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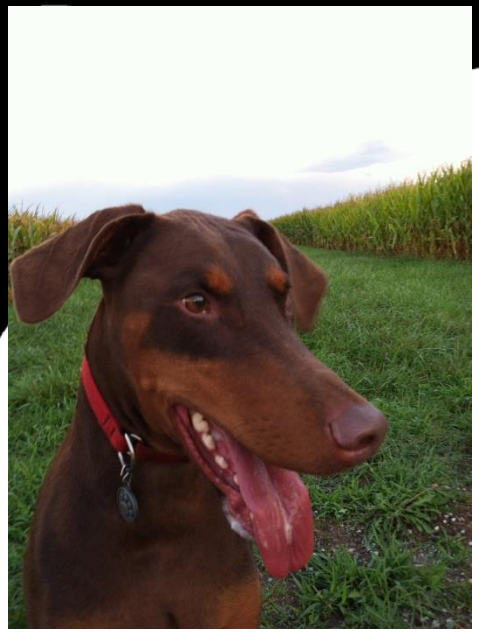
# Studies of Lm at Retail

Susan Hammons

April 11, 2016

Iowa Food Safety Task Force Meeting



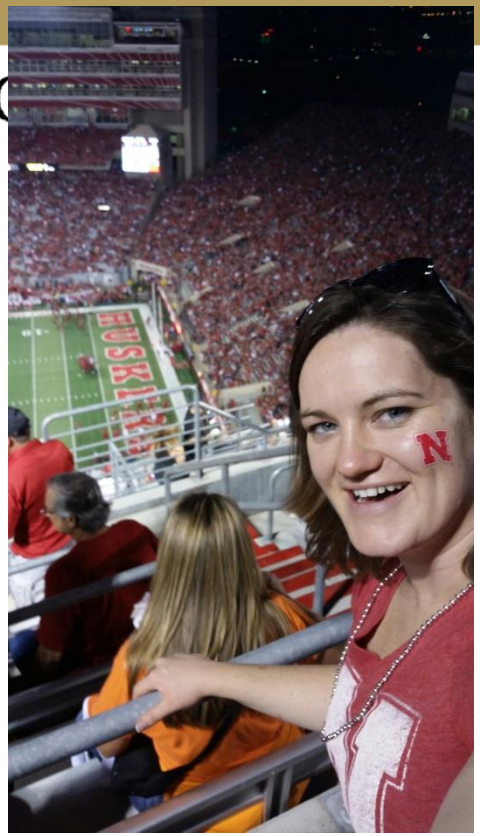
# My Background

## Master of Science

Food Science

Purdue University

May 2014




## Bachelor of Science

Food Science & Technology

University of Nebraska-Lincoln

May 2011

# Oliver Lab – *Listeria* at Retail

## Objective

Improve public health through evidence-based interventions to control *Listeria monocytogenes*.

- Strategies
  - Collaborate with retailers & sanitation providers
  - Locate environmental niches
  - Determine transient vs. persistent contamination
  - Test alternative sanitation procedures
  - Identify best practices
  - Develop long-term practical controls

# Estimated annual human health burden of selected known foodborne diseases, United States

| Pathogen | Illnesses | Deaths | Case-fatality |
|---|---|---|---|
| ***Campylobacter*** | 1,322,137 | 119 | 0.1% |
| ***Salmonella*** | 1,229,007 | 452 | 0.5% |
| ***E. coli* O157:H7** | 96,534 | 31 | 0.5% |
| ***Listeria*** (LM) | 1662 | 266 | 15.9% |

CDC
Centers for Disease Control and Prevention

Scallan, et al., *Emerging Infectious Diseases, 2011*

# 2010 FSIS Risk Assessment

**FSIS Comparative Risk Assessment for *Listeria monocytogenes* in Ready-to-eat Meat and Poultry Deli Meats**

This risk assessment indicates that of those listeriosis cases and deaths attributed to deli meats, approximately 83% are associated with deli meats sliced at retail.

| Relative Risk Ranking | Predicted Median Cases of Listeriosis for 23 Food Categories | | | | | |
|---|---|---|---|---|---|---|
| | Per Serving Basis[a] | | | Per Annum Basis[b] | | |
| | | Food | Cases | | Food | Cases |
| 1 | | Deli Meats | $7.7 \times 10^{-8}$ | Very High | Deli Meats | 1598.7 |

# Why *Listeria* in deli meats

- Ubiquitous: “found everywhere”[12-14]
- Salt tolerant[15, 16]
- Grows at refrigeration temps [15, 16]
- Formation of biofilms [16, 7]

Once *L. monocytogenes* enters a deli, it can grow, potentially be transferred to food, and cause illness.

# *Listeria monocytogenes* and *Listeria* spp. Contamination Patterns in Retail Delicatessen Establishments in Three U.S. States

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Longitudinal study of deli environments

# Which surfaces have highest prevalence of *L. monocytogenes?*

Small group activity

- Find a small group of 3-4
- Person born CLOSEST to this room, record responses
- Person who had a HAIRCUT most recently, designated reporter

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## Food Contact

| Site | +/Total | % |
|---|---|---|
| Slicer Blade | 5/180 | 2.8 |
| Deli Case | 4/179 | 2.2 |
| Case by Meat | 2/33 | 6.1 |
| Deli Case Tray | 4/180 | 2.2 |
| 3-Basin Sink Interior | 14/179 | 7.8 |
| 1-Basin Sink Interior | 30/164 | 18.3 |
| Cold Room Rack | 4/180 | 2.2 |
| Cutting Board | 4/152 | 2.6 |
| Rewrap table | 1/179 | 0.6 |
| Counter | 5/178 | 2.8 |

## Transfer Point

| Site | Total | % |
|---|---|---|
| Slicer Knob | 3/180 | 1.7 |
| Case Handle | 8/180 | 4.4 |
| Scale Top | 7/180 | 3.9 |

## Non-Food Contact

| Site | +/Total | % |
|---|---|---|
| 3-Basin Sink Ext | 6/180 | 3.3 |
| Floor-Wall Junct. (under 3-basin sink) | 24/180 | 13.3 |
| 1-Basin Sink Exterior | 7/164 | 4.3 |
| Floor/Wall Junct (under 1-basin sink) | 31/111 | 27.9 |
| Deli Drain | 36/180 | 20.0 |
| Floor Adjacent to Deli Drain | 46/180 | 25.6 |
| Deli Floor | 23/179 | 12.8 |
| Cold Room Floor | 36/179 | 20.1 |
| Cold Room Wall | 4/180 | 2.2 |
| Cold Room Drain | 40/119 | 33.6 |
| Standing Water | 16/90 | 17.8 |
| Squeegee | 36/132 | 27.3 |
| Cart Wheel | 14/180 | 7.8 |
| Hose | 6/134 | 4.4 |
| Trash Can | 9/180 | 5.0 |

# What is the difference between *persistent* and *transient* environmental *Lm?*

Think – Pair – Share

1. Think: consider your answer
2. Pair: discuss it with a partner
3. Share: share with group if called

- **Transient**: *Listeria* strain isolated during one event in a facility; regular cleaning eliminates.

- **Persistent**: same strain of *Listeria* present across multiple sampling events; regular sanitation not effective.

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| | July | Aug | Sept | Oct | Nov | Dec |
|---|---|---|---|---|---|---|
| ***Food Contact Sites*** | | | | | | |
| **Slicer** | - | - | - | - | - | - |
| **Deli case** | - | - | - | - | - | - |
| **Deli case near raw meat** | NT | NT | NT | NT | NT | NT |
| **Deli case trays** | - | - | - | - | - | - |
| **3-basin sink interior** | - | - | - | - | - | - |
| **1-basin sink interior** | NT | NT | NT | NT | NT | - |
| **Cold room rack** | - | - | - | - | - | - |
| **Cutting board** | - | - | - | - | - | - |
| **Rewrap table** | - | - | - | - | - | - |
| **Counter** | - | - | - | - | - | - |
| ***Non-food contact sites*** | | | | | | |
| **3-basin sink exterior** | - | - | - | - | - | - |
| **Floor/wall junction (3-basin)** | - | - | - | - | - | - |
| **1-basin sink exterior** | NT | NT | NT | NT | NT | NT |
| **Floor/wall junction (1-basin)** | NT | - | NT | NT | NT | - |
| **Deli drain** | - | - | - | - | - | - |
| **Floor adjacent to drain** | - | - | - | - | - | - |
| **Deli floor** | - | - | - | - | - | - |
| **Cold room floor** | - | - | - | - | - | - |
| **Cold room wall** | - | - | - | - | CU-299,338 | - |
| **Cold room drain** | - | - | - | - | - | - |
| **Standing water** | NT | NT | NT | NT | NT | NT |
| **Squeegee** | NT | NT | NT | - | - | - |
| **Cart Wheel** | - | - | - | - | - | - |
| **Hose** | NT | NT | NT | NT | NT | NT |
| **Trash can** | - | - | - | - | - | - |
| ***Transfer Points*** | | | | | | |
| **Slicer knob** | - | - | - | - | - | - |
| **Case handle** | - | - | - | - | - | - |
| **Scale** | - | - | - | - | - | - |

- = negative for LM; NT= not tested; LM = positive for *L. monocytogenes;* CU-#= PFGE subtype

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| | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|
| ***Food Contact Sites*** | | | | | | | | | |
| **Slicer** | - | - | - | - | - | - | - | - | - |
| **Deli case** | NT | NT | NT | - | - | - | - | - | - |
| **Deli case near raw meat** | NT | NT | NT | - | - | - | - | - | - |
| **Deli case trays** | NT | NT | NT | - | - | - | - | - | - |
| **3-basin sink interior** | NT | NT | NT | CU-57,267 | - | - | - | - | - |
| **1-basin sink interior** | NT | NT | NT | CU-258,69 | - | - | - | CU-294,321 | - |
| **Cold room rack** | - | - | - | - | - | - | - | - | - |
| **Cutting board** | NT | NT | NT | NT | - | - | NT | NT | - |
| **Rewrap table** | NT | NT | NT | - | - | - | - | - | - |
| **Counter** | NT | NT | NT | - | - | - | - | - | - |
| ***Non-food contact sites*** | | | | | | | | | |
| **3-basin sink exterior** | NT | NT | NT | - | - | - | - | - | - |
| **Floor/wall junction (3-basin)** | CU-258,69 | CU-258,69 | CU-258,69 | CU-258,69 | CU-258,69 | CU-8,96 | LM | CU-258,69 | CU-258,69 |
| **1-basin sink exterior** | NT | NT | NT | CU-258,69 | - | - | LM | - | CU-258,69 |
| **Floor/wall junction (1-basin)** | NT | NT | NT | CU-258,69 | - | - | LM | CU-258,69 | CU-258,69 |
| **Deli drain** | NT | NT | NT | CU-258,69 | CU-258,333 | - | CU-258,69 | CU-258,69 | CU-258,69 |
| **Floor adjacent to drain** | - | CU-258,69 | CU-258,69 | CU-258,69 | CU-258,69 | - | - | CU-258,69 | CU-258,69 |
| **Deli floor** | NT | NT | NT | CU-258,69 | - | - | - | CU-258,69 | - |
| **Cold room floor** | NT | NT | NT | CU-258,69 | CU-295,329 | - | CU-258,69 | CU-258,69 | CU-258,69 |
| **Cold room wall** | CU-258,69 | - | - | - | - | - | - | - | - |
| **Cold room drain** | NT | NT | NT | CU-258,69 | CU-258,69 | - | CU-258,69 | CU-258,69 | CU-258,69 |
| **Standing water** | NT | NT | NT | NT | - | - | NT | NT | - |
| **Squeegee** | NT | NT | NT | CU-258,69 | CU-258,69 | - | CU-258,69 | CU-258,69 | CU-258,69 |
| **Cart Wheel** | - | - | CU-258,69 | CU-258,69 | - | - | - | - | - |
| **Hose** | NT | NT | NT | - | CU-258,69 | - | - | - | - |
| **Trash can** | - | - | CU-258,69 | - | CU-258,69 | - | - | - | - |
| ***Transfer Points*** | | | | | | | | | |
| **Slicer knob** | - | - | - | - | - | - | - | - | - |
| **Case handle** | - | - | - | - | - | - | - | - | - |
| **Scale** | NT | NT | NT | - | - | - | - | - | - |

| | August | September | October | November | December | January |
|---|---|---|---|---|---|---|
| *Food Contact Sites* | | | | | | |
| Slicer | - | - | - | - | - | - |
| Deli case | - | - | - | - | - | - |
| Deli case near raw meat | - | CU-259,322 | - | - | - | - |
| Deli case trays | - | - | - | - | - | - |
| 3-basin sink interior | - | - | - | - | - | - |
| 1-basin sink interior | CU-40,96 | CU-296,330 | CU-57,267 | CU-296,330 | - | LM |
| Cold room rack | - | - | - | - | - | - |
| Cutting board | - | CU-262,79 | - | - | - | - |
| Rewrap table | - | - | - | - | - | - |
| Counter | - | - | - | - | - | - |
| *Non-food contact sites* | | | | | | |
| 3-basin sink exterior | - | - | - | - | - | - |
| Floor/wall junction (3-basin) | CU-258,323 | CU-258,322 | - | - | - | LM |
| 1-basin sink exterior | - | - | - | - | - | - |
| Floor/wall junction (1-basin) | CU-258,323 | CU-258,323 | - | CU-258,69 | - | LM |
| Deli drain | CU-259,322 | CU-258,323 | CU-11,320 | CU-262,334 | - | LM |
| Floor adjacent to drain | CU-259,322 | CU-262,317 | CU-258,322 | LM | CU-258,322 | LM |
| Deli floor | CU-258,333 | CU-258,323 | - | - | - | LM |
| Cold room floor | CU-258,322 | - | CU-258,322 | - | - | LM |
| Cold room wall | - | - | - | - | - | - |
| Cold room drain | CU-258,322 | CU-259,322 | CU-258,67 | LM | CU-258,323 | LM |
| Standing water | CU-82,215 | NT | CU-298, 335 | NT | CU-258,323 | - |
| Squeegee | CU-259,322 | CU-258,322 | CU-262,334 | LM | CU-259,322 | LM |
| Cart Wheel | - | - | CU-258,323 | - | - | - |
| Hose | - | - | - | - | - | - |
| Trash can | - | CU-258,322 | - | - | - | LM |
| *Transfer Points* | | | | | | |
| Slicer knob | - | - | - | - | - | - |
| Case handle | - | CU-258,322 | - | - | - | - |
| Scale | - | - | - | - | - | - |

# Conclusions From Simmons, et al. 2014

- LM can be prevalent in retail delis (0-40%) [18, 19]
  - only 8/30 delis were highly prevalent (>10% LM)
- LM can persist in retail delis (observed ~1.5 years)[19, 21]
- LM does not persist in all stores (only 11/30 observed)[19]
- Non-food contact surfaces have higher LM prevalence than food contact surfaces (NFCS 15% vs. FCS 4%)[18-21]

Environmental *L. monocytogenes* occurs.

# WHAT DO WE DO ABOUT IT?

To protect the unpublished results for future distribution some

# SLIDES REDACTED

# Recommendations to Retailers

- Maintain good daily SSOPs in all delis
- Identify store with greatest food safety challenges and focus resources
- Target NFCS for additional cleaning
  - Use cleanable squeegees; store in sanitizer solution
  - Eliminate standing water
  - Improve floor cleaning procedures/frequency
- Education, training & facilities maintenance complement benefits of sanitation changes

- Review Food Code and ensure compliance

# What else should I do?

**FSIS**
**Best Practices Guidance for Controlling *Listeria monocytogenes* (*Lm*) in Retail Delicatessens**
**June 2015**

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# Questions?

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