United States Department of Agriculture
Food Safety and Inspection Service

A Scientific Foundation for Future Decision-Making

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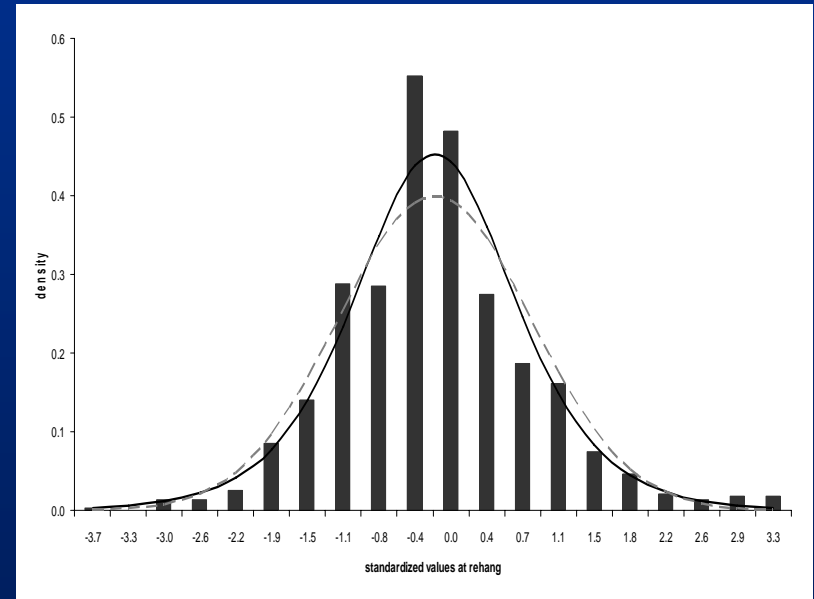# 2005 National Survey, Poultry Operations

E. coli levels and process controls:

- 1600 specimens collected
  - 20 randomly selected plants
  - Sampled in each of 4 seasons
  - 10 rinses, early and late processing
- Generic *E. coli* and *Campylobacter* levels
- Prevalence of *Salmonella*

2005 National Survey, Poultry Operations

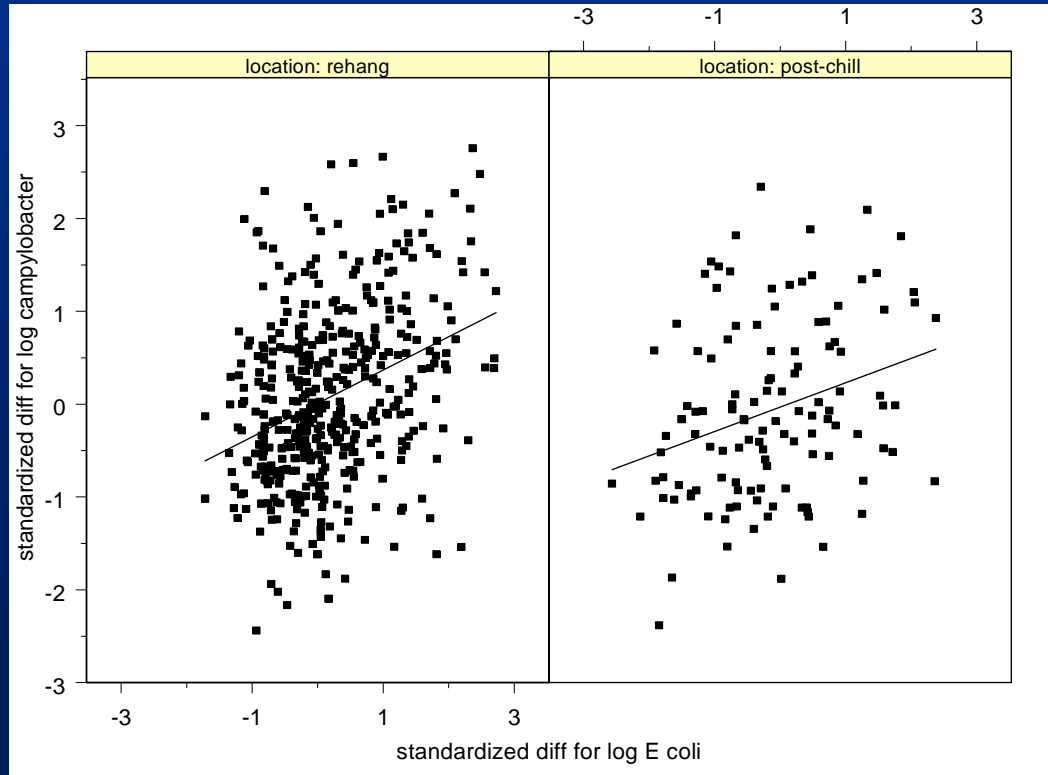*E. coli* levels on raw poultry:

- Demarcation level:
  1.1 $\log_{10}$ *E coli*/mL*
  Pathogens at higher levels

- Standard deviation
  0.5 $\log_{10}$ *E coli*/mL

Distribution of observed data

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Correlations between *E. coli* and *Campylobacter* level*:

* Early and late processing

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E. coli level and *Salmonella* incidence

Mean $\log_{10}$ *E coli* levels, raw poultry

Season	< 1.1		≥ 1.1	
	No.	*Salmonella* Incidence	No.	*Salmonella* Incidence
Autumn	13	25%	7	34%
Winter	8	14%	12	25%
Spring	13	11%	7	27%
Summer	14	15%	6	23%
Overall	48	17%	32	27%

2005 National Survey, Poultry Operations

E. coli level, pathogens, and raw poultry

Mean $\log_{10}$ *E coli* level

Pathogen status

	$\leq$1.0	>1.0	Total
Low*	8	5	13
High†	1	6	7
Total	9	11	20

P=0.06, Fisher's one sided exact test

* *Salmonella* incidence <25% and mean log10 *Campylobacter* level <0.55 cfu/mL

† All less favorable results

2005 National Survey, Poultry Operations

Summary

- Correlation of *E. coli* and *Campylobacter* levels

- High *E. coli* levels in raw poultry related to *Salmonella* incidence

- *E. coli* levels fit logistic distribution

- Supports process control based on post-chill *E. coli*

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Poultry Slaughter Inspection Risk Assessment for Young Poultry

Risk Assessment Background

- FSIS conducted a risk assessment to guide new inspection system in young poultry slaughter establishments

- A simulation model associates observed inspector activities with *Salmonella* prevalence on young poultry carcasses

- Uses *Salmonella* culture results from regulatory sampling at post-chill as dependent variable

Risk Management Questions

1. Can FSIS reallocate inspectors in young chicken slaughter plants without significant negative impact on *Salmonella* prevalence in the plants?

2. How will the relocation of on-line inspectors to off-line duties, or other areas within or outside the plant, affect human illness?

Risk Management Questions

3. Where within the plant can relocated inspectors have the most impact to reducing microbial prevalence and corresponding human illness?

4. What is the uncertainty about these effects?

Data Used in Risk Assessment

- 2,395 observations

- Structural Variables – Dates, Inspection Type, Volume
  - CY 2003-2005 Variables Aggregated by Month, Quarter, Year
  - Type of Inspection (SIS (24.8%) , Maestro (19.8%), NELS (19.5%), Mixed/Unknown (16.5%), HIMP (13.2%), Nu-Tech (6.1%)
  - Volume Number of Head Slaughtered

Data Used in Risk Assessment

- Decision Tracking Variables – On-line/Off-line Inspectors and Scheduled/Unscheduled Procedures
  - Procedure Based Inspection System (PBIS)– Number of Scheduled, and Unscheduled Procedures (Sanitation (01), HACCP (03), Economic/Wholesomeness (04), Sampling (05), Facilities (06), and Biosecurity (08))
  - Numbers of Inspectors On-Line and Off-Line

- Performance Deficiency Variables – PBIS Non-Complaint and Not Performed Procedures
  - Non-Compliances (procedures 01, 03, 04, 05, and 06),
  - Scheduled Procedures not Performed (procedures 01, 03, 04, 05, and 06)

Model Results

- An increase in number of off-line inspectors is associated with reduced *Salmonella* prevalence.

- A decrease in the number of <u>unperformed</u> sampling, sanitation, and HACCP procedures are all associated with reduced *Salmonella* prevalence

Model Results

- An increase in the number of <u>scheduled</u> sampling, random facility sanitation, and some wholesomeness procedures are associated with reduced *Salmonella* prevalence

- An increase in the number of <u>unscheduled</u> sampling, and sanitation procedures are associated with reduced *Salmonella* prevalence

Next Steps

- New Model Development Questions
  - What is the optimal use of FSIS resources and the pubic health impact of re-allocation of inspection resources?
  - What is the relationship of re-allocation to process control?
  - What are good re-allocation program performance measures?

Next Steps

- Data Needs-Model Modifications
  - Enumeration of *Salmonella* to determine relationship of product contamination to illness (baseline sampling programs)
  - Enhanced isolate identification and tracking (*Salmonella* subtyping)
  - Process control evaluation in establishments for line speed, on-and off-line reprocessing, contamination at re-hang and post-chill relationship