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### What is the Concern?

- Depends on food type, cooking or processing method, storage conditions, sanitation
- Undercooked or cross-contaminated meat products may contain pathogens such as *Escherichia coli* O157:H7 or *Salmonella*.
- Cooked rice or starch products that have been held at temperatures under 140 °F or cooled in large containers may contain *Clostridium perfringens*, *Bacillus cereus* and *Staphylococcus aureus*.
- Cold foods and salads may contain enterobacteriaceae.
- Cheese may contain *Listeria monocytogenes*.

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### What is the Concern?

- *E. coli* O157:H7 (verotoxin) and *Salmonella* can cause foodborne illness.
- *C. perfringens* and *B. cereus* are Gram-positive spore-forming rods that produce toxins. *S. aureus* is a Gram-positive cocci that can produce a heat-stable toxin (re-fold).
- Enterobacteriaceae encompasses a large group of Gram-negative rod-shaped bacteria capable of causing foodborne illness.
- *L. monocytogenes* can cause spontaneous abortion in pregnant women.
  - Unpasteurized cheese is a common food in Mexican homes. Cultural habits can play a role in foodborne disease.
- Transmission of a range of pathogens via food handlers.
  - Viruses, parasites, infective bacteria

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### *Listeria monocytogenes*

- Bacterial cells entrapped in slimy mucilagenous coating
- Constitutes microbes colonizing on surface, associated polymers and water (90-95%)
- Develops within 12-24 hours of growth on a surface for *Listeria* spp.
- Motility and flagellation of *Listeria* spp. plays a role in biofilm formation.
- Protection against environmental stress
- Resistance to cleaning and disinfection activities
- Difficult to remove or eradicate as compared to free living cells

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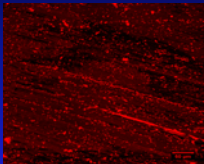
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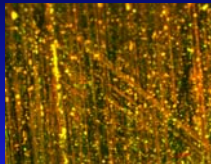
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### Survival of *L. monocytogenes* vs. *Escherichia coli*



*E. coli* O157:H7



*L. monocytogenes*

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### Criteria and RTE Food

- Manufactured versus point-of-sale food
  - Soft cheese versus prepared sandwiches
- Criteria in place for quality and safety of manufactured food
- Do not use two or three class sampling plans for point-of-sale foods
- Zero tolerance ( $c=0$ ) is in reference to pathogenic bacteria at the level of the food manufacturer in an effort to minimize foodborne illness when used in conjunction with GMPs at the point-of-sale level.

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### Zero Tolerance

- People with lowered immunity are more susceptible to foodborne illness and intoxication; therefore limits on pathogens are set in place to protect those people.
- Bacteria are ubiquitous in nature.
- Sterilization of most food is not practical.
- Is the goal achievable?
  - Meat industry and *E. coli* O157:H7
- Are limits achievable and based on scientific evidence?

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Product Testing versus Process Manufacturing: What Can be Done at the Process Manufacturing Level to Minimize Risk

- Employee education
  - Hygiene
  - Safe food handling practices
  - ATP
- Sanitation Processes
- Time-Temperature control and monitoring
  - Adequate cooking
  - Hot holding
  - Rapid and proper cooling of hot product
  - Safe cold storage
  - Adequate re-heating of product

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Questions

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