#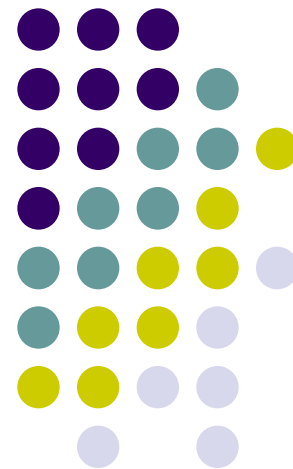 Using the JIFSAN Pilot Observational Study of Food Safety Practices in Interagency *Listeria monocytogenes* at Retail Deli Risk Assessment

JIFSAN Advisory Council

Spring Symposium

Sherri Dennis

March 24, 2010

# Role of Risk Analysis in Public Health Policy

A Powerful Public Health Tool

- Scientific basis for food safety policies and allocation of resources

- Allows for transparency and stakeholder involvement to ensure credibility and scientific accountability

- Facilitates the application of science to policy – " informational bridge" between data and decisions
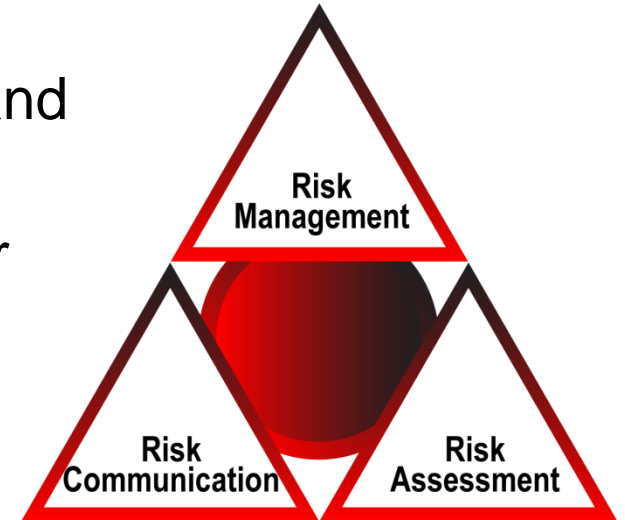
What's So Special About This Project?
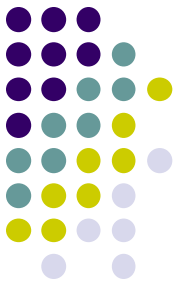
A new paradigm !

- Collaboration (FDA, FSIS, CDC, JIFSAN, UMD, and others)
- Develop data specifically for the risk assessment model
- First retail cross-contamination model
- Stakeholder participation early in the process

The Interagency Retail *Lm* Risk Assessment
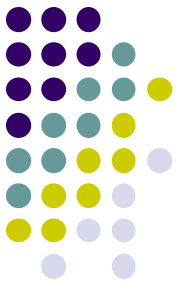
- Objective: Ascertain the impact on public health of current practices and potential interventions that reduce or prevent *Listeria monocytogenes* contamination in ready-to-eat food sliced, prepared and/or packaged in retail facilities

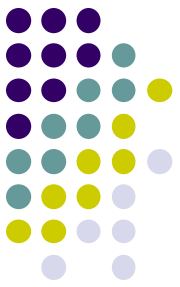# Background … in 5 studies

- *Listeria monocytogenes* (*Lm*): 2nd cause of foodborne-disease related death in the US
  - 500 deaths amongst 2,500 invasive cases (Mead et al., 1999)

Pathogen	Illnesses	Deaths	Case fatality rate
Campylobacter	2,453,926	124	0.1%
Salmonella	1,412,498	582	0.8%
E. coli O157:H7	73,480	61	0.8%
Listeria moncytogenes	2,518	504	20.0%

Background … in 5 studies
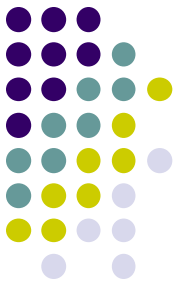
- Deli meat: 1st ready-to-eat (RTE) food vehicle of *Lm*.
  - *ca*. 1,600 cases per year (FDA/FSIS, 2003)
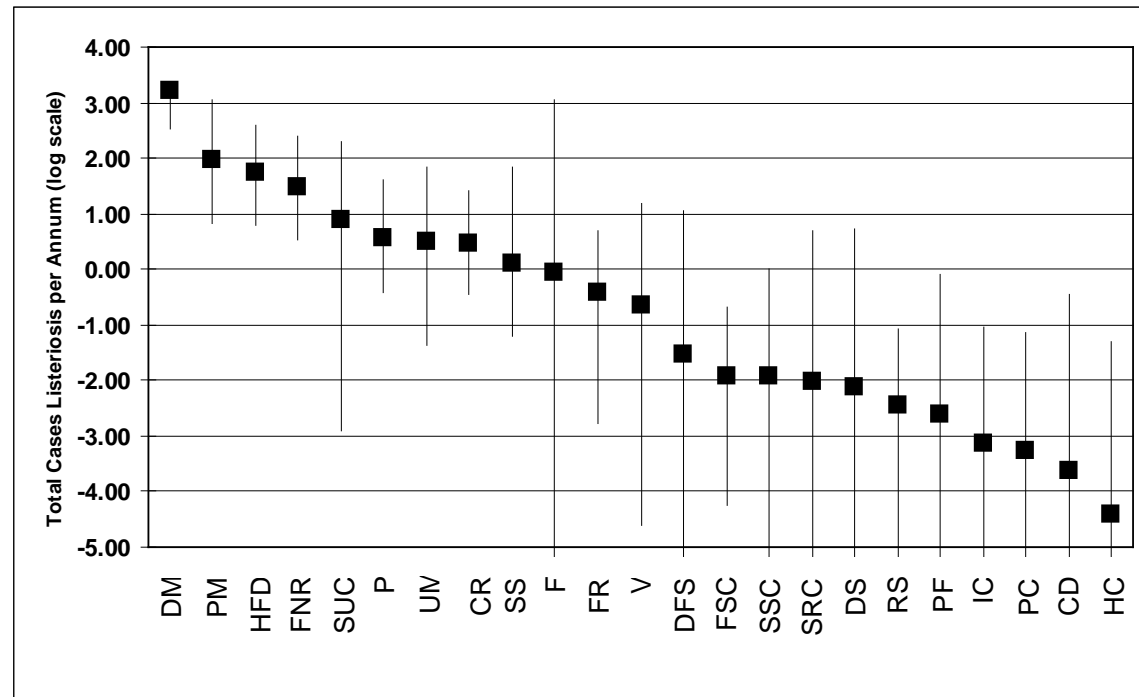
Background … in 5 studies
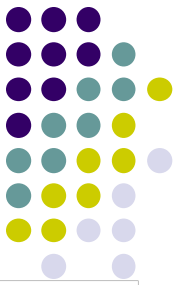
- *Lm* prevalence and *Lm* levels are higher for in-store packaged than for manufacturer-packaged RTE food
  - Gombas et al., 2003
  - NAFSS, 2008 [unpublished results]
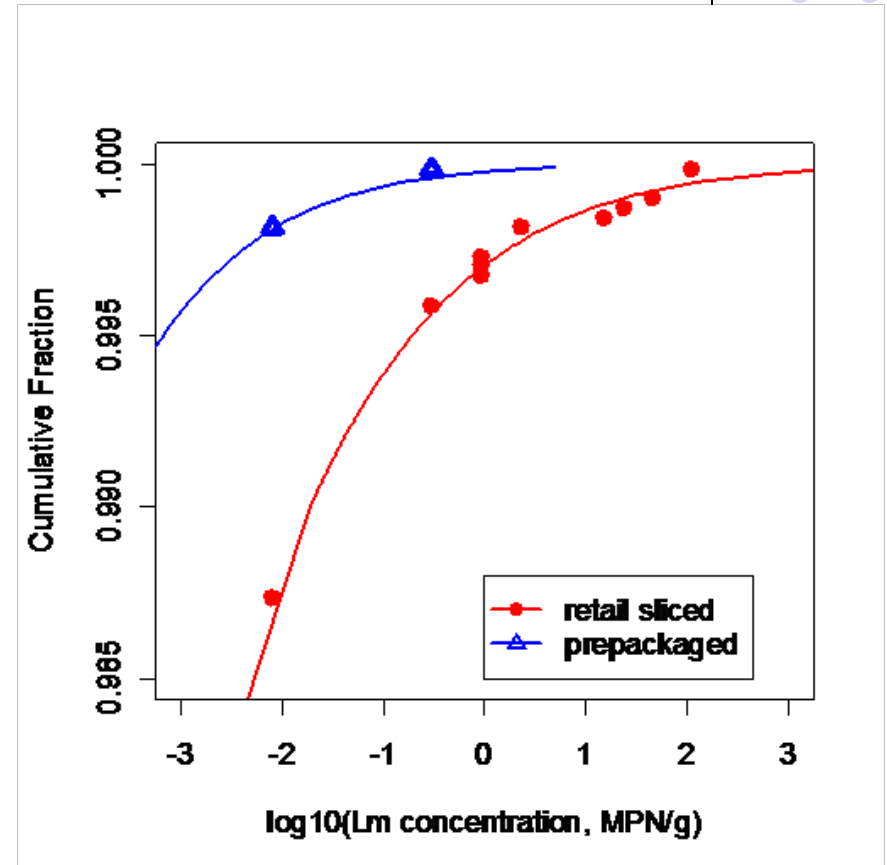
Background … in 5 studies

- **83% of all listeriosis cases attributed to deli meat are from deli meat sliced and packaged at retail**
  - FSIS, 2009 report using NAFSS contamination data

Category	Public Health Impact	Retail-sliced Deli Meat	Pre-packaged Deli Meat	Total Illnesses/ Deaths
With Growth Inhibitor	Deaths	26.5	10.5	37.1
	Illnesses	146	58	205
Without Growth Inhibitor	Deaths	140.3	23.6	163.9
	Illnesses	773	130	904
Total	Deaths	166.9	34.1	201.0
	Illnesses	920	189	1108

Why would in-store-packaged products be more contaminated than manufacturer-packaged ones?
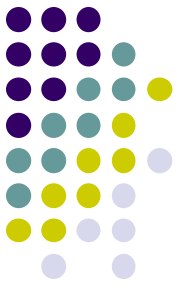
- Major hypothesis: additional cross-contamination

  - More than one kind of products manipulated at a given time / place
    - Meat, Poultry, Vegetables, Seafood, …

  - More than one process at a given time / place:
    - Slicing, Cutting, Mixing, …

Lm at Retail Risk Assessment Model

The mathematical model will simulate the retail environment and determine how practices at retail influence exposure.

Initial contamination

↓

Contamination when sold

↓

Contamination when eaten

Dose Response Model

↓

Probability of Illness
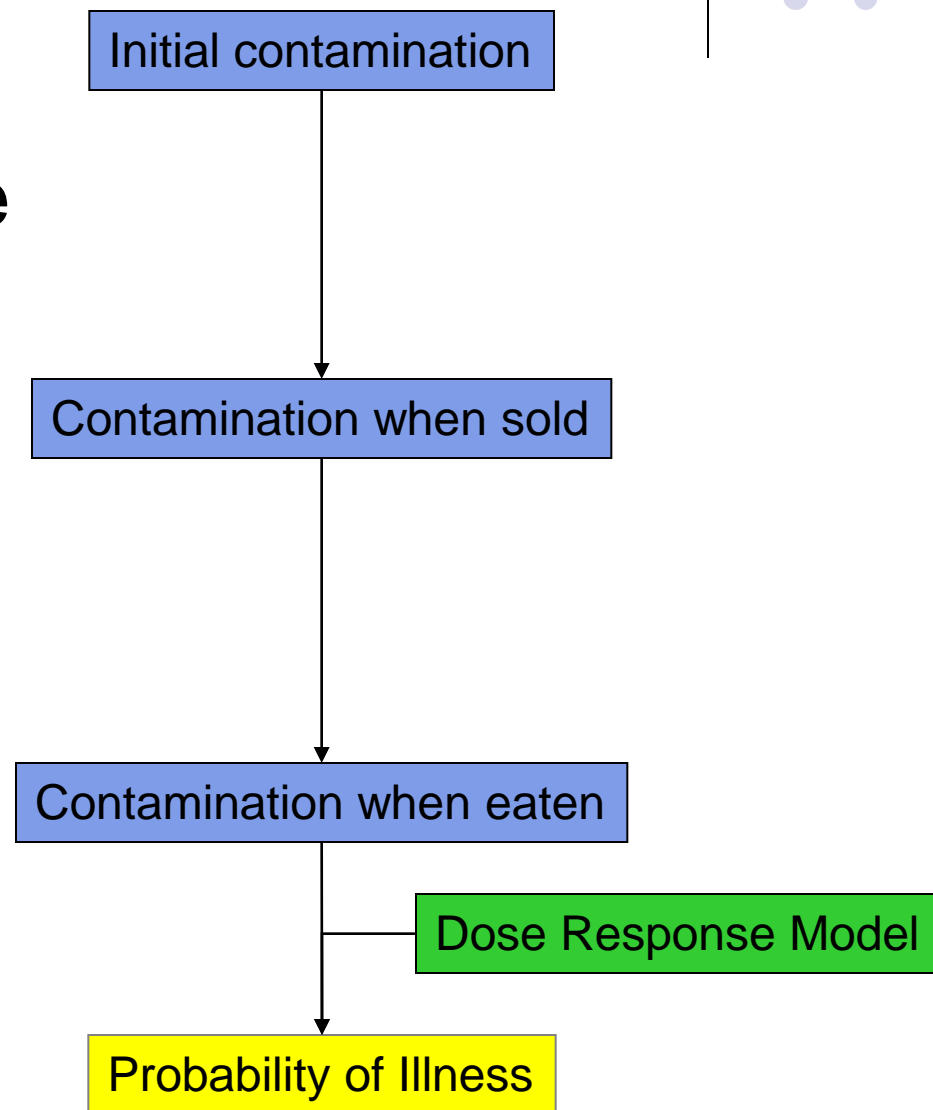
Data Needs

- Worker behavior
- Transfer coefficients
- Concentrations at retail
- Growth
- Product formulation
- Product sales
- Retail Operations
- Retail storage
- Retail sanitation
- Consumer handling
- Dose-response model
- Niches
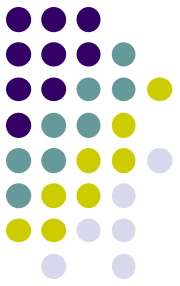
Pilot Retail Food Handler Observational Study

Meryl Lubran
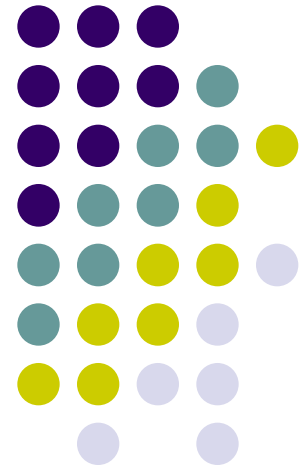
Available Data on Food Safety Practices of Food Handlers

- Several studies have assessed food employees' behavior in food service settings

- Methods used include:
  - Self-reports
  - Observational designs

- None provided data with the level of detail needed for the risk assessment model.

Methods
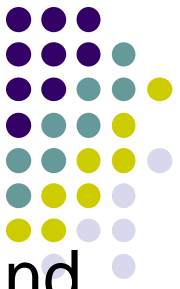
- Nine retail facilities which sell deli meat, cheese, and deli-type salads were selected for the study based on size, location, and other criteria.
  - Six chain stores (n=25)
  - Three independent stores (n=8)

- Procedure
  - Interview was conducted with store manager.
  - Employee was selected at random.
  - Researcher observed employee for 15 minutes during which time data collected was discarded.
  - Researcher continued to observe until at least 100 actions were performed/recorded (~15-45 min).

Example Notational Analysis Chart
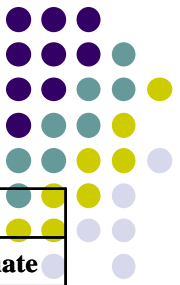
Action No.	Action Sequence	Notes	Specific Food Safety Action			
			Action	Required	Attempted	Adequate
1-TIME: 10AM	WS HDS	No soap	WS	X	X	
2	PON GLVS					
3	OPN CAS					
4	PUP SAL					
5	CLS CAS					
6	P SAL ON SLI #3					
7	SL SAL ONTO GLV					
8						
9						
10						

Frequency of Events

- Wipe Slicer (8%)
- Change Gloves: Wash-N-Change (40%), Change Only (27%), None (33%)
- Touch NFCS(5%)
- Open Case (82%)
- Touch Refrigerator Handle (3%)
- Contact When Open Chub: None (35%), Sink (24%), FCS (35%), Slicer (6%)
- Touch Knob (22%)
- Slice On Gloves (99%)
- Touch Scale (100%)
- Put Chub On FCS (1%)
- Wipe Slicer (22%)

Approximately 3,300 data points !

The "Virtual" Deli is Open !

- Products in display case
- Food workers
- Sites/ equipment
- Products sold

Tracking changes in contamination levels

Example: Serve Customer Event

Wipe Slicer

Removes some bacteria from the slicer

Example: Serve Customer Event

Wipe Slicer

Wash hands &
change gloves

Products sold
Sliced Meat   Sliced Cheese   Portioned Salad

Products
Meat Chub
Cheese Brick
Bulk Salad

FoodWorker
Gloves
Hands

Growth
Removal
Potential Niche
Transmission Travels Both Directions

Sites
Utensils
Slicers
Food Contact Surfaces
Scales
Cases
Sinks
Handles
Non Food Contact Surfaces
Floor
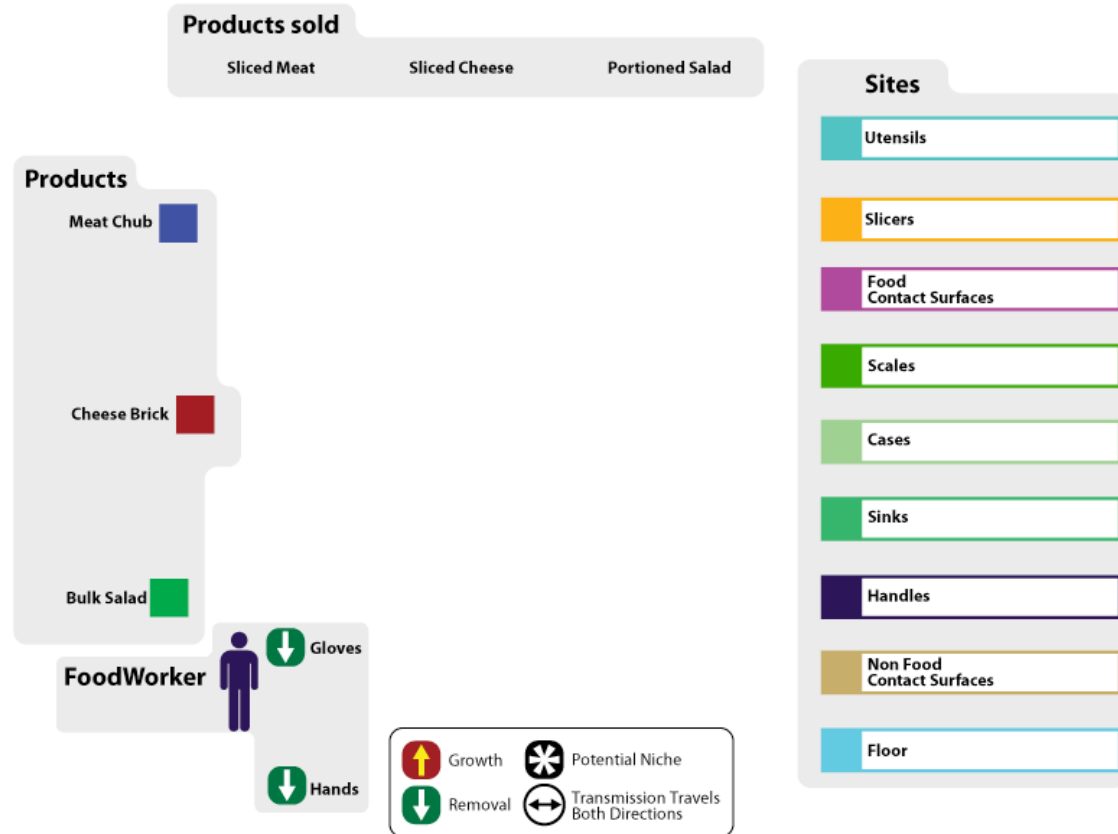
Removes some
bacteria from hands

Example: Serve Customer Event

Wipe Slicer

Wash hands & change gloves

Open case, remove chub, close case

Products sold: Sliced Meat, Sliced Cheese, Portioned Salad

Products: Meat Chub, Cheese Brick, Bulk Salad

FoodWorker — Gloves, Hands

Sites: Utensils, Slicers, Food Contact Surfaces, Scales, Cases, Sinks, Handles, Non Food Contact Surfaces, Floor

Growth, Removal, Potential Niche, Transmission Travels Both Directions
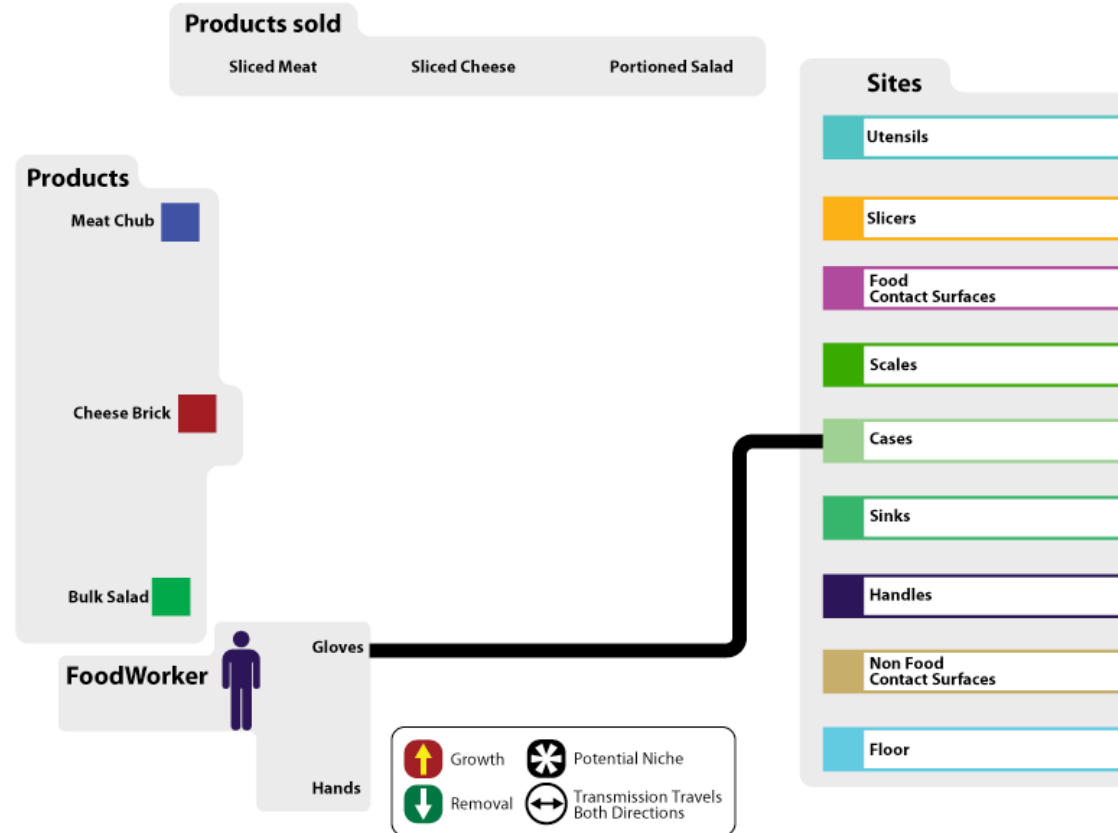
Cross contamination between gloves and case

Example: Serve Customer Event

Wipe Slicer

Wash hands & change gloves

Open case, remove chub, close case
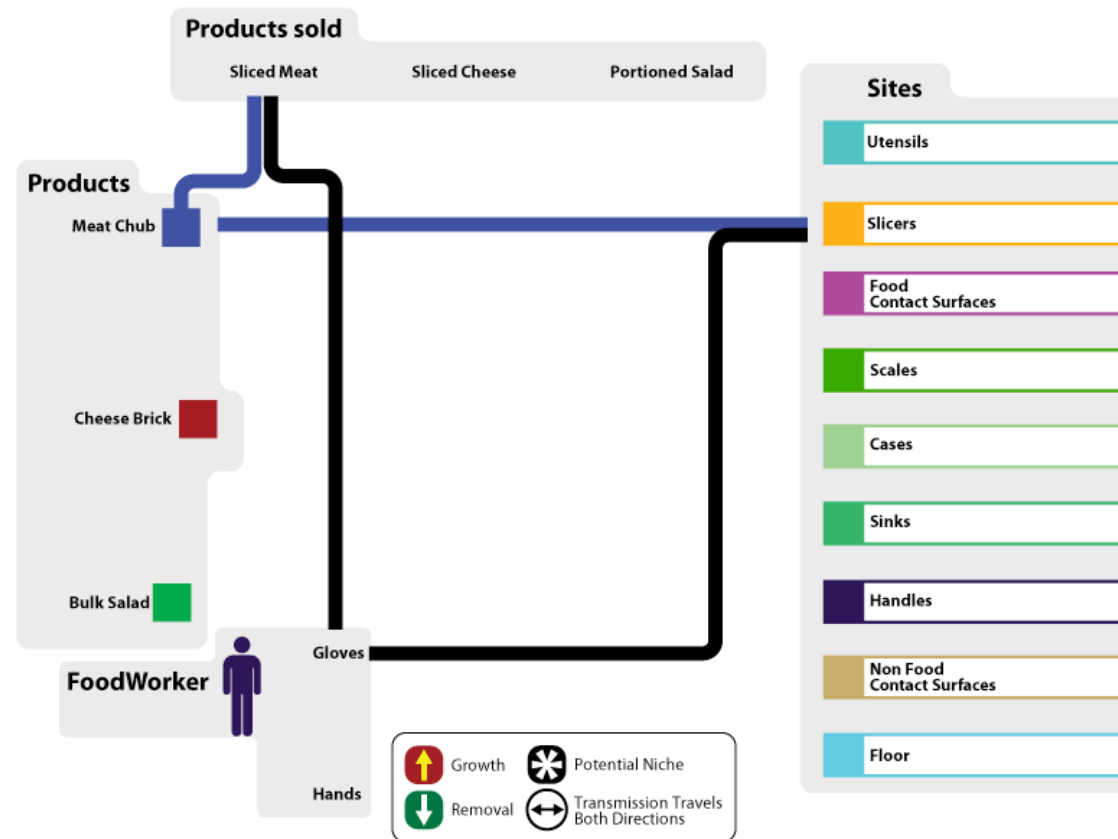
Slice on gloves

Cross contamination among gloves, slicer, chub

Example: Serve Customer Event

Wipe Slicer

Wash hands & change gloves

Open case, remove chub, close case

Slice on gloves

Touch scale

Products sold

Sliced Meat   Sliced Cheese   Portioned Salad

Sites

| Utensils |
| Slicers |
| Food Contact Surfaces |
| Scales |
| Cases |
| Sinks |
| Handles |
| Non Food Contact Surfaces |
| Floor |

Products

Meat Chub

Cheese Brick

Bulk Salad

FoodWorker

Gloves

Hands

↑ Growth   ✳ Potential Niche

↓ Removal   ↔ Transmission Travels Both Directions
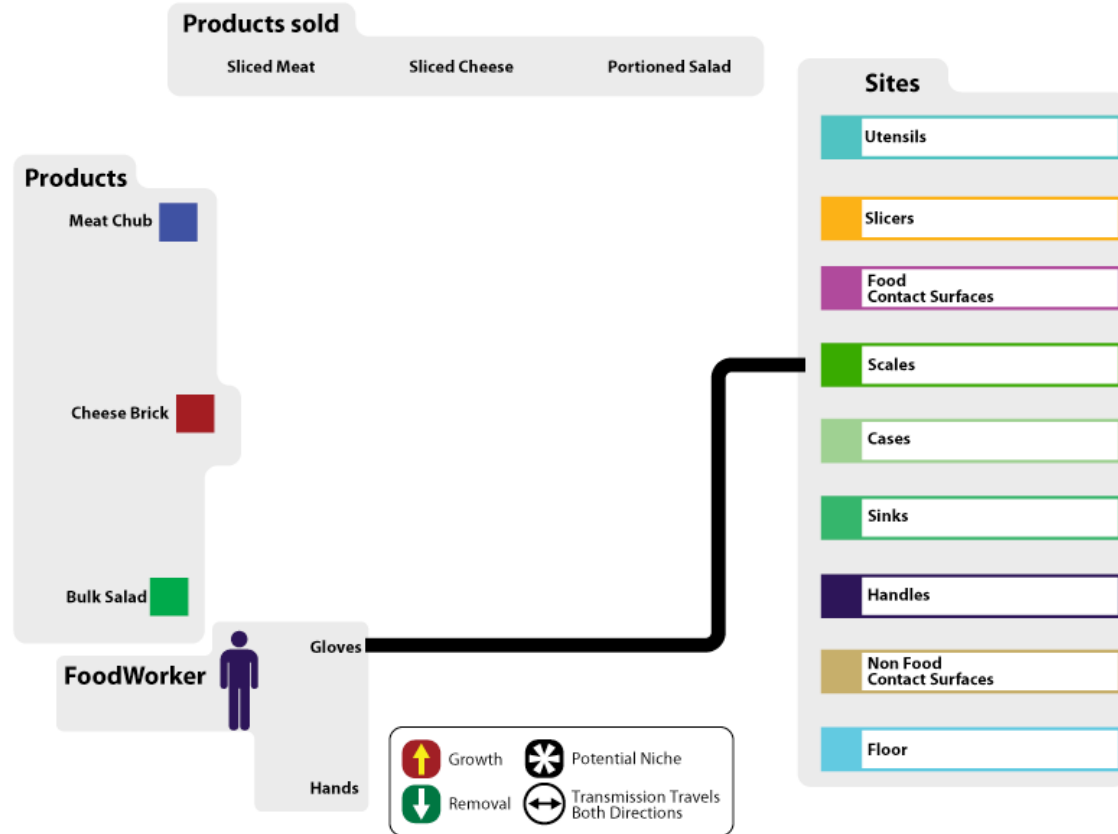
Cross contamination between gloves and scale

Example: Serve Customer Event

Wipe Slicer

Wash hands & change gloves

Open case, remove chub, close case

Slice on gloves

Touch scale

Rewrap chub

Products sold

Sliced Meat   Sliced Cheese   Portioned Salad

Sites

	Utensils
	Slicers
	Food Contact Surfaces
	Scales
	Cases
	Sinks
	Handles
	Non Food Contact Surfaces
	Floor

Products

Meat Chub

Cheese Brick

Bulk Salad

FoodWorker   Gloves

Hands

↑ Growth   ✳ Potential Niche

↓ Removal   ↔ Transmission Travels Both Directions
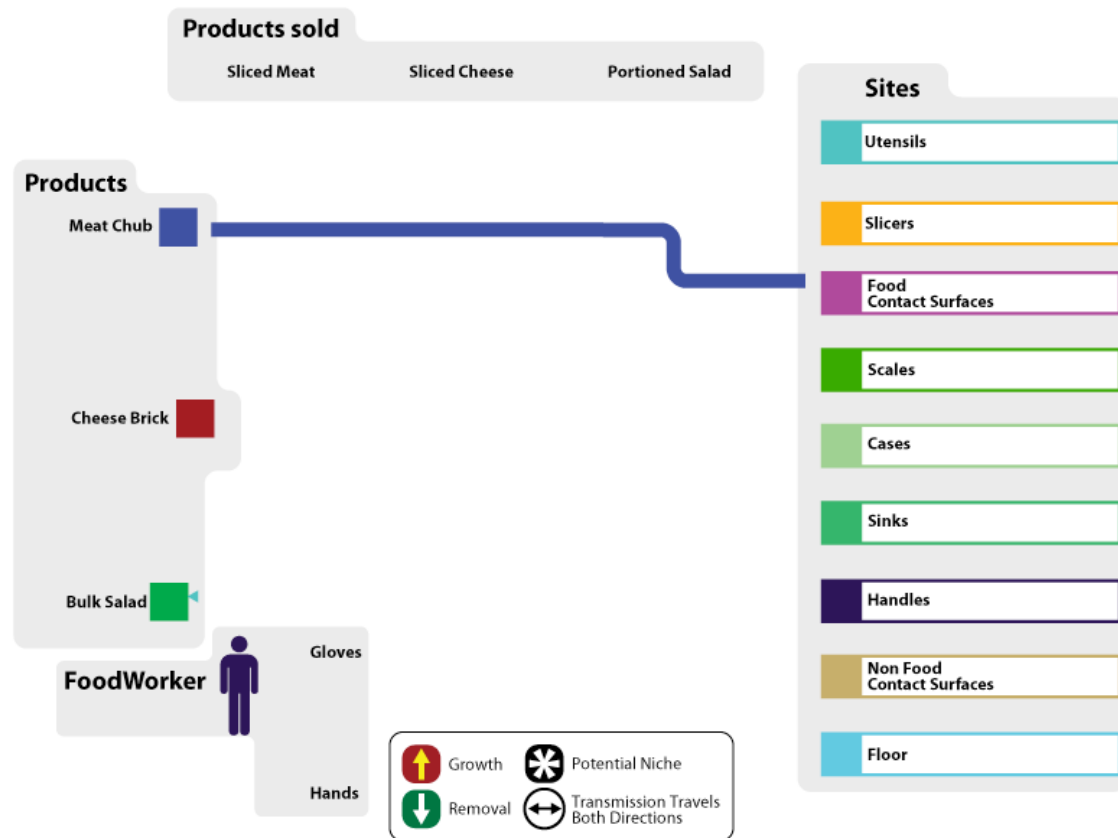
Cross contamination between the chub and the food contact surface

Example: Serve Customer Event

Cross contamination between the gloves and the case

Products sold

Sliced Meat   Sliced Cheese   Portionned Salad

Products

Meat Chub

Cheese Brick

Bulk Salad

FoodWorker

Gloves

Hands

Sites

- Utensils
- Slicers
- Food Contact Surfaces
- Scales
- Cases
- Sinks
- Handles
- Non Food Contact Surfaces
- Floor

Legend

Growth

Removal

Potential Niche

Transmission Travels Both Directions
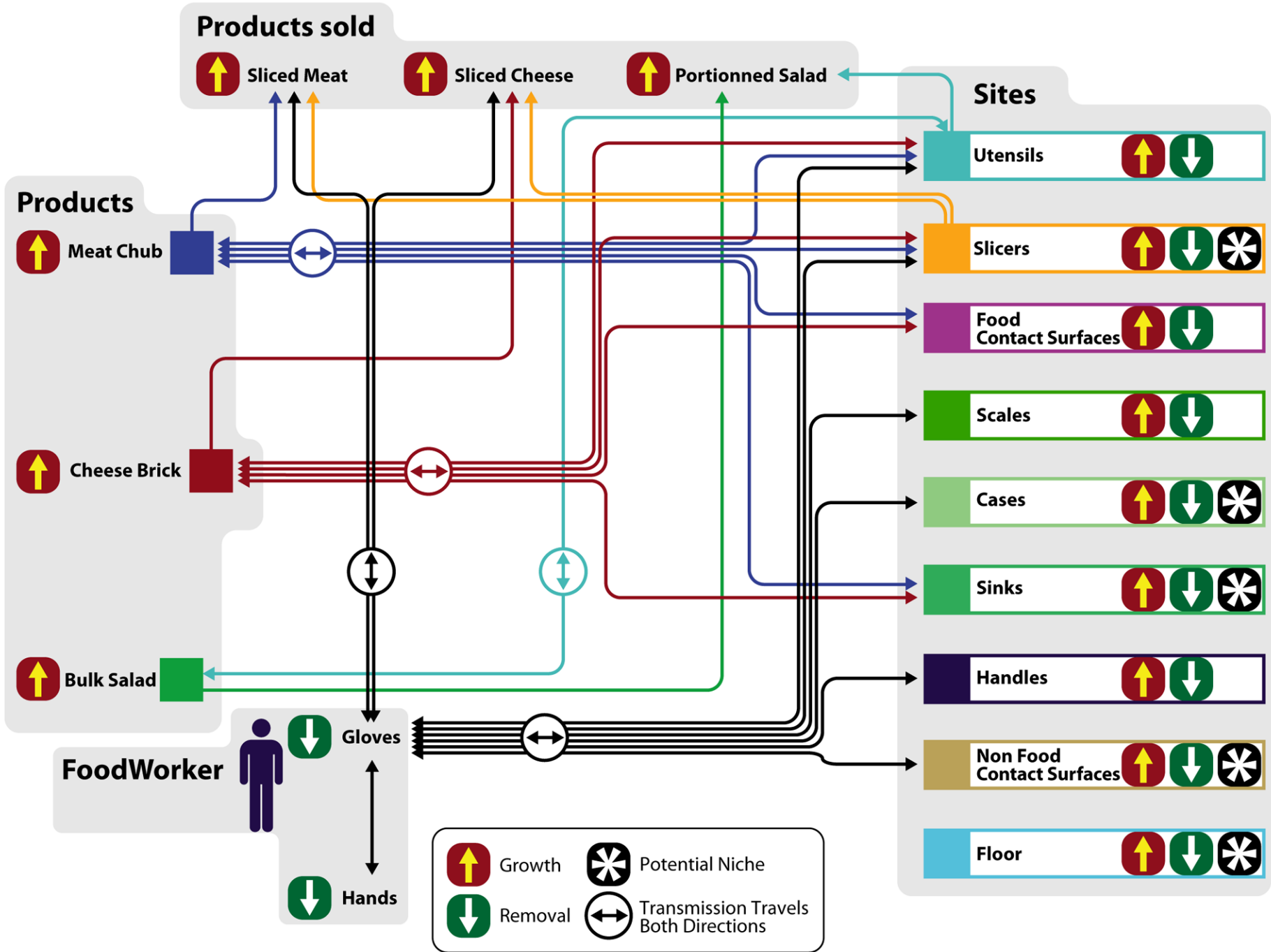
Timeline
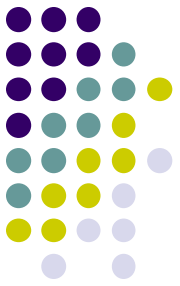
- Commission RA (Charge from risk managers)
- FR notice; June 2009 public meeting
- Collect data and information (an ongoing process)
  - Literature search
  - Expert opinion
  - Input from stakeholders
  - Pilot observational retail study
- Develop conceptual model
- Develop and test Beta model
- Prepare draft RA report
- External peer review
- Issue draft RA report for public comment
- Revise RA model and report, as appropriate

Timeline of Events

FSIS comparative Lm risk assessment completed; 83% of listeriosis cases attributed to deli meat are associated with those sliced at retail

FSIS and FDA brief the Joint Institute for Food Safety and Applied Nutrition and Food Marketing Institute (JIFSAN/FMI)

FSIS has VA Tech conduct laboratory studies and provide transmission data

FSIS and FDA brief the Association of Food and Drug Officials (AFDO) Retail & Food Committee

Draft FDA-FSIS quantitative risk-ranking of ready-to-eat foods; identify deli meats as highest risk

FSIS and FDA initiate joint interagency retail Lm risk assessment to evaluate the transmission of Lm at retail and effectiveness of controls

FSIS and FDA joint public meeting on the interagency risk assessment

FDA presents at ISOPOL XVII (International Symposium on Problems of Listeriosis)

FSIS quantitative risk assessment evaluating the effectiveness of various Lm processing controls; used to guide FSIS' RTE Rule for Lm

FDA garners ORISE fellow for interagency retail Lm risk assessment

FDA/JIFSAN pilot food worker retail observation study completed (started Summer 2009)

FSIS and FDA present at the 2009 Society for Risk Analysis

| '01 | '02 | '03 | '04 | '05 | '06 | '07 | '08 | Jan'09 | Feb'09 | Mar'09 | Apr'09 | May'09 | Jun'09 | Jul'09 | Aug'09 | Sep'09 | Oct''09 | Nov'09 | Dec'09 | Jan'10 | Feb10 | May'10 |

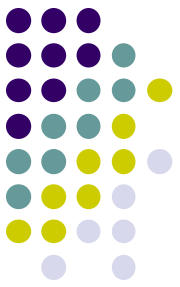**FSIS develops risk-based Lm sampling algorithm with parameters informed by QMRAs; establishments producing RTE products are selected for monthly sampling based on this risk-ranking**

FSIS contracts VA Tech to support the development of an interagency retail Lm risk assessment model

CDC, FSIS, and FDA briefing on interagency retail Lm risk assessment

President's Food Safety Working Group Report identifies Interagency Retail Lm Risk Assessment as a priority

FSIS contracts Cornell University to develop data for the interagency retail Lm risk assessment

FSIS presentation at AMIF Meat Industry Research Conference

FSIS presentation at the 2010 FSIS-ARS Annual Conference

Final FDA-FSIS quantitative risk-ranking of ready-to-eat foods; deli meats remain the highest risk

FDA call for data for interagency risk assessment

CDC to participate on interagency retail Lm risk assessment work group

FSIS briefs CDC FoodNet Attributions Workgroup

Joint FSIS-FDA docket for public comments closes

FSIS and FDA follow-up briefing with the Joint Institute for Food Safety and Applied Nutrition and Food Marketing Institute (JIFSAN/FMI)
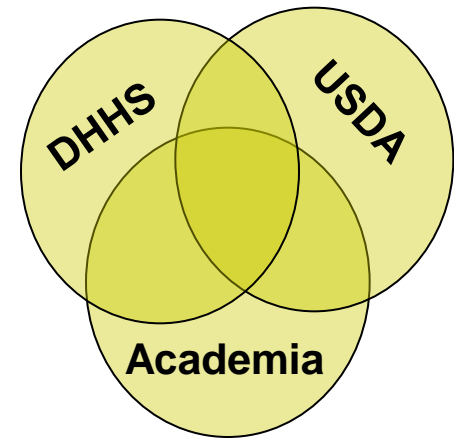
Acknowledgements

Interagency Retail Lm Risk Assessment Workgroup

- Federal Partners

    - USDA, Food Safety and Inspection Service

    - FDA, Center for Food Safety and Applied Nutrition

    - CDC

- Academia

    - VA Tech

    - Cornell University

    - University of Maryland/Joint Institute for Food Safety and Applied Nutrition

Food Marketing Institute (FMI)