An Update on Costs to Implement Pathogen Control in Almonds

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August 2009
Overview of the Presentation

• Findings:
  – Operating costs
  – Capital investments
  – Market disruptions
  – Costs of oversight/assurance

• Conclusions and implications
  – Market for treatment
  – Auditors’ credibility

• Research methods
- 810 million pounds would need treatment
- Operating costs ~ $22-31 million, ignoring transportation

- 502 million pounds shipped to North America
- Operating costs $28 million - $34 million
- Capital costs ~ $4 million - $10 million
- Validation of technology is more costly than anticipated.
Terminology

Operating costs
- Variable expenses
  - Labor
  - Energy
  - Raw materials

Capital investments
- Machinery
- Routines, protocols, and systems for safer foods
  - Validation and testing
  - Audit - certification
Operating costs
## Table 1. Operating costs of the almond food safety Action Plan, by category

<table>
<thead>
<tr>
<th>Cost items</th>
<th>All respondents (Unadjusted)</th>
<th>Within group statistics – (Unadjusted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Shipments (average per firm)</td>
<td>Small</td>
</tr>
<tr>
<td></td>
<td>4,685,302</td>
<td>282,195</td>
</tr>
<tr>
<td>Total Cost</td>
<td>6.52</td>
<td>6.05</td>
</tr>
<tr>
<td>Custom treatment charges</td>
<td>4.74</td>
<td>4.75</td>
</tr>
<tr>
<td>Packaging</td>
<td>1.30</td>
<td>1.39</td>
</tr>
<tr>
<td>Transport</td>
<td>2.30</td>
<td>2.02</td>
</tr>
<tr>
<td>Identify custom provider</td>
<td>1.70</td>
<td>1.44</td>
</tr>
<tr>
<td>Handler treatment plan</td>
<td>0.44</td>
<td>0.39</td>
</tr>
<tr>
<td>Audits by DFA</td>
<td>0.31</td>
<td>0.38</td>
</tr>
<tr>
<td>ABC compliance reports</td>
<td>0.76</td>
<td>1.04</td>
</tr>
<tr>
<td>USDA inspection</td>
<td>0.27</td>
<td>0.30</td>
</tr>
<tr>
<td>DV program recordkeeping</td>
<td>1.06</td>
<td>1.32</td>
</tr>
<tr>
<td>DV program plans</td>
<td>0.34</td>
<td>0.36</td>
</tr>
</tbody>
</table>

| % treated in-house                     | 11.39                        | 4.44  | 7.14   | 24.57 |
| % treated custom                       | 60.95                        | 61.89 | 78.83  | 44.43 |
| % DV                                   | 18.14                        | 11.67 | 12.83  | 31.00 |

Source: Survey of almond handlers.
### Product Flows and Costs under Action Plan

<table>
<thead>
<tr>
<th></th>
<th>Share of North Amer. shipments</th>
<th>Survey reported costs (cents per pound)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Custom treatment</td>
<td>61%</td>
<td>4.74 + 1.3 + 2.3 + …</td>
</tr>
<tr>
<td>In-house treatment</td>
<td>11%</td>
<td>******</td>
</tr>
<tr>
<td>Direct verifiable</td>
<td>18%</td>
<td>1.06 + .34</td>
</tr>
<tr>
<td>Other</td>
<td>10%</td>
<td></td>
</tr>
</tbody>
</table>

*Total cost ~ 6.76 cents/pound.*

Source: Survey of almond handlers.
Market Price and Supply Situation

Source: NASS. 2008/09 is forecast. $ values are farm price per pound.

Increasing supply and falling price.

Total cost ~ 6.5 cents per pound. Burden of Action Plan relative to market price ~ 4%.
Capital Investments

Survey reports are very limited and should be interpreted with caution.
- Total $4-10 million.
- Modifications to known processes are significant.
- Some respondents excluded investments made prior to official rule.

Table 2. Capital investments associated with the Action Plan, for new facilities and for modifications to existing equipment or facilities

<table>
<thead>
<tr>
<th></th>
<th>New</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average of those reporting an investment</td>
<td>$1,050,000</td>
<td>$193,000</td>
</tr>
<tr>
<td>Median (value greater than half of responses)</td>
<td>$725,000</td>
<td>$150,000</td>
</tr>
</tbody>
</table>
Technology validation has been costly

- Process authorities $6,500 to $50,000. Access / delays were mentioned.
- Laboratory costs have been high, particularly when repeated trials are needed.
- Pathogen-reduction goals have conflicted with quality.
Market Disruptions
Sales Losses or Delays

- Loss of sales to raw-organic consumer segment
- Loss of sales to Canada due to PPO
- Lost markets reported as major burden to smaller handlers
- Timeliness of custom treatment
Reports of Lost Markets due to Action Plan

Source: Survey of almond handlers. 2 unquantified responses on losses are not included here.
Reasons for loss of markets

- Canada (PPO) n=2
- Organic – raw n = 10
- No loss of markets, n = 12
Timeliness of Custom Treatment

Source: Survey of almond handlers.
Logistics Model Results

- Treatment step in the marketing channel adds $28 million to the total cost.
- Capacity is adequate, with some constraints in the South.
- Diesel fuel is a relatively minor contributor to total cost ($2 more in fuel = $290,000).
Costs of Oversight and Assurance
Cost of Auditing

• DFA audits the Handler Treatment Plans
  – Costs are low - $27,489 total – for 3 audits per year at each handler.
  – Recent adverse publicity on 3rd party audits, particularly the payment incentives.
• Larger firms report higher auditing costs
• Time, effort, hassle factor are difficult to quantify.

Note: DFA = Amer. Council of Food Safety and Quality.
Issues for Further Consideration

• Competitiveness of the market for treatment services is a key issue in outlook for the program.

• Acceptance of heat-treatment in the raw-organic customer segment merits attention.

• Credibility of third-party expertise supporting audit-verification functions is essential.
Methods and Information Used in the Study
Features of the Logistics Model

- Linear programming – the gold standard for transportation modeling
- Limitations of this model, mainly in the production features
  - Common treatment technology
  - Costs are the same everywhere
  - Result: the complex product flows are not recognized.
  - Much more data would be required to fix this.
Issues not analyzed:

Constraints on capacity at critical times throughout the year.

Complexity of product types and access to acceptable treatment technology for that product.
Survey and its Limitations

• Field work is the best possible information
  – Specific to the industry
  – Original
  – Up-to-date
  – Drawbacks: Sensitive information, burdensome to respondents

• There are a few problems in interpretation or and understanding of the questions

• Major issue with non-response
  – Analysis and adjustments for potential non-response bias
Weighting for Size Classes

Table i. Cost estimates based on unadjusted survey responses compared with two weighting methods.

<table>
<thead>
<tr>
<th></th>
<th>Unadjusted</th>
<th>Adjusted by Numbers of Respondents in Group</th>
<th>Adjusted by Shipment Volumes in Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost (cents/pound)</td>
<td>6.52</td>
<td>6.76</td>
<td>4.24</td>
</tr>
<tr>
<td>Charge for Custom Treatment (cents/pound)</td>
<td>4.74</td>
<td>4.79</td>
<td>4.49</td>
</tr>
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</table>