Listeria
Why is it still relevant

2017 IPPE Listeria Workshop
Why should we care?

Cost of Listeria Foodborne Illness

- 3rd most costly foodborne pathogen in US (Salmonella is #1)
- High mortality rate: 1 in 5 cases of Listeriosis leads to death
  - Death toll is higher among pregnant, newborns, and unborn
- High cost per Case: $1.7MM

What’s Being Done

- Faster Detection & response
- 1985: 31 days to public warning after outbreak
- 2011: 7 days to public warning after outbreak
- 2016: 3 days with WGS and smaller case numbers

<table>
<thead>
<tr>
<th></th>
<th>Listeria</th>
<th>Salmonella</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Annual Cost</td>
<td>$2.8 Billion</td>
<td>$3.7 Billion</td>
</tr>
<tr>
<td>Number of Cases</td>
<td>1,591</td>
<td>1.2 Million</td>
</tr>
<tr>
<td>Cost per Case</td>
<td>$1.7 Million</td>
<td>$3,568</td>
</tr>
</tbody>
</table>

&
http://www.cdc.gov/vitalsigns/listeria/
What does it mean to industry

RTE Meat - 2008
• RTE sliced meat contaminated with *Listeria monocytogenes*
• Result: 23 deaths & 57 illnesses
• Cost to Producer: $27MM

Cantaloupes - 2011
• Cantaloupes contaminated with *Listeria monocytogenes*
• Result: 33 deaths & 147 illnesses
• Cost to Producer: Estimates from $125-150MM
  (Food Safety News)
• 5 years probation, 6 months home detention, fined $150,000 each and 100 hours community service for the Jensen brothers
LISTERIA DEFINED
Listeria – what is it?

- Genus of Bacteria
- 7 species
  - L. grayi
  - L. innocua
  - L. ivanovii
  - L. monocytogenes
  - L. seeligeri
  - L. murrayi
  - L. weshimeri
- Gram-positive Bacteria
- Psychotropic
- Facultatively anaerobic
- Non-spore forming
- Rod-shaped
Listeria – what Does it like?

- **Temperature**: Psychrotropic
  - 29.3° to 113 °F
  - Able to live in low temp
- **pH**: 4.3 to 9.4
- **Water activity**: 0.92
- **Sodium Chloride level**: 10% (20-30%)
- **Atmosphere**: Facultative anaerobe
  - With or without O₂
- **Chemicals**: Not resistant to antimicrobials, but does develop biofilm
Listeria – what is success

• Meat and Poultry products free of pathogens
• Food that tests negative for bacteria
• Food made under sanitary conditions and tests negative for bacteria
• We can not eliminate it from the environment but we can control it.
Eliminate Listeria from RTE

The “Listeria Control Equation”

GMP’s + Traffic Patterns + Dry, Clean, Intact Floors + Effective Sanitation Procedure + Sanitary Design of Equipment and facility

Verify control through routine monitoring

= Listeria Control
Industry History

March 2000

- During Bruce Tompkin’s Armour-Swift-Eckrich copacker workshop, the concept of the AMI Listeria Intervention and Control Workshop was developed.

November 2000

- First AMI Workshop
  - Founders:
    - Bruce Tompkin - Armour Swift Eckrich
    - Bruce Cords - Ecolab
    - Doug Craven - Hormel
    - Gene Bartholomew – John Morrell
    - Tim Freier - Silliker
    - John Weisgerber - Oscar Mayer
    - John Butts - Land O' Frost
  
  AMI Staff
  Randy Huffman & Kim Rice

  - Consensus in methods and Best Practices was attained

October 2001

- AMI Board declared “Food Safety Not Competitive”
History

2001 to today

• Elimination of single growth niches produced new levels of control.
• More aggressive sampling was deployed.
• Benefits of dry floors were realized
• Cooking/pasteurization of equipment became commonplace
• Spread of organisms from growth niches became better understood.
• Physical separation of RTE areas became common place and more important
• 2010’s – the Agency change analysis method to PCR and included swabbing both FCS and NFCS
• 2016 – The Agency changed the algorithm for sampling from high risk (deli and hot dogs) to all other RTE products.
• Beyond 2016 - DNA linkages with the increased use and evolution of Whole Genome Sequencing (WGS)

There has been no reported illnesses or outbreaks from Federally Inspected meat or poultry plants since 2003.
FSIS Regulatory Testing for LM in RTE Products
by Calendar Year 1990-2015*
(All Years All Projects)

Percent Positive
*Starting with CY2008, annual microbiological results are reported by sample collection date as opposed to analysis end date.
We’ve all heard:

You are not sampling hard enough, if you are not finding positives
President

- VP Sales
- VP Operations
- VP Finance
- VP Technical
- VP of Good Intentions
Good Intentions ≠ Execution

FSIS can’t regulate how you **manage** your processes, but **they can** regulate poor management decisions.
Quality Matrix

• **Uncertainty:** We don’t know why we have problems with quality.

• **Enlightenment:** Through management commitment and quality improvement we are identifying and resolving our problems.

• **Certainty:** We know why we do not have quality problems.

Quality is Free—the Art of Making Quality Certain, 1979, Crosby, Philip, B. McGraw-Hill Book Company
# Seek & Destroy Maturity Model

## Evolution of Listeria Control in Processed Meats

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doubt</td>
<td>Awareness</td>
<td>Enlightenment</td>
<td>Preventive</td>
<td>Predictive</td>
</tr>
<tr>
<td>(Know of)</td>
<td>(React to)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### No testing or only testing as required to meet regulatory requirements

<table>
<thead>
<tr>
<th>“Blue Bell”</th>
<th>Initially sampled finished product, then some contact surfaces and environmental sites</th>
<th>Growth niches recognized in both equipment and facilities</th>
<th>Interventions developed and applied to manage growth niches. Sanitary design applied to eliminate.</th>
<th>Comprehensive indicator site process controlling facility and equipment growth niches combined with hurdles and barriers to control transfer pathways. Indicator sites used to measure risk and signal when to apply intervention or strengthen hurdle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental sampling and corrective action resulted in giving the drains to Listeria.</td>
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**Food Safety By Design**

[Image of the Food Safety By Design logo with tabs for Awareness, Enlightenment, Preventative, and Predictive]
Validation of “Best Practices”

• The rapid recovery of the unfortunate incident at Maple Leaf Foods (MLF) effectively validated the Best Practices we teach in this workshop.
  - Randy Huffman now the MLF Chief Food Safety Officer, Sr. VP of Six Sigma and Operations along with John Weisgerber, consultant, and Steve Tsuyuki applied our learnings to their 26 plants and brought Listeria under control in approx. 2.5 years

• Maple Leaf is now in what we call the “Preventive” and “Predictive” states of Listeria Control maturity.

• Their new Heritage Plant represents “Internalization” of these practices across the asset.
Validation of “Best Practices”

Seek and Destroy Process

• The Seek and Destroy Process is a systematic approach to finding sites of persistent strains (niches or pets) in food processing plants, with the goal of either eradicating or mitigating effects of these strains.

• We cannot eliminate Lm from the RTE environment, but we can deploy preventive practices that enable a high level of control of Listeria species.
Prevention
Monitoring
Corrective Actions

As I suspected, you’re full of bacteria. We’re going to have to throw you away.
Learning Objectives

Topics Covered

• Kris will discuss the science of sanitation
• Steve will address the sanitation process best practices
• Matt will help you understand the Sanitary Design Principles
• I will address Verification Monitoring and other sampling programs
• Lastly, Steve will present to you the Pathogen Control Program Maturity Model to help you identify where you are in the journey
For a more in-depth understanding of Listeria control, visit the AMI website at www.nami.com and look up the Advanced Listeria Workshop. The 2.5 day course is held up to twice a year.