Packer Perspective on Food Safety and Quality Issues

Dr. John Ruby
JBS Technical Services
A California meat company on Sunday issued the largest beef recall in history, 143 million pounds, some of which was used in school
lunches. The recall was broadened Monday to include the
potentially contaminated items.

The New York Times

Largest Recall of Ground Beef Is Ordered
By ANDREW MARTIN
Published: February 18, 2008

USDAA Food Safety and Inspection Service sent this bulletin at 04/04/2013 10:45 PM EDT

New York Firm Recalls Additional Frozen Mini Meals And Other Snack Products Due To Possible E. Coli O121 Contamination
04/04/2013 09:48 PM EDT

Rich Products Corporation, a Buffalo, N.Y. firm, is expanding its recall of various heat treated, not fully cooked frozen mini meals and snack items to more than 10.5 million pounds because they may be contaminated with E. coli O121.

The New York Times

The Burger That Shattered Her Life
Trail of E. Coli Shows Flaws in Inspection of Ground Beef
By MICHAEL MOSS
Published: October 3, 2009
What Packers Consider in Food Safety and Quality Issues

• Foreign objects
• Shelf-life/spoilage
• Allergens
• Residues

From 2011-YTD 198 Recalls for the Above Mentioned Issues…the Packer Perspective is really about Control.
Without a Doubt!

Controlling Microbiological Contamination is a #1 Priority for Packers
Recalled Products due to Microbiological Contamination (2011-YTD)

<table>
<thead>
<tr>
<th>Organism</th>
<th>Pounds Recalled</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E. coli O157:H7 and STECs</em></td>
<td>11 million</td>
</tr>
<tr>
<td>Salmonella**</td>
<td>2,246,536</td>
</tr>
<tr>
<td>Listeria</td>
<td>764,170</td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>77</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>14,010,783</td>
</tr>
</tbody>
</table>

*Rich Products Corporation, snack items, current 10.5 million lbs.

**Ground Turkey-2,029,374
Presentation Overview

- What Packers are Doing to Control Microbial Contamination in the Facilities (raw products)
  - Pork
  - Chicken
  - Beef
  - Controlling Adulterant Through the System

- Pressure on the System example
  - Beef Example of how data is collected and used

- When Pathogens Get Through an Overwhelmed System
  - Beef Processing Event Periods
Foundation on Basics of Best Practices and Regulatory Compliance

• Good Dressing Procedures
• Monitoring Programs
  - Harvest Floor SOPs
  - Microbial Activity
• Optimize Intervention Technologies

• Robust Sampling Methods
  - Carcass sampling
  - N=60 Trim Sampling (beef)
• Operate under fully implemented HACCP plan
  - Complies with 9 CFR Ch.III Part 417
• Sanitation Standard Operating Procedures
  - Complies with 9 CFR Ch.III Part 416
Multiple Hurdle Strategy

• In addition to visible contamination, removal of bacterial contamination that may not be visible on the carcass.

• The use of repeated, aggressive interventions targeting microorganisms at critical points throughout the process.

• Additive benefit of staggered intervention steps throughout harvest and fabrication.
Goal of Microbial Intervention System

Reduce microbial loads when transferred from hide to carcass
Pork Food Safety Multiple Hurdles

Slaughter Floor Microbial Interventions

- External Thermal Sterilization (singe step)
- Steam Vacuum (before & after carcass chill)
- Organic Acid Application via Internal/External Carcass Surface Rinse
Cold Chain Management

- JBS closely monitors carcass / product temperatures
- Deep Chill process decreases surface microbial counts
Microbial Monitoring - Pork

- Carcass Microbial Mapping of general Aerobic Plate Counts (APC) occur twice weekly
- Generic *E. coli* Sampling as part of regulations
- Another process in conjunction with cold chain management to ensure consistent product quality.
Poultry Microbial Multiple Hurdle Interventions

• Live Receiving
  - Focus on preventing cross contamination
  - Cage sanitation and Cleaning

• Defeathering
  - Hot Water and/or Chlorination

• Washing
  - Chlorine or Peroxyacetic Acid

• Inside Washer
  - High pressure high volume wash, washing with chlorinated water and application of processing aid chemical
Poultry Microbial Multiple Hurdle Interventions cont.

- **Brush Scrubber**
  - High volume low pressure wash, antimicrobial application and brush scrubbing

- **Final Wash**
  - Up to 50 ppm free chlorine, 5% sodium bisulfate

- **Finishing Chiller**
  - 30 application of high acid PPA

- **Post Chill Spray**
  - Up to 0.8% cetylpyridinium chloride
Beef *SAFE* Program

**Slaughter Actions For Excellence**

*Major Impact Areas*

- Carcass Dressing
- Mechanical Interventions
- Microbial Monitoring
Addressing the Issue
Three Truths of the Harvest Process

1. You cannot dress a carcass without transferring microorganism to the surface of the carcass; therefore, you need to implement a strong mechanical intervention system.

2. You cannot implement a mechanical intervention system strong enough to overcome a poor carcass dress job.

3. You need to have both a robust dressing procedure and strong mechanical intervention system.
Beef SAFE Program

Major Impact Area

Carcass Dressing

- Critical Job Monitoring
- Contamination Audits
- Carcass Spacing Standards
- Fold and Flap Audit

- Mechanical Interventions
- Microbial Monitoring
Carcass Dressing

• Focus on prevention rather than correction

• A dressing audit system monitors SOPs and visible defects through the slaughter process

• To enhance the auditing system:
  - Cameras are utilized
  - Arrowsight 3rd party auditing
Remote Video Auditing, RVA

- Camera technology and 3rd party auditing will be used for:
  - Animal Welfare
  - Slaughter practices

- Unbiased auditing will be performed by a trained QA technician.

Arrowsight
Vision for Peak Performance. Every Site, Every Shift.
SAFE Program
Slaughter Actions For Excellence

RVA

Major Impact Area

Carcass Dressing

Critical Job Monitoring

Contamination Audits

Carcass Spacing Standards

Fold and Flap Audit

Mechanical Interventions

Microbial Monitoring
SAFE Program

Major Impact Area

- Carcass Dressing
- Mechanical Interventions
  - Slaughter
  - Fabrication
- Microbial Monitoring
Multiple Hurdle Intervention System

Hide Wash

Pre-evis Wash
Multiple Hurdle Intervention System

Final Wash

Chill
Multiple Hurdle Intervention System

Cold Carcass Spray

Sub-primal Spray
SAFE Program

Major Impact Area

- Carcass Dressing
- Mechanical Interventions
- Microbial Monitoring
- Harvest Monitoring
Harvest Monitoring Program
Steps within the process

Step 1 = Hide on
Step 2 = Hide off pre-intervention

*Intervention: Thermo-pasteurization 5% lactic acid spray*

Step 3 = Post evisceration
Step 4 = Pre-pasteurization/lactic acid/bromine spray

*Intervention- Bromine application, Thermo-pasteurization, 5% lactic acid spray*

Step 5 = Post-pasteurization/lactic acid
Step 6 = Pre-hot box

*Chilling process*
Step 7 = Post-chilled
All Effective Systems Include Validation and Verification

- Validation to demonstrate they can control microbial contamination
  - Monitor the levels of indigenous microbial activity before and after antimicrobial application and determine effectiveness
  - Surrogates for *E. coli* O157:H7 and *Salmonella* Typhimurium.

<table>
<thead>
<tr>
<th>Inoculation</th>
<th>Before Treatment</th>
<th>After Treatment</th>
<th>Cellular Log Reduction</th>
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</thead>
<tbody>
<tr>
<td>Uninoculated</td>
<td>1.2 ± 0.5(^a)</td>
<td>0.3 ± 0.5(^b)</td>
<td>1.14</td>
</tr>
<tr>
<td>Inoculated</td>
<td>6.1 ± 0.3(^a)</td>
<td>1.0 ± 0.5(^b)</td>
<td>6.10</td>
</tr>
</tbody>
</table>

\(^a\) Means with different superscripts within the row are different (P<0.05)
Verification the System has been Properly Implemented

- Measure the effect of an antimicrobial treatment or the effect of an intervention system

- Testing beef trimmings for *E. coli* O157:H7 is one way to effectively demonstrate process control.
  - JBS tests all combos destined for grind beef production for *E. coli* O157:H7
  - Negative results indicate system is working as intended
  - Positive results indicates need for investigation and implementation of process improvement.
Pressure on the System and Managing Unknown Incoming Loads
Performance Objective for Harvest Monitoring

**Step 2** = Hide off pre-intervention

\[ \text{PO} = < 2.0 \log_{10} \text{APC on carcass post hide removal} \]

**Step 4** = Pre-pasteurization/lactic acid spray

\[ \text{PO} = < 1.5 \log_{10} \text{APC on carcass pre-final harvest intervention} \]

**Step 7** = Post-chilled

\[ \text{PO} = < 1.0 \log_{10} \text{APC on carcass post chilling} \]
Example of Harvest Monitoring Data and bacterial activity of carcasses relative to incoming loads on hides.
Hypothesis: A Micro-organism Count of greater than 2 logs is Associated with an Increased Risk of E. coli O157:H7; May Differ by Production Stage

- Protocol
  - Modeled the incidence of O157:H7 positives on microbial counts at Hide Off, putting the log counts into two categories: less than or equal to 2, or greater than 2. We tested whether the effect was different for the Greeley and Cactus plants.

- Results
  - The microbial count level at Hide Off is a significant (p = .003) predictor of O157:H7 positives, in both the Greeley and Cactus plants. The likelihood of a positive is higher (106%) when the log APC count is greater than 2. The effect is the same in Greeley and Cactus.
The microbial count level at Hide Off is a significant (p = .003) predictor of O157:H7 positives. The **likelihood of a positive is higher (106%) when the log APC count is greater than 2.**
When the System Gets Overwhelmed

Event Day “THREATCON Levels”

- **Normal**
  - All clear, all negative results

- **ALPHA**
  - Single presumptive events
    - Glitch in the system
    - Typically isolate the presumptive product and release the negative tested product

- **BRAVO**
  - Multiple sporadic presumptive events
    - May have “associated” negative tested products sent to lethality
Event Day THREATCON Levels

- CHARLIE
  - Multiple presumptives at levels where sub-primals may need to be addressed

  **DELTA**

  Systemic contamination affecting majority of days production
Example of THREATCON BRAVO

- 4 positives out of 156 lots

Time Analysis
Example of THREATCON CHARLIE

Sub-primal Time and Space

1. When was the contamination?
2. Where was the affected product produced?

- 36 of 38 presumptives occurred between 7:00 am and 10:30 am
- Product Mix:
  - 50’s – 18
  - 65’s – 6
  - 85’s – 9
  - Sirloin xf – 5
- Presumptive Trim Came From:
  - Arm line
  - Rough Meat line
  - Round line
  - Strip line
  - Loin Line
Timeframe of presumptives and affected sub-primals

Sub-primal timeframe

Sub-primals not affected

Single isolated positives

Shift change - 1 positive out of a total of 7 combos produced
Example THREATCON DELTA

Trim – 114 presumptives of 429 test = 26.6%
THREATCON DELTA

- 114 presumptives
- High incidence of presumptives throughout entire days production

Entire Days Production is Affected
Take Away Messages

• **Never lose sight of the basics**
  - Good Manufacturing Practices – GMP
  - Strict, daily attention to sanitation – SSOP’s
  - Prevention of food safety hazards – HACCP Reassessment

• **Plants must have a strong intervention system**

• **When pressure is put on the system it very important to identify affected product and control the movement of that product.**

• **Never be complacent; always search for improvements**
Thank you for your time! Questions?