The Government’s Role in Stabilizing Beef Supply when BSE Strikes

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Introduction

• Bovine Spongiform Encephalopathy (BSE)
  ▪ Affecting the central nervous system of adult cattle
  ▪ Causing a variant of Creutzfeldt-Jakob (vCJD) disease in human
  ▪ No known cure for vCJD
History of BSE

• First identified in UK in 1986

• Consumption of meat and bone meal was identified as the cause of BSE epidemic in 1987

• In 1989, an official investigation concluded that BSE pose no threat to human

• In 1996, the relationship between BSE and vCJD was recognized
BSE Crises and Intervention

• In 1996, UK ordered the destruction of all cattle older than 30 months
• EU banned the use of MBM in 1997 and all cattle over 30 months old are tested
• Canada U.S. banned the use of MBM in 1997
• From 1996 to 2001, UK spent more than £2 billion on OTM
Current Situation

• Large scale outbreak is no longer likely
• Sporadic occurrences
• Dramatic economic consequences
  ▪ 2003 Canadian BSE crisis was costing $25 million per day
  ▪ Recent discovery of one BSE case caused the major beef export market loss
Sources of Economic Impact

• Loss of export markets
• Temporary or permanent declining of beef demand
• Instability in beef production
  ▪ Increasing adjustment cost
  ▪ causing inefficiency in feeding and slaughtering facilities
• Government’s role in providing stability?
Model Specification—Breeding

- Population dynamics defined on annual intervals
- Breeding stocks differentiated by age
  - 9 years of productive life
  - Reproduction begin in the third year
- Optimal production plans
  - Due usages of heifers—feeder and breeding
  - Equal returns from alternative usages
- Increasing marginal adjustment cost
Model Specification—feeding

• Feeders go through backgrounding and a fixed ration feeding program

• Growth and body composition of feeders predicted using Nutrient Requirements

• Quality and yield grade predicted to fit the grid marketing system

• Linear search to determine the optimal days on feed
Model Specification—Market Structure

- Single-equation CES domestic demand for both fed beef and cow beef
- Four beef export markets—Canada, Mexico, South Korea, and Japan
- Three foreign beef suppliers—Australia, Canada, and New Zealand
- Feeder and fed cattle import from Canada and Mexico
- Breeding cow export to Mexico
BSE Outbreak Scenarios

• Outbreak results in loss of all beef and live cattle exports for 3 years

• Scenario I: no domestic demand loss

• Scenario II: 5% proportional decrease in domestic demand

• Scenario III: 10% proportional decrease in domestic demand
# Simulation Results—Welfare Loss

<table>
<thead>
<tr>
<th>Scenario</th>
<th>CS</th>
<th>PS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (No Demand Reduction)</td>
<td>4397.736</td>
<td>-3000.44</td>
<td>1397.295</td>
</tr>
<tr>
<td>II (5% Demand Reduction)</td>
<td>-3167.94</td>
<td>-4780.84</td>
<td>-7948.78</td>
</tr>
<tr>
<td>III (10% Demand Reduction)</td>
<td>-10514.4</td>
<td>-6954.35</td>
<td>-17468.7</td>
</tr>
</tbody>
</table>
Simulation Result—Price Response

The graph shows the price response over time for different scenarios labeled as 'bsae', 'SC I', 'SC II', and 'SC III'. The y-axis represents price in dollars per kilogram, ranging from 2.2 to 3.2. The x-axis represents time, ranging from 1 to 97.
Scenarios—Government Intervention

• Government implement a price support for feeder cattle for the period of export loss

• Comparison of scenario III and IV: 10% demand reduction without and with the price support

• Comparison of scenario V and VI: 10% temporary demand reduction and 2% permanent demand reduction without and with price support
## Simulation Results

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<th>PS</th>
<th>Gov</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>III (10% Demand Reduction)</td>
<td>-10514.4</td>
<td>-6954.35</td>
<td>0</td>
<td>-17468.7</td>
</tr>
<tr>
<td>IV (III+Price Support)</td>
<td>-2411.11</td>
<td>54.32707</td>
<td>-13322.2</td>
<td>-15679.0</td>
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<td>V (III+2% Permanent Demand Reduction)</td>
<td>-28069.5</td>
<td>-10271.1</td>
<td>0</td>
<td>-38340.6</td>
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<tr>
<td>VI (V+Price Support)</td>
<td>-19957.3</td>
<td>-3346.91</td>
<td>-13322.2</td>
<td>-36626.4</td>
</tr>
</tbody>
</table>
Conclusions

• BSE outbreak can create long term fluctuations in beef production

• Government interventions can absorb the effect of temporary distortions
  ▪ Stabilize beef supply
  ▪ improve social welfare

• Stable beef production helps to maintain the peak efficiency of feeding and slaughtering facilities
Conclusions

• A variety of government transfers can be used to achieve the goal as long as the transfers are tied to the number of feeder produced

• Over-subsiding the beef cattle producer is counter productive