Role of Economics in Pathogen Control Regulations

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FSIS Activity

In FY06
- ~ 7,600 full-time inspectors
- ~ 5,921 processing establishments inspected daily
- ~ 1,100 slaughter establishments in which every animal inspected
- ~ 140 million head of livestock; 9.3 billion poultry carcasses; 4.4 billion pounds of liquid egg product
- ~ 8 million inspection procedures annually
- ~ 3.9 billion pounds of meat and poultry and ~ 5.9 million pounds of liquid egg products presented for import inspection

FSIS Inspection Systems

Traditional system (beginning - 1906)
- Regulatory enforcement
- Animal disease
- In-plant focus of sanitary operations
HACCP system (beginning - 1996)
- Food safety hazard control
- Prevent, eliminate, reduce biological, chemical, and physical hazards reasonably likely to occur
Risk-based system (evolving beyond HACCP - 2006)
- Focus on risk of product and the degree of control of risk
- Conducting inspection in a manner designed to measurably impact public health and effectively use inspection resources
**Inspection System Design**

- Microbiological data, in the form of verification testing results for each establishment, supplement on-site observations and give a perspective on compliance with regulatory requirements over time.

- Changes in the % positive rate serve as an early warning of systemic problems arising, tracked quarterly and annually.

- Public health assumption is that a reduction in the % positive rate of product containing pathogens of public health concern should result in a reduction on disease incidence in humans.

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**Healthy People 2010 Objectives**

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>1997 Baseline</th>
<th>2010 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campylobacter infections*</td>
<td>24.6</td>
<td>12.3</td>
</tr>
<tr>
<td>*Laboratory confirmed cases/100,000 humans (FoodNet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Escherichia coli O157:H7 infections*</td>
<td>2.1</td>
<td>1.0</td>
</tr>
<tr>
<td>*Laboratory confirmed cases/100,000 humans (FoodNet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Listeria monocytogenes infections*</td>
<td>0.5</td>
<td>0.25</td>
</tr>
<tr>
<td>*Laboratory confirmed cases/100,000 humans (FoodNet)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella infections*</td>
<td>13.7</td>
<td>6.8</td>
</tr>
<tr>
<td>*Laboratory confirmed cases/100,000 humans (FoodNet)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Food Safety concerns – Salmonella**

- CDC estimates 1.4 million cases of foodborne illness annually.

- For 2006, CDC estimated the Salmonella incidence at 14.81 cases per 100,000 population (2010 goal of 6.8 cases per 100,000)
  - S. Typhimurium decreased significantly from baseline (MMWR 56(14): 337)
FSIS Public Health Driven Program

- Salmonella verification sampling program for raw product (>\= 90% Category 1 target by 2010 – i.e., at half the current standard

Salmonella Categories

<table>
<thead>
<tr>
<th>Previous</th>
<th>Current</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 50% of standard</td>
<td>≤ 50% of standard</td>
<td>1</td>
</tr>
<tr>
<td>- No prior set</td>
<td>- &gt;50%</td>
<td></td>
</tr>
<tr>
<td>- Above standard</td>
<td>&lt; 50% of standard</td>
<td>2</td>
</tr>
<tr>
<td>Any result</td>
<td>&gt; 50% of standard without failing</td>
<td></td>
</tr>
<tr>
<td>Any result</td>
<td>Exceeded standard</td>
<td>3</td>
</tr>
</tbody>
</table>

71 FR 9772: February 27, 2006

Predicted Public Health Benefits – Salmonella on Broiler Carcasses

As the proportion of establishments in Category 1 increases (blue line), the relative risk of illness from Salmonella on broiler carcasses decreases (pink line)
• Broilers
  • 73.5% (up from ~35% in 1st Qtr CY2006 when first tracked)

<table>
<thead>
<tr>
<th>Source</th>
<th>Raw Product Salmonella Baseline</th>
<th>Raw Product Salmonella 3rd Quarter CY2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broilers</td>
<td>20.0%</td>
<td>10.6%</td>
</tr>
<tr>
<td>Cow/Bulls</td>
<td>2.7%</td>
<td>1.3%</td>
</tr>
<tr>
<td>Ground Beef</td>
<td>7.5%</td>
<td>4.1%</td>
</tr>
<tr>
<td>Ground Chicken</td>
<td>44.6%</td>
<td>28.3%</td>
</tr>
<tr>
<td>Ground Turkey</td>
<td>49.9%</td>
<td>16.3%</td>
</tr>
<tr>
<td>Market Hogs</td>
<td>8.7%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Steers/Heifers</td>
<td>1.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Turkeys</td>
<td>19.6%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>
Long Term Focus on *Salmonella* and *Campylobacter*

1. Looking at primal/sub-primal and other parts of raw products in Federal establishments regarding new performance standards based on current baseline studies

2. Looking at carcasses and parts at retail, particularly poultry, and association between the type and enumerative level of these pathogens at slaughter, further processing, and retail

How Economics Impact Risk Management

- Risk assessment for *Salmonella* and *Campylobacter* bacteria
  - Prevalence and serotype informs FSIS' selection of alternative risk management actions listed in an index for successive analysis of each alternative action
  - Establishments select interventions, based on a risk assessment
  - Interventions would effect supply chain; shift the supply curves of affected establishments because of net changes in costs and quantities of young chickens produced
  - Public health benefits of the reduction of the targeted microbes and the net dollar cost of the interventions for the targeted reduction of bacteria would be used for the computation of the benefit-cost and cost effectiveness analysis of each of the proposed risk management actions
  - The results would be a ranking of the cost-effectiveness ratios and the benefit-cost ratios of the risk management actions

Impact Considerations

- **Producer**
  - Large, small, very small establishments
  - Establishments that also slaughter other poultry
  - Effect on new hires and training
  - Facility and equipment modifications/purchase
  - Adding inspection stations
  - Evisceration linespeed
  - Dressing performance standards
  - HACCP plan/Sanitation SOP modifications
- **Consumer** – food safety vs other (e.g., bruises)
- **FSIS inspection** – training
United States Department of Agriculture
Food Safety and Inspection Service

Risk Mgmt Alternative
(A)

Economic Impact Report

Cost-Benefit Analysis
Against Baseline as the absence of the alternative

Decreased Public Health

Increased Costs

Increased Benefit

Risk Mgmt Alternative
(B)

Benefit-Risk Analysis (Identify a suitable risk level vs expected benefits)

Cost-Benefit Analysis (to produce the same baseline data)

The comparison of benefits among other alternatives

Making Decision to maximize benefit or minimize the cost

Repeat the process as Risk Mgmt Alternative (A)

United States Department of Agriculture
Food Safety and Inspection Service

Cost-Benefit Analysis

Cost-Benefit Analysis

Net Benefit

Against Baseline as the absence of the alternative

Cost:
Government, Industry and Indirect Cost

Benefit:
Lower Incidences of foodborne illness and all associated costs

Net Benefit = Benefit - Cost

Cost-Benefit Analysis

Benefit-Risk Analysis
(Select a suitable risk level vs expected benefits)

Making Decision to maximize benefit or minimize the cost

No

Yes

Repeat the process as Risk Mgmt Alternative (A)
Economic Analysis for RTE Listeria monocytogenes

- Benefit-cost Analysis compares:
  - cost of the rule to industry, and
  - Monetized health benefit
- Cost-effectiveness estimates:
  - Cost per QALY saved
  - Cost per death averted
  - Cost per life-year saved
  - Net cost per QALY
- Risk assessment model estimates averted death and illnesses
- FSIS analyses policy alternatives by changing parameters in the risk assessment model and the cost items

Dynamic Simulation Model

In plant component
  - Risk of illness component
    - Contamination event
    - Intervention
    - Contamination at retail
  - Retail to table exposure assessment (Contamination at retail + Lm growth)
  - Dose-response relationship
  - # of illnesses and death

Thank you