Food Safety and Inspection Service
Protecting Public Health and Preventing Foodborne Illness
Overview

- FSIS 2003 “in-plant” deli meat risk assessment
- Regulatory actions
Food Safety and Inspection Service:  
FSIS Listeria Risk Management Questions  

• Examine the effectiveness of testing and sanitation of food contact surfaces on mitigating product contamination, and reducing the subsequent risk of illness

• Evaluate the effectiveness of other interventions (e.g., pre- and post-packaging interventions)

• Provide guidance on how frequently to test and sanitize food contact surfaces for Listeria spp.
In-plant Model Description

• Dynamic “in-plant” Monte Carlo model predicts Lm concentrations at retail
• Coupled with an updated version of the FDA Listeria risk assessment model to predict human health impacts
• Mass balance approach – track bacteria as move from one media to another
• Incorporates FCS testing, product testing, sanitation, pre- and post-packaging interventions, growth inhibitors
• Conducted on deli meats (“high risk”)
The model initially coded in Visual Basic then R, with Monte Carlo simulation and 1 million RTE lots.
Dynamic Mass Balance Model
Results are based on the following different scenarios:

1. **Baseline: No sampling**

2. **Sampling frequency**: increase from 4-2-1 (minimum) to 60-60-60 (maximum)

   “4-2-1” means that food contact surfaces are tested for *Listeria* species at one of the following frequencies, depending on establishment size:
   - If the plant is large, at least four tests, per line, per month;
   - If the plant is small, at least two tests, per line, per month;
   - If the plant is very small, at least one test, per line, per month.

3. All plants with **post-processing intervention**

4. All plants with **growth inhibitors**
Food Safety and Inspection Service: Lm Concentration Profiles

Leaving Plant

At Consumption

L. monocytogenes concentration, log10 cfu/g

Cumulative fraction
Food Safety and Inspection Service: Public Health Effects

![Bar Chart](chart_url)

- **Annual deaths among elderly Median Prediction**
- **Scenario**
  - Baseline
  - 4-2-1
  - 8-4-2
  - 10-10-10
  - 16-8-4
  - 32-16-8
  - 40-20-10
  - 60-60-60
  - 60-60-60 RTE
  - PP
  - GIP
  - PP & GIP
Control of Lm in Ready-to-Eat Meat and Poultry Products (June 2003)

Establishments producing post-lethality exposed RTE product must comply with requirements included in one of the following alternatives (9 CFR 430.4)

**Alternative 1:** Use post-lethality treatment **AND** an antimicrobial agent or process

**Alternative 2:** (a) Use post-lethality treatment **OR** (b) an antimicrobial agent or process

**Alternative 3:** Use sanitation measures **ONLY**
Food Safety and Inspection Service: Inspection

- FSIS verification sampling allocated among establishments based on public health risk (initiated: Jan. 2005)
  - Risk-based sampling algorithm
    - intervention, product type, volume, and FSIS Lm test results
  - Industry data (Form 10,240-1 or PHIS)
- Interim Final Rule enhanced FSIS oversight of RTE establishments, while providing incentives for industry to implement new preventive measures
  - Monthly ranking
  - Test & hold tested product “lot”
Food Safety and Inspection Service: Industry Response

- Industry adopted more effective Lm control measures
  - Use of growth inhibitors
  - Post-lethality interventions
- RTE meat and poultry industry considers Lm it’s “success story”
  - Food safety a non-competitive issue/information sharing
  - Paradigm change: proactively seeking to find Lm and institute controls to prevent it (“find it/fix it”)

Food Safety and Inspection Service:
Notable Reduction of Lm in RTE Meat and Poultry Products

- FSIS results of routine regulatory testing of finished RTE meat and poultry products analyzed for Lm (1990-2011). Approximately 4,000-10,000 samples taken annually.
Food Safety and Inspection Service:
Success Story: Reduction of Listeriosis Cases

<table>
<thead>
<tr>
<th>Year</th>
<th>Hot Dogs</th>
<th>Deli Meats</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cases</td>
<td>Deaths</td>
</tr>
<tr>
<td>1998</td>
<td>112</td>
<td>14</td>
</tr>
<tr>
<td>1999</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>2000</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2002</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2003</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2004</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2006</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2007</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2008</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

*Adapted from Cartwright et al. 2013*
Food Safety and Inspection Service: Take-away messages

- Involve stakeholders
- Allocate inspection resources based on public health
  - Efficient use of resources
  - Enhance verification of food safety programs and increase confidence in public health protection
- Provide economic incentives to improve food safety
- Support industry to effectively improve food safety
- Evaluate the impact of federal food safety policies and programs
- Shared sense of “success” between regulators and stakeholders is essential for effective food safety programs
Food Safety and Inspection Service:
Slide Title