Value of Animal Traceability Systems in Managing a FMD Outbreak

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Objective

- Evaluate impacts of different depths of animal id in the event of a FMD outbreak

- Use epidemiological disease spread model to evaluate the impact of a FMD outbreak in SW KS

- Integrate epidemiological disease spread model with economic model to capture welfare outcomes
Input = f(Disease, Contact, Detection, Destruction, Vaccination, & Cost Accounting)
Epidemiological Model

- North American Animal Disease Spread Model
- Stochastic temporal and spatial spread model that simulates FMD outbreak
Identification Levels

- **Low**
  - 30% successful trace within 24 hours
  - Current U.S. animal ID system

- **Medium**
  - 60% successful trace within 24 hours
  - Potential voluntary U.S. animal ID system

- **High**
  - 90% successful trace within 24 hours
  - Potential mandatory U.S. animal ID system
Economic Model

- Equilibrium displacement model
  - Estimate welfare changes due to exogenous shock
  - Exogenous shift
    - Epidemiological model
- Market parameters
  - Previous literature & estimation
  - Monte Carlo simulations

- System contains 44 equations
  - Consumer substitutability
  - Farm-Retail marketing chain
  - Kansas and Other States
Number of Animals Stamped-Out

- Low: 800,000
- Medium: 600,000
- High: 400,000
## Short-Run Welfare Changes with Change in Demand ($ million)

<table>
<thead>
<tr>
<th>Beef Producer Surplus</th>
<th>Animal Identification Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
</tr>
<tr>
<td><strong>Retail Level</strong></td>
<td>-238.72</td>
</tr>
<tr>
<td><strong>Wholesale Level</strong></td>
<td>-144.76</td>
</tr>
<tr>
<td><strong>OS Slaughter Level</strong></td>
<td>-65.46</td>
</tr>
<tr>
<td><strong>KS Slaughter Level</strong></td>
<td>-69.27</td>
</tr>
<tr>
<td><strong>OS Farm Level</strong></td>
<td>-64.51</td>
</tr>
<tr>
<td><strong>KS Farm Level</strong></td>
<td>-1.18</td>
</tr>
<tr>
<td><strong>Total Beef</strong></td>
<td>-583.91</td>
</tr>
<tr>
<td><strong>Total Meat Industry</strong></td>
<td>-534.95</td>
</tr>
<tr>
<td><strong>Total Consumer Surplus</strong></td>
<td>-270.98</td>
</tr>
</tbody>
</table>
Summary of Findings

- **FMD outbreak**
  - Reduced quantity and increased costs leads to reduction in consumer and producer surplus
    - *Consumer* – $410.04 million
    - *Producer* – $626.70 million

- **Increased animal ID levels**
  - Difference between low and high ID levels
    - *Consumer* – $220 million
    - *Producer* – $205 million
Future Extensions

- Economic
  - Traceability impact
- Regional impact
Thank You
Market Shares of World Beef Exports by Country, 2000-2006 ('06 forecasted)

Source: Foreign Ag Service, USDA