


Food Safety and Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Environmental Sampling: *Listeria monocytogenes* (Lm)

"Where's the Bug?"

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Agenda

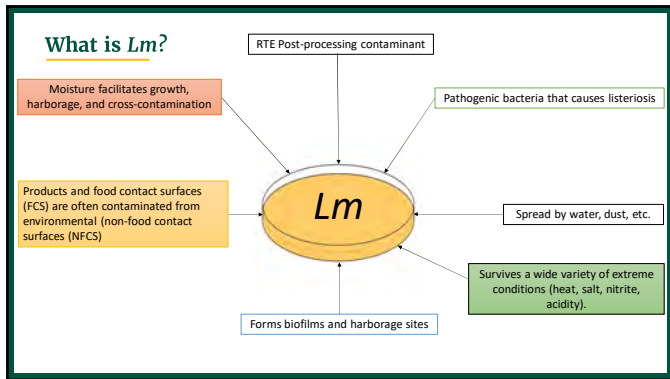
- Part I. Overview and Background of *Lm*
- Part II. *Lm* Sampling
- Part III. *Lm* Outbreaks
- Part IV. IVT and R*Lm* Testing Results

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Part I. Overview and Background of *Lm*

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Control of *Lm*

- Proper sanitation
- In-plant pasteurization
- Establishments should have support for the safety of incoming produce
- Workers should follow GMPs – change gloves, should not wipe their nose and touch product, etc.

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How does *Salmonella* get into RTE products?

- Incidence of *Salmonella* in RTE products is much lower than *Lm*
- RTE products can be contaminated with *Salmonella*:
 - Under processing
 - Ingredients added after lethality (spices, sauces) – [Appendix A](#)
 - Cross contamination – Product contact surfaces contaminated with *Salmonella*
 - Improper handling by employees
 - Insect and animal vectors

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Lm Sampling

- Flow of people, supplies, ingredients, etc.
- Exposed product contamination
- Workers' hands and aprons
- High contact areas (e.g., keypads, doorjams, door handles)
- Moisture and condensation
- Areas that are difficult to clean and sanitize effectively
- Areas that may be overlooked during sanitation

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Slide 9

HTF14 (BW 06/07) There are two parts, cleaning which is the removal of debris and sanitization which is killing of micro organisms. Many establishments fail to support both parts in LTD situations. So my recommendation is to always say these two things together, perhaps even explain it.

Hazard, Tennetta - FSIS, 6/14/2022

HTF15 I've never seen cracks and crevices sanitized in establishments. Crevices of equipment are washed, rinsed and sanitized, but cracks (in floors, walls etc.) are usually repaired.

Hazard, Tennetta - FSIS, 6/14/2022

Lm Sampling: Food Contact Surface (FCS)

- **FCS:** An area in the post-lethality processing environment that comes in direct contact with post-lethality exposed RTE product.

FCSs	FCSs: Cooking and Cooling	FCSs: Employees	FCSs: Packaging
<ul style="list-style-type: none"> • Tables • Conveyor Belts • Chutes • Cutting Boards • Blades and hopper surfaces of slicers • Hooks and hopper surfaces of shredders • Blade and table of saws 	<ul style="list-style-type: none"> • Racks • Pans • Tubs • Brine for chilling 	<ul style="list-style-type: none"> • Utensils: knives, tongs, thermometers • Aprons (touches product) • Gloves/hands (touches product) 	<ul style="list-style-type: none"> • Low priority • Storage and handling of packaging material • Film wrap • Bags • Soaker pads

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Lm Sampling: Food Contact Surface (FCS)

- Some pieces of equipment have both FCSs and NFCSs
- Notate exactly where each sample was collected
- **Take good sampling notes**

Activity

Question: Which part is an FCS area?

Answer: Employee's gloved hands

Question: Which part is the NFCS?

Answer: The slicer handle

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Environmental, Non-Food Contact Surface (NFCS) Sampling

- **NFCS:** A surface that has no direct contact with exposed product.
- EIAOs may collect samples from any area FSIS RTE product is processed, held, or stored.
- Collected in other areas associated with post-lethality exposed, RTE processing.

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Environmental, Non-Food Contact Surface (NFCS) Sampling

NFCSs

- Wet spots on floors and walls, low places on floors where water collects, and door jambs
- Entrances where workers or equipment can track *Lm*
- Wheels of equipment
- Anything associated with moisture and condensation: overhead pipes, drains, squeegees, drip pans

Collect near FCSS

- Handles, switches, and control buttons
- Bottom, front and side edges of stools or chairs used by employees
- Equipment that overhangs product
- Undersides of solid conveyer belts
- Compressed air or vacuum lines
- Oven smokehouse exit areas

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NFCS Sampling Sites



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Part III. *Lm* Outbreaks

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Past Outbreak Related Positive RTE FCSSs

SAMPLE	RATIONALE
Tray for deboned ribs	Extensive hand contact
Surface of portion scale	Extensive hand contact
Belt entering beef slicer (post op)	Index Sample
Top belt entering slicer (post op)	Index Sample
Slicer blades (post op)	Index Sample
Weighing bowl for sliced beef	Index Sample

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Past Outbreak Related Positive NFCSSs

SAMPLE	RATIONALE
Wet spots at floor/wall junction	Possible harborage
Underside of rib deboning table	Sanitation overlooked
Condensation	Possible harborage
Freezer door jamb	Common contact point
Electrical Switches	Common contact point
Drains	Possible harborage
Table that trays pass over	Sanitation overlooked
Door jamb gap between door and wall	Possible harborage

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Construction in the Plant

- Bil Mar Foods Facility, Michigan: 11 states, 50 illnesses, 6 deaths, 2 spontaneous abortions
 - Demolition of a refrigeration unit increased environmental contamination
 - Condensation falling from overhead pipes and the ceiling onto exposed product
 - Recalled 35 million pounds of hot dogs and deli products
- Plantation Foods, Texas: 10 states, 29 illnesses, 4 deaths, 3 miscarriages or stillbirths
 - Construction of the walls and floors
 - Walls harbored *Lm* (led to cross-contamination)
 - Recalled 16.7 million pounds of products
 - Deli turkey meat probable source of infection

[Controlling *Listeria monocytogenes* in Post-lethality Exposed Ready-to-Eat Meat and Poultry Products](#) (Construction pp. 76 – 77)

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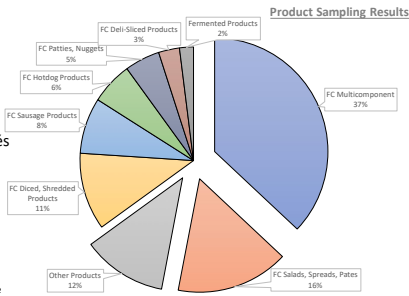
Part IV. IVT and RLM Testing Results



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IVT Results (2005–2014)

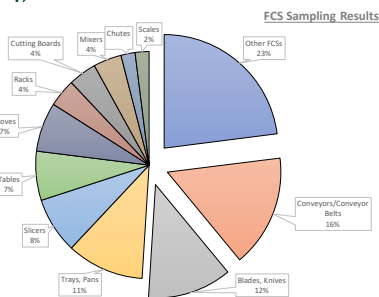
- Products with the most positive results:
 - FC Multicomponent Products
 - Salads, Spreads, Pâtés
 - Other Products



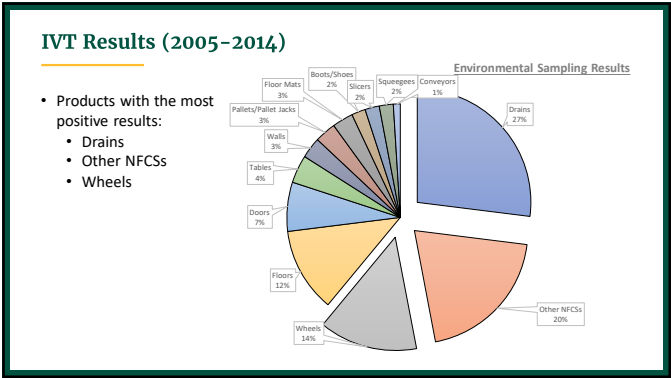
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IVT Results (2005–2014)

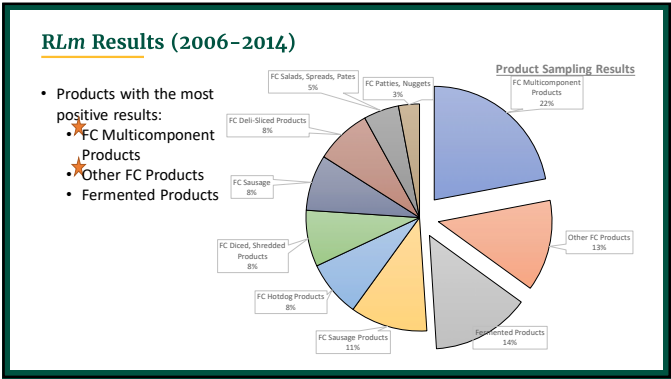
- Products with the most positive results:
 - Other FCSs
 - Conveyors/Conveyor Belts
 - Blades, Knives
 - Why do knives test positive so often?



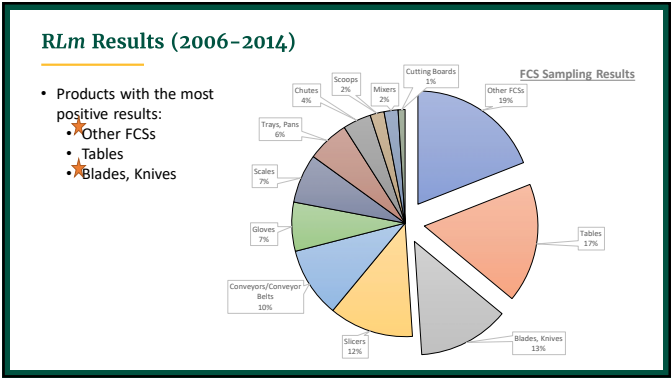
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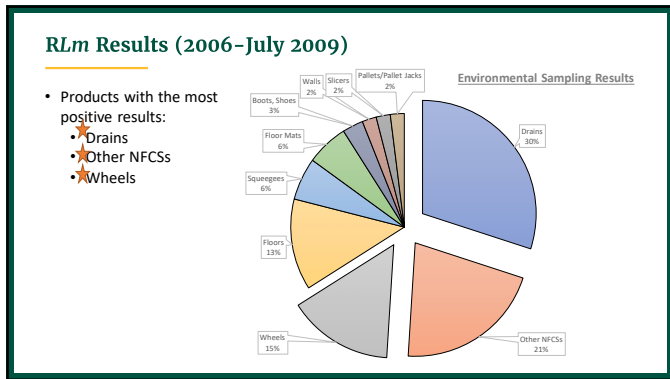
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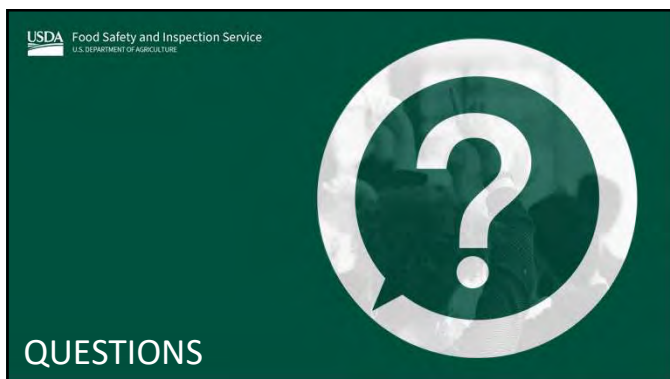


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Take-Aways

- Lm* can survive a wide range of environmental conditions and thrives in moisture
- Lm* is known to form biofilms
- Establishments should control sanitation
- Anything brought into the post-lethality RTE environment should be thoroughly cleaned and sanitized
- Construction in the RTE area is high risk for *Listeria* contamination
- Take good sampling notes that describe what was sampled and where the sample was collected

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