A Multi-Step Evaluation of the Economic Effects of USDA’s 1996 HACCP Regulation on Meat and Poultry Plants

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Presented by
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RTI International is a trade name of Research Triangle Institute.
Overall Study Background

- FSIS was required to conduct an ex-post evaluation of the PR/HACCP regulation as stated in the final rule.

- Areas covered in the broader study:
  - Foodborne illness reduction due to PR/HACCP
  - Inspection effectiveness and efficiency
  - Domestic and international economic effects
  - Consumer confidence in food safety
  - Animal and egg food safety production practices

- Studies were completed in October 2002 and RTI and FSIS staff briefed Garry McKee, Administrator of FSIS, on the study findings.
Domestic & International Economic Effects: Study Questions

Effects of PR/HACCP on:

- **Productivity** in U.S. meat and poultry plants
- **Rates of entry & exit** of meat and poultry plants
- **Factors affecting exit** of meat and poultry plants
- U.S. **exports** of meat and poultry
- U.S. **imports** of meat and poultry
- **Worldwide adoption** of PR and HACCP systems
<table>
<thead>
<tr>
<th>Date</th>
<th>Affected Plants</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1997</td>
<td>All plants</td>
<td>- Sanitation standard operating procedures (SSOPs)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Generic <em>E. coli</em> carcass testing</td>
</tr>
<tr>
<td>January 1998</td>
<td>Large Plants (&gt;500 employees)</td>
<td>- HACCP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <em>Salmonella</em> testing on some raw products</td>
</tr>
<tr>
<td>January 1999</td>
<td>Small plants (10-500 employees)</td>
<td>- HACCP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <em>Salmonella</em> testing on some raw products</td>
</tr>
<tr>
<td>January 2000</td>
<td>Very small plants (&lt;10 employees &amp; $2.5 million in annual sales)</td>
<td>- HACCP</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- <em>Salmonella</em> testing on some raw products</td>
</tr>
</tbody>
</table>
Effect of PR/HACCP on Plant Productivity

- **Purpose:** Describe the effects of PR/HACCP on costs, revenues, and other productivity-related changes

- **Methodology:** 27 structured interviews with plant managers (9), FSIS district managers (5), university extension (6), trade associations (4), FSIS Technical Service Center staff (3)

- **Key findings published in Choices, Summer 2002**
Key Findings: Productivity Effects

- Larger plants have made more changes in response to PR/HACCP than smaller plants.
- Most changes made to address microbial (rather than physical or chemical) hazards.
- Plants have many changes increasing costs of production to improve food safety:
  - Installed new capital equipment
  - Increased staff for food safety activities
  - Increased training for employees
  - Increased voluntary pathogen testing
- Many plants perceive PR/HACCP to have had positive effects on their operations.
Effect of PR/HACCP on Plant Entry and Exit Rates

■ Purpose: Examine changes in rates of plant entry and exit before, during, and after implementation of PR/HACCP

■ Methodology: Calculation and statistical testing of changes in rates using data from the Enhanced Facilities Database (EFD)

■ Findings for the implementation period published in *Journal of Agricultural & Food Industrial Organization*, 2003
Key Findings: Rates of Entry

Annual Entry Rates

Meat Slaughter | Poultry Slaughter | Processing Only

VS = Very Small, S = Small, L = Large.

Pre-PR/HACCP
Implementation
Post-Imp.
Key Findings: Rates of Exit

VS = Very Small, S = Small, L = Large.
Effect of PR/HACCP on Plant Exit Factors

■ Purpose: Determine which factors explain the probability of exit over time and whether the probability of exit changed because of PR/HACCP


■ Results for implementation period published in *JARE*, 2002, and *JAFIO*, 2003

■ New results using panel data set not yet published
**Key Results: Probit Models of Plant Exit (I)**

<table>
<thead>
<tr>
<th>Plant Size and Type</th>
<th>Implementation vs. Pre-PR/HACCP</th>
<th>Post-implementation vs. Pre-PR/HACCP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meat Slaughter Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Small</td>
<td>Increased 8.9% (p=0.03)</td>
<td>NS</td>
</tr>
<tr>
<td>Small</td>
<td>Increased 7.2% (p=0.04)</td>
<td>NS</td>
</tr>
<tr>
<td>Large</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Poultry Slaughter Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Small</td>
<td>NS</td>
<td>Increased 9.4% (p=0.06)</td>
</tr>
<tr>
<td>Small</td>
<td>Increased 5.8% (p=0.06)</td>
<td>Increased 5.6% (p=0.04)</td>
</tr>
<tr>
<td>Large</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

NS = not statistically significant at the 10 percent level.
Key Results: Probit Models of Plant Exit (II)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Effect on Exit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Meat Slaughter Plants</strong></td>
<td></td>
</tr>
<tr>
<td>Plant age</td>
<td>Each additional year of age decreases the probability of exit until 32 years of age</td>
</tr>
<tr>
<td>Slaughter volume</td>
<td>Each additional million head slaughtered decreases the probability of exit up to 5.4 million head</td>
</tr>
<tr>
<td>Cattle species</td>
<td>Plants that slaughter cattle have a lower probability of exit</td>
</tr>
<tr>
<td>Regional competitiveness</td>
<td>Smaller plants in regions with higher market concentration have a higher probability of exit</td>
</tr>
<tr>
<td>Cattle prices</td>
<td>Plants in states with higher live cattle prices have a higher probability of exit</td>
</tr>
<tr>
<td><strong>Poultry Slaughter Plants</strong></td>
<td></td>
</tr>
<tr>
<td>Slaughter volume</td>
<td>Each additional million birds slaughtered decreases the probability of exit up to 72 million birds</td>
</tr>
<tr>
<td>Turkey species</td>
<td>Plants that slaughter turkeys have a lower probability of exit</td>
</tr>
<tr>
<td>Wage rates</td>
<td>Plants in states with higher wage rates have a lower probability of exit</td>
</tr>
</tbody>
</table>

Note: Only statistically significant variables are listed.
Effects of PR/HACCP on International Trade

- **Purpose:** Examine whether PR/HACCP affected meat and poultry imports and exports and adoption of PR and/or HACCP worldwide

- **Methodologies:**
  - Analysis of meat and poultry trade data from the International Trade Commission
  - Interviews with trade associations, importers, and International Policy and Technical Service Center staff
  - Review of equivalency documents
  - Analysis of results from survey of international trade authorities
Key Findings: International Trade

- International trade in meat and poultry is volatile thus difficult to identify clear effect of PR/HACCP

- Because of PR/HACCP, fewer countries are authorized to export meat and poultry to the U.S., but negligible effect on import volumes
  - Note: Countries must have equivalent PR and HACCP systems in place to export to the U.S.

- PR/HACCP has not really affected exports—U.S. products were already considered to be high quality.

- Many other countries are adopting PR and/or HACCP requirements even if they are not exporting to the U.S.
Final evaluation briefing papers to be posted at:

http://www.fsis.usda.gov/OPPDE/peis/FinReps.htm