

## ***L. monocytogenes* Control Strategies: Interventions for Small and Very Small RTE Meat and Poultry Processors**

Margaret D. Hardin, Ph.D.  
Associate Professor of Food Microbiology  
Texas A&M University



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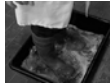
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### **Programs for Prevention & Control of *Listeria***

- Focus on prevention contamination of cooked products.
- The primary sources of LM contamination within food processing plants are:
  - Employees, through their clothing, gloves, boots, or skin coming into direct contact with product
  - Improperly cleaned and sanitized equipment
  - The environment, through airborne bacteria or aerosol moisture droplets generated in other work areas



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### **Potential Product Sources of *L. monocytogenes***

- Raw product and ingredients (meat and poultry)
- Solutions used to chill foods (ex. ice; brine solutions)
- Loose product
- Rework
- Returned product



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**Possible Post-Cooking Product Contact Surface Areas Contaminated with *L. monocytogenes***

- Slicers, saws and dicers
- Casing peelers
- Shelves and racks
- Lugs, tubs, and containers
- Hand tools, gloves and aprons



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**Possible Post-Cooking Product Contact Surface Areas Contaminated with *L. monocytogenes***

- Packaging materials
- Packaging equipment
- Tables
- Conveyors and belts
- Sponges, mops, brushes and squeegees used for cleaning
- Maintenance tools



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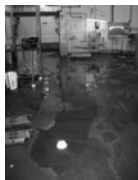
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**Potential Reservoirs of *L. monocytogenes* in Small Processing Plants**

- Floors and drains
- Standing Water
- Ceilings and overhead pipes
- Refrigeration/ Condensation units
- Wet insulation (exposed to processing areas)



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### Potential Reservoirs of *L. monocytogenes* in Small Processing Plants

- > Cleaning tools (sponges, brushes, squeegees)
- > Overhead rails and trolleys
- > Maintenance tools (wrenches, screwdrivers, tool belts and toolboxes)
- > Wooden pallets
- > Forklifts and pallet jacks



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### Strategies to Control *Listeria monocytogenes*

1. Sanitation & Design – the prevention and elimination of growth niches
2. Post-lethality Technologies – Use of appropriate technologies (e.g. temperature control, antimicrobial additives, post-packaging thermal and non-thermal treatments, freezing)
3. Sampling and Testing – aggressive testing to find LM
4. Corrective Actions and Verification – respond, verify, analyze

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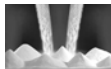
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### Additives & Post-lethality Technologies for RTE Meats

- > Antimicrobial Additives
  - Lactate, Diacetate, Lauric arginate, Acidified sodium chloride, etc.
  - Cost; labeling
- > Post-packaging
  - Thermal (hot water; steam; Unitherm)
  - Non-thermal treatments (high pressure processing; Irradiation)
- > Temperature control
  - Freezing



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**L. monocytogenes Control Strategies:  
Interventions for Small and Very Small  
RTE Meat and Poultry Processors**

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**Interventions for Small and Very Small  
RTE Meat and Poultry Processors**

USDA FSIS (Food Safety and Inspection Service)

- > Interim Final Rule on:
  - Control of *Listeria monocytogenes* in ready-to-eat meat and poultry products
  - Effective October 6, 2003
- > Control alternatives in post-lethality exposed RTE meat and poultry products
  1. Use of post-lethality treatment and an antimicrobial (Alternative 1)
  2. Use of post-lethality treatment or an antimicrobial (Alternative 2)
  3. Use of sanitation measures only (Alternative 3)

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**Interventions for Small and Very Small  
RTE Meat and Poultry Processors**

- > Most small and very small meat processors fall into Alternative 3
- > To assist this group of processors, Pennsylvania State University conducted research in 2003 and 2004 on the application of post-packaging heat treatment to reduce *Listeria monocytogenes* on RTE meat products commonly produced by small and very small meat establishments



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## Research Results

➤ A post-packaging heat treatment using a hot water bath and recommended packaging:

- produced a > 1 log reduction of *Listeria monocytogenes* on RTE products
- Reduction of spoilage organisms
- Increased shelf-life was observed (kielbasa, ring bologna, summer sausage, and snack sticks)



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## Procedure

1. Prior to start of the production day:
  - turn on hot water bath and allow bath to come to a resting temperature of  $99 \pm 2^{\circ}\text{C}$  ( $210^{\circ}\text{F}$ ).
  - Calibrate all thermometers to be used to monitor the temperature of the bath for the day.
  - Allow at least 30 minutes for the uniform stabilization of the water bath temperature.
  - Also, prepare an ice water bath to cool all products after heat treatment and calibrate cold thermometers to monitor the temperature of this water bath as well.



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## Procedure

2. As production begins, make sure that all packages to be heat treated are fully vacuum packaged and not leaking at the seals.



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## Procedure

3. Add an appropriate number of packages of RTE meat products. Once these are added, the temperature of the water bath will fall below the target temperature.



**Allow for the hot water bath to return to the target temperature zone 99 ±2°C (210 ±2°F).**  
**This may take several minutes.**

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## Procedure

4. All products should be completely submerged in the hot water bath for a minimum of 2 minutes. After 2 minutes, remove all packages from the hot water bath and immediately immerse them in an ice water bath (3°C/35°F) for 5 minutes to return the product back to refrigeration temperature. Dry off all packages before boxing.



**NOTE: This rapid cooling will ensure that the product meets USDA-FSIS stabilization guidelines.**

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## Procedure

5. The product is now heat treated and ready for further packaging and storage.



**Store packages in refrigerated storage at <5°C (< 40°F)**

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## Advantages

1. By implementing this post-packaging heat treatment into your production plan, treated RTE products can be classified as Alternative 2 under USDA FSIS 9CFR430 :Control of *Listeria monocytogenes* in ready-to-eat meat and poultry products.
2. The use of a post-packaging heat treatment demonstrates an increased level of protection of your brand name and of your company's reputation.
3. The use of a post-packaging heat treatment decreases the number of spoilage organisms able to survive and grow in finished product. This processing may increase the shelf-life of treated ready-to-eat products.

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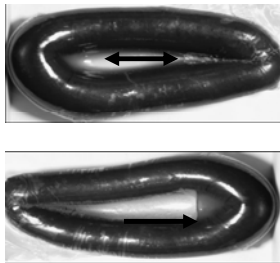
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## Disadvantages

1. Some RTE products may demonstrate an increase in purge when exposed to the technology.



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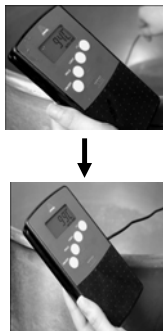
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## Disadvantages

2. The temperature of the water bath must remain constant for the given exposure time (2 min.) to be effective in yielding a 1 log<sub>10</sub> reduction of *Listeria monocytogenes*. Therefore, additional "come up time" for the water bath will be needed to reach the target temperature in between treatments. Careful monitoring of the water bath is recommended throughout the process to ensure adequate heat treatment for all RTE products.



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## Summary



1. This study demonstrated that a post-packaging heat treatment, using a hot water bath and recommended packaging
  - ✓ Produced a > 1 log reduction of *Listeria monocytogenes* on RTE products
  - ✓ Resulted in a reduction of spoilage organisms
  - ✓ Increased shelf-life for all products (kielbasa, ring bologna, summer sausage, and snack sticks)
2. While these studies validated that the process was effective and deemed acceptable by consumers however application in the plant is still needed.

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## Summary

3. Each company will need to evaluate the effect of the process on shelf-life through storage of the heat-treated product in a refrigerated cooler.
4. In addition, each product will need to be evaluated for product quality and acceptability as some product are more sensitive to the heat process than others.
5. If this technology is incorporated into a company's HACCP plan, critical control points and critical limits as well as temperature calibration and verification procedures will need to be developed.



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## Questions???



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