2013 National Institute for Animal Agriculture

Getting to a Comprehensive Food Safety System

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VP Technical Services
# JBS S.A.

## AT A GLANCE

- Founded in the 1950s in Midwest Brazil
- Leading protein producer in the world
- **Net Revenue** of $26.9 billion accumulated in nine months of 2012
- **EBITDA** of $1.6 billion accumulated in nine months of 2012
- 140,000 employees worldwide
- 307 production units on 5 continents
Where We Are

A GLOBAL REACH

JBS S.A.

- Brazil
- United States
- Australia
- Mexico
- Puerto Rico
- Argentina
- Paraguay
- Uruguay
- Chile
- England
- Italy
- Egypt
- China
- South Korea
- Japan
- Canada
- United Kingdom
- Belgium
- Hong Kong
- United Arab Emirates
- New Zealand
- Russia
- Taiwan
- Mercosul
JBS USA

- Started in US market in 2007
- is a leading processor of beef, pork and lamb and poultry
- is the largest cattle feeder in the world
- provides products to customers in more than 60 countries on five continents
- employs more than 73,000 people at 95 facilities in 48 states, Australia, Canada, Puerto Rico and Mexico
Beef

**WORLD LEADER**

**U.S. Processing Plants:** 9

**Australian Processing Plants:** 10
(beef & smalls)

**Canadian Processing Plants:** 1

**Number of Employees:** 16,000+

**Daily Processing Capacity:**
35,500 head

**Domestic Market Share:**
22 percent

**U.S. Procurement:**
Cattle procured from Canada, Mexico and the U.S.
Pork

QUALITY BEGINS AT THE FARM

Facilities: 3 Plants, 2 Case Ready Facilities, 1 Lamb Plant

Plant Locations:
- Worthington, MN
- Marshalltown, IA
- Louisville, KY
- Greeley, CO

Case Ready Locations:
- Muskegon, MI
- Santa Fe Springs, CA

Capacity: 50,000 Head/Day

3rd Largest Fresh Pork Producer in the U.S.
2nd Largest Lamb Producer in U.S.

12 Percent Share U.S. Pork Industry
Pilgrim’s

HIGH QUALITY | GREAT VALUE

**Facilities:** 29 Fresh Processing Plants; 8 Prepared Foods Cook Plants

**Employees:** 38,000

**Growers:** 3,900 Contract Growers

**Bird Capacity:** 36 Million Birds Per Week or

9.5 Billion Pounds of Live Chicken Per Year

United States

Puerto Rico
Presentation Overview

• Why is a Comprehensive Food Safety System Important

• USDA Perspective on:
  - Live side
  - Further processing

• What are the Packers doing?

• Additional Food Safety Efforts:
  - Packer Side
  - Live side

• Concluding Points
It’s hard to believe...but not everyone Loves the Meat Industry!

Animal Agriculture has its fair share of external challenges
But for the ~300 million Americans that do buy our products...we own them the reassurance they are feeding their families with safest products possible.
We all agree Food Safety Must happen From Farm to Fork
Although we all agree there is a need for Food Safety, each segment of the industry is a slightly different “shade” when it comes to responsibility.
Am I Responsible for Food Safety?

YES!

If you make money in the meat protein industry, you have responsibility in the area of food safety.
In reality, many of us “can’t handle the truth” that we are not doing enough to control pathogens through the meat protein system.
Packer, You are the funnel and should have systems in place to control pathogens...

...Packers need to play their part, but pathogens are still getting through the system.
## Foodborne Illness Acquired in the United States—Major Pathogens

Elaine Scallan,¹ Robert M. Hoekstra, Frederick J. Angulo, Robert V. Tauxe, Marc-Alain Widdowson, Sharon L. Roy, Jeffery L. Jones, and Patricia M. Griffin

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Hospitalization rate, % †</th>
<th>Hospitalizations, mean (90% credible interval)</th>
<th>Death rate, % †</th>
<th>Deaths, mean (90% credible interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacteria</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Bacillus cereus</em>, foodborne ‡</td>
<td>0.4</td>
<td>20 (0–85)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Brucella</em> spp.</td>
<td>55.0</td>
<td>55 (33–84)</td>
<td>0.9</td>
<td>1 (0–2)</td>
</tr>
<tr>
<td><em>Campylobacter</em> spp.</td>
<td>17.1</td>
<td>8,463 (4,300–15,227)</td>
<td>0.1</td>
<td>76 (0–332)</td>
</tr>
<tr>
<td><em>Clostridium botulinum</em>, foodborne ‡</td>
<td>82.6</td>
<td>42 (19–77)</td>
<td>17.3</td>
<td>9 (0–51)</td>
</tr>
<tr>
<td><em>Clostridium perfringens</em>, foodborne ‡</td>
<td>0.6</td>
<td>438 (44–2,008)</td>
<td>&lt;0.1</td>
<td>26 (0–163)</td>
</tr>
<tr>
<td><strong>STEC O157</strong></td>
<td>46.2</td>
<td>2,138 (549–4,614)</td>
<td>0.5</td>
<td>20 (0–113)</td>
</tr>
<tr>
<td><strong>STEC non-O157</strong></td>
<td>12.8</td>
<td>271 (0–971)</td>
<td>0.3</td>
<td>20 (0–113)</td>
</tr>
<tr>
<td><strong>ETEC, foodborne</strong></td>
<td>0.8</td>
<td>12 (0–53)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Diarrheagenic <em>E. coli</em> other than STEC and ETEC</strong></td>
<td>0.8</td>
<td>8 (0–36)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Listeria monocytogenes</strong></td>
<td>94.0</td>
<td>1,455 (521–3,018)</td>
<td>15.9</td>
<td>255 (0–733)</td>
</tr>
<tr>
<td><strong>Mycobacterium bovis</strong></td>
<td>55.0</td>
<td>31 (21–42)</td>
<td>4.7</td>
<td>3 (2–3)</td>
</tr>
<tr>
<td><strong>Salmonella</strong> spp., nontyphoidal**</td>
<td>27.2</td>
<td>19,336 (8,545–37,490)</td>
<td>0.5</td>
<td>378 (0–1,011)</td>
</tr>
<tr>
<td><em>S. enterica</em> serotype Typhi</td>
<td>75.7</td>
<td>197 (0–583)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Shigella</em> spp.</td>
<td>20.2</td>
<td>1,456 (287–3,695)</td>
<td>0.1</td>
<td>10 (0–67)</td>
</tr>
<tr>
<td><em>Staphylococcus aureus</em>, foodborne ‡</td>
<td>6.4</td>
<td>1,064 (173–2,997)</td>
<td>&lt;0.1</td>
<td>6 (0–48)</td>
</tr>
<tr>
<td><em>Streptococcus</em> spp. group A, foodborne ‡</td>
<td>0.2</td>
<td>1 (0–6)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><em>Vibrio cholerae</em>, toxigenic</td>
<td>43.1</td>
<td>2 (0–5)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>V. vulnificus</strong></td>
<td>91.3</td>
<td>93 (53–145)</td>
<td>34.8</td>
<td>36 (19–57)</td>
</tr>
<tr>
<td><strong>V. parahaemolyticus</strong></td>
<td>22.5</td>
<td>100 (50–169)</td>
<td>0.9</td>
<td>4 (0–17)</td>
</tr>
<tr>
<td><strong>Vibrio</strong> spp., other</td>
<td>37.1</td>
<td>83 (51–124)</td>
<td>3.7</td>
<td>8 (3–19)</td>
</tr>
<tr>
<td><strong>Yersinia enterocolitica</strong></td>
<td>34.4</td>
<td>533 (0–1,173)</td>
<td>2.0</td>
<td>29 (0–173)</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td></td>
<td>35,796 (21,519–53,414)</td>
<td>861 (260–1,761)</td>
<td></td>
</tr>
</tbody>
</table>
What is the potential for systems that are overwhelmed?

- Retailers
- Distributors
- Further Processors
- QSR
- Food Service
Can It Happen?

Closure of giant XL Foods meat plant triggers economic crisis for Alberta city

At a conference with Alberta Livestock and Meat Agency and the question was asked: “What keeps you up at night?”

“The fear of having another plant closure like XL Foods!”
The good news is when all play our part...we can get our desired results and control the organisms that affect our business!
**Producer**
- 1) Feed Additives
- 2) Vaccines

**Packer**
- 1) Sub-primal Spray
- 2) Trim Treatment
- 3) Cold chain
- 4) Age specs

**Further Processor**
- 1) Sub-primal Spray
- 2) Trim Treatment
- 3) Cold chain
- 4) Age specs

**Grinder**
- 1) Trim Treatment
- 2) Cold chain
- 3) Age Specs

**Retailer**
- 1) Sub-primal Spray
- 2) Trim Treatment
- 3) Cold chain
- 4) Age specs

**Transporter**
- 1) Cold chain
The Food Safety and Inspection Service (FSIS) recommends that slaughter establishments receive their cattle from beef producers that implement one or more documented pre-harvest management practices to reduce fecal shedding. FSIS encourages pre-harvest interventions as the first control steps in an integrated beef products safety system. Pre-harvest interventions, adequate sanitary dressing procedures at slaughter, and adequate sanitary conditions during further processing are a part of an integrated approach to reduce the public health impact of *E. coli* O157:H7. Thus, beef producers, slaughterers, and processors should work together to control *E. coli* O157:H7 to reduce its presence in beef products.
II. Purpose

This compliance guideline describes concerns and validated controls for each step in the poultry slaughter process. It targets small and very small poultry plants to help them better comply with regulatory requirements (9 CFR 381.65, 381.76, 381.92, 381.93, and 381.94, 416, and 417).

FSIS encourages plants to reduce levels of *Salmonella* and *Campylobacter* on carcasses during poultry slaughter operations using best management practices outlined in this guideline. The interventions suggested cannot overcome poor pre-harvest production practices, poor sanitary practices in slaughter and dressing, or poor slaughter facility sanitation. Plants should use this guideline to improve management practices. When a plant makes changes at the appropriate locations, process control should improve. As a result, plants should produce raw poultry products that have less contamination with pathogens, including *Salmonella* and *Campylobacter*. Generally, those interventions to reduce or prevent *Salmonella* will likewise reduce or prevent *Campylobacter*. The Agency strongly recommends that plants consider both pathogens when designing food safety systems.
CHAPTER VI – MEASURES TO ADDRESS *E. coli* O157:H7 AT ESTABLISHMENTS THAT RECEIVE, GRIND, OR OTHERWISE PROCESS RAW BEEF PRODUCTS

This chapter provides instructions for EIAOs and Consumer Safety Inspectors (CSIs) to verify the measures (e.g., prerequisite programs or CCPs) an establishment has in place to address *E. coli* O157:H7.

I. INADEQUATE MEASURES TO ADDRESS *E. coli* O157:H7

A. An establishment that receives, grinds, or otherwise processes raw beef products cannot conclude that *E. coli* O157:H7 is not reasonably likely to occur in its production process because the product it receives bears the mark of inspection. The mark of inspection is a reflection of a finding made by FSIS personnel that the establishment has followed the validated procedures in its HACCP plan, not that the pathogen has been eliminated or reduced to undetectable levels.

B. If IPP find that an establishment’s only conclusion regarding control of the pathogen is a determination that *E. coli* is not reasonably likely to occur in its operation because the product that it receives bears the mark of inspection, they are to correlate with the DO through the FLS to determine whether it is necessary for an EIAO to conduct a FSA, or whether an enforcement action, such as a Notice of Intended Enforcement (NOIE), is warranted because the HACCP plan is inadequate (9 CFR 417.6(a)).
Multiple Interventions System Anti-microbial Applications

Live receiving

Stunning

Stick and Bleed

Scalding/de-hair

Dressing Procedures

Evisceration

Splitting

Fat-O-Meter

Final Carcass Wash

Chilling

Cut Floor

USDA Generic E. coli Sampling

Live Receiving: Pen Cleaning

Singeing Process

Final Wash: Acetic acid 2.5%
Lactic Acid 2.0%

Spray chill: chlorinated water

Sub-primal: PPA application
Multiple Interventions System Anti-microbial Applications

**Live Receiving:**
- Focusing on preventing cross contamination
- Transport cage washing
- Cage sanitation

**Stunning:**
- Provides fecal release prior to scalding

**Scalding:**
- Pre-scald brushes
- Multi-stage scalding tanks
- Counter-flow water movement

**De feathering:**
- Hot water and/or chlorination

**Washing:**
- Chlorine solution, acidification, PAA

**Inside Washing:**
- High pressure high volume wash
- Washing with chlorinated water
- Application of processing aid chemical

**Brush Scrubber:**
- High volume low pressure wash
- Antimicrobial application
- Brush scrubbing

**Final Wash:**
- Upto 50 ppm free chlorine
- 5% sodium bisulfate

**Finishing Chiller:**
- High acid PPA

**Post Chill Spray:**
- Up to 0.8% cetylpyridinium chloride

**Chiller:**
- Multi-stage chilling system
  - High water flow rate
  - Chlorination
  - pH adjustment

**Refrigeration:**
- Cold chain management
  - <40 degrees F
Cattle Receiving / Holding
- Stunning
- Sticking / Bleeding
- Skinning
- Head Removal
- Evisceration
- Final Rail Trimming
- USDA Final Inspection
- Final Hot Water Carcass Wash Cabinets
- Final Organic Acid Spray Cabinet
- Carcass Chill

SAFE Program
- Slaughter Actions For Excellence
  - Major Impact Areas
    - Carcass Dressing
    - Mechanical Interventions
    - Microbial Monitoring

Remote Video Auditing, RVA
- Camera technology for critical slaughter jobs
- Double Check System
  - Continuous QA re-plant auditing during production
  - Arrowvision 3rd party auditing during production
- Immediate feedback into the system for improvements

SAFE Program
- Slaughter Actions For Excellence
  - RVA
    - Critical Jobs Monitoring
    - Microbial Monitoring
    - Organism Testing
    - Field and Lab Audit

Multiple Hurdle Intervention System
- Hide Wash
- 180 degree Hot Water Pre-eva Wash
- Final Wash
- Chill

Harvest Monitoring Program
- Microbiological Sample Location Steps for Process Control
  - Step 1: Hide on
  - Step 2: Side off
  - Step 3: Post evisceration
  - Step 4: Pre-pasteurization lactic acid spary
  - Step 5: Post-pasteurization lactic acid
  - Step 6: Post-wash
  - Post-chilled
  - Curing process
  - Post-chilled
Carcass Transfer / Grading / Sortation

Fabrication Carcass Spray Cabinet

Carcass Breakdown – deboning / trimming

Subprimal / Trim Spray Cabinets

Packaging / Boxing

Refrigerated Storage / Shipment

Multiple Hurdle Intervention System

Cold Carcass Spray Sub-primal Spray

Harvest Monitoring Program
Microbiological Sample Location Steps for Process Control

Step 1 = Hinge on
Step 2 = Hinge off pre-intervention
   Intervention: Thermo-panzerization 5% lactic acid spray
Step 3 = Post evisceration
Step 4 = Pre-panzerization/lactic acid spray
   Intervention: Thermo-panzerization 5% lactic acid spray
Step 5 = Post-panzerization/lactic acid
Step 6 = Pre-heat box
Chilling process
Step 7 = Post-chilled

Quality Assurance
Our Approach to Quality Assurance – “Multiple Hurdles”

On-line inspection
- Products audited on an established frequency basis with levels for accept, resample or retain
- Randomly timed box audits
- Weekly conference call
- Trend line analysis to strive for continuous improvement
- Feedback from customers / field reps, competitive product reviews
Bromine Technology
• Generates hypobromus acid as an antimicrobial
• Use in carcass washes, hide washes and spray chill application

### Inoculated Carcasses

<table>
<thead>
<tr>
<th>Chemical</th>
<th>n</th>
<th>Before Treatment</th>
<th>After Treatment</th>
<th>Log₁₀ Diff</th>
</tr>
</thead>
<tbody>
<tr>
<td>BoviBrom (inoculated)</td>
<td>48</td>
<td>6.2 ±0.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.48 ±0.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1.72</td>
</tr>
</tbody>
</table>

<sup>a,b</sup> Means with different superscripts within row are different (<i>P < 0.05</i>)

### Uninoculated Carcasses

<table>
<thead>
<tr>
<th>Chemical</th>
<th>n</th>
<th>Before Treatment</th>
<th>After Treatment</th>
<th>Log₁₀ Diff</th>
<th>% undetected AT</th>
</tr>
</thead>
<tbody>
<tr>
<td>BoviBrom(uninoculated)</td>
<td>48</td>
<td>3.82 ±0.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.65 ±0.2&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.17</td>
<td>38</td>
</tr>
</tbody>
</table>

<sup>a,b</sup> Means with different superscripts within row are different (<i>P < 0.05</i>)
Bacteriophage

- Viruses that target specific bacteria
- Invade targeted bacteria, replicate, kill the bacterium, but not other bacteria
- Organism specific
  - *E. coli* O157:H7
  - Salmonella
Additional Packer Intervention Investigation

Water Management Resources
Hide-on Washes

• Very Expensive

• Do require “prep work” on really muddy cattle

• Requires a large footprint
Live Side Efforts

Vaccine

- At Pilgrams Pride, used in about 50% of flocks for Salmonella
- Testing was performed at JBS Five Rivers feedyards and Greeley plant
- SRP (Siderophore Receptor Protein); iron sequestered from bacteria
- Systemic model: Cattle/Fecal ➔ Hide ➔ Trim
  - 1 dose was operationally feasible
- Averaged across time, hide results
  - Controls: 23.5 (95% CL; 11.9, 41.2)
  - Vaccinated: 10.2% (95% CL; 4.7, 20.9)
  - This provides a 56% reduction in prevalence.
Live Side Efforts

Direct-fed Microbials

- Bovamine Defend (Feedlot):
  - *E. coli* response at $10^9$:
    - around 50% reduction in prevalence in feces
  - Performance response at $10^6$
  - Product is not heat-stable; issue in many feedyard mills
    - Working with NPC to find solutions

![Graph showing effect of Bovamine Defend on microbial analysis](image)

*Source: 2013 NCBA Beef Industry Food Safety summit (BIFSCo)*
Sodium chlorate

- Chlorate kills bacteria that have the enzyme nitrate reductase only
- Kills *E. coli* O157:H7 and *Salmonella* but not other bacteria

- Cannot evaluate is currently in review – FDA
A comprehensive food safety system is not going to be free...

...but we collectively need to start having the conversation around how to move forward.
If you make money in the meat protein industry, you have responsibility in the area of food safety.
We are all in this together!
Thank you all for your time!

Have Safe Travels...

For he will command his angels concerning you to guard you in all your ways

Psalm 91:11