10^4$  $10^2$  US

Cary-Blair  GN Broth

22°C  4°C

4 days  8 days  14 days

Oranienburg  Newport  Unspiked

Hektoen  XLD
Cary-Blair
GN Broth

Day 4
Day 8
Day 14

Seeded:
3 colony picks
1 sweep

Unseeded:
6 colony picks
1 sweep

qPCR
Outcomes

- No significant difference between transport media or plating media
- Only difference seen with storage temperature

Preliminary Recommendations:

- Cary-Blair is more widely used
- Hektoen has a longer shelf-life
- Recovery best when specimens transported/stored at 22°C
Phase 1.1 “Hot Truck”

How does transport temperature during warmer months affect *Salmonella* isolate recovery?
Phase 1.1 “Hot Truck”: Goals

- Determine optimal
  - Transport temperature during warmer months

- TRIPLICATE
Oranienburg  Newport  Unspiked

$10^4$  $10^2$  US

Cary-Blair

78°C  55°C  55°C

22°C  22°C

4 days  7 days  14 days

Hektoen
Phase 1.1: Workflow

Seeded:
- 3 colony picks
- 1 sweep

Unseeded:
- 6 colony picks
- 1 sweep

<table>
<thead>
<tr>
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<th>0</th>
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<th>3</th>
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<tbody>
<tr>
<td>22°C</td>
<td>78°C*</td>
<td>22°C</td>
<td>HEK</td>
</tr>
<tr>
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<td>55°C*</td>
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<tr>
<td>22°C</td>
<td>22°C*</td>
<td>22°C</td>
<td>HEK</td>
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</table>

*ice mitigation
Picks

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<tr>
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<th>10⁴</th>
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<tbody>
<tr>
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Sweeps

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### Mean Positive Picks

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<td>10000</td>
<td>4</td>
<td>7</td>
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<tr>
<td>6</td>
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<td>7</td>
<td>14</td>
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### Mean Positive Sweeps

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<th>0.66</th>
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<td>7</td>
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<tr>
<td>6</td>
<td></td>
<td></td>
<td>7</td>
<td>14</td>
</tr>
</tbody>
</table>
Outcomes

- No difference in recovery between specimens on ice vs 22°C
  - For Phase 2, hold samples at 22°C

- We recommend that during warmer months...

Clinical Lab

22°C

SPHL Lab

22°C
Phase 2

Is an enrichment necessary for recovery? If so, how well does it improve *Salmonella* growth and suppress commensal growth?
10^3 10^2 10^1 US

Oranienburg Newport Unspiked

Cary-Blair Hektoen

22°C

MSRV 4 days TET 7 days TET 14 days SEL
Seeded:
3 colony picks
1 sweep

Unseeded:
6 colony picks
1 sweep
100% Recovery!!

So far...
<table>
<thead>
<tr>
<th>Pros</th>
<th>Enrichments</th>
<th>Cons</th>
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<tbody>
<tr>
<td>• Plate immediately</td>
<td>Cary-Blair - Control</td>
<td>• &lt;100% recovery on low inoculum samples</td>
</tr>
<tr>
<td>• User-friendly, no preparation required</td>
<td></td>
<td>• Potentially a lot of commensal growth</td>
</tr>
<tr>
<td>• Long shelf-life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Easy to make</td>
<td>Selenite</td>
<td>• Hazardous</td>
</tr>
<tr>
<td>• 1-day incubation</td>
<td></td>
<td>• Has to be carefully disposed of</td>
</tr>
<tr>
<td>• Eliminates some commensals</td>
<td></td>
<td>• Not a lot of <em>Salmonella</em> growth</td>
</tr>
<tr>
<td>• 100% recovery</td>
<td>Tetrathionate (37°C)</td>
<td></td>
</tr>
<tr>
<td>• User-friendly, easy prep</td>
<td></td>
<td>• Somewhat difficult to make</td>
</tr>
<tr>
<td>• Long shelf-life</td>
<td>Tetrathionate (42°C)</td>
<td>• Has to be carefully disposed of</td>
</tr>
<tr>
<td>• 1-day incubation</td>
<td></td>
<td>• Not a lot of growth</td>
</tr>
<tr>
<td>• Eliminates some commensals</td>
<td>Tetrathionate (42°C)</td>
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</tr>
<tr>
<td>• Eliminates most commensals</td>
<td></td>
<td>• 2-day incubation</td>
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<tr>
<td>• 100% recovery</td>
<td>Tetrathionate (42°C)</td>
<td>• Very poor growth</td>
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<tr>
<td>• Long shelf-life</td>
<td></td>
<td>• Has to be carefully disposed of</td>
</tr>
<tr>
<td>• Eliminates some commensals</td>
<td>MSRV Semisolid Plates</td>
<td></td>
</tr>
<tr>
<td>• 100% recovery</td>
<td></td>
<td>• Short shelf-life</td>
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<tr>
<td>• A lot of <em>Salmonella</em> growth</td>
<td></td>
<td>• Time consuming and difficult to make</td>
</tr>
<tr>
<td>• Long shelf-life</td>
<td></td>
<td>• Has to be carefully disposed of</td>
</tr>
</tbody>
</table>
Preliminary Outcomes

- 100% recovery across all enrichments
- Deciding on an enrichment:
  - Cost
  - Preparation difficulty/time
  - Commensal suppression
  - Shelf-life
Next Steps
Next Steps

- Write up our recommendations
- Meet with APHL Subcommittee
- Pilot testing with SPHLs (Spring/Summer 2019)
  - 4-5 labs
  - Concurrent workflows
- Begin STEC Isolate Recovery Project
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Thank you!

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.