Producer Technology Use and the Value of Autonomy: 
The Case of rbST

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Introduction

- Consumers are increasingly sensitive to the conditions under which their food is produced. Consumers today are considering factors such as:
  - Environmental impacts
  - Animal Welfare
  - Other process attributes
- Production agriculture is facing increased pressure to adopt changes to production processes.
- Milk producers facing questions regarding willingness to produce milk without the use of rbST.

What is rbST?

Recombinant bovine somatotropin (rbST), also called recombinant bovine growth hormone (rbGH), was approved by the Food and Drug Administration in November 1993 for commercial use to increase milk production in dairy cattle. First made commercially available in the U.S. in February 1994, controversy continues today over the use of rbST in milk production.

In the legal arena rbST has been controversial since approval. The FDA failed to force Monsanto to devise a test for rbST, which has provided grounds for challenging the FDA’s decision to approve rbST for commercial use.

- The FDA determined that a tolerance level for rbST was not required due to the fact that “(i) it is undisputed that the dairy products derived from herds treated with rbST are indistinguishable from products derived from untreated herds.”

Regardless of the reasons retailers are demanding milk produced without the use of rbST, producers must respond to changes in demand if they wish to continue to serve the market.

This analysis analyzes the welfare impacts on Michigan dairy farmers when rbST was eliminated as a technology available for use Michigan as a case study. The decision by Kroger to procure rbST-free milk led to a chain of events occurring in the Michigan milk market as cooperatives and individual producers adjusted to meet changing demands. For the individual Michigan producer this is essentially a mandated change (regardless of the fact that it is market rather than legislatively driven).

Data and Methods

- A mail-based survey was used to obtain information from Michigan dairy producers regarding rbST use, perceived benefits of rbST use, and questions surrounding producers’ perception of consumer desire for dairy products produced without the use of rbST.

The complete combinatorial test prescribed by Poe, Giraud, and Loomis (2005) was used to determine if the welfare impacts on producers with different characteristics were statistically different from one another. Results from the test prescribed by Poe, Giraud, and Loomis (2005) are shown below for the cases in which differentiation was based upon rbST use.

As expected, those producers forced to make adjustments had larger welfare impacts than those not forced to make adjustments. Still, those not making adjustments had statistically significant welfare losses due to the loss of a choice of production system, even though it was a system that they had not used in the year preceding the change.

Forced disadoption of practices, in the case of rbST in milk production, was shown to have heterogeneous welfare effects. Similar analyses could be completed for welfare analyses of producers facing potential disadoption of other practices, such as tail docking or individual crates. Implications of heterogeneous welfare effects must be recognized when production systems are eliminated from producers’ options, whether via legislative channels or through market changes.

Table 1: Producer Welfare Implications

<table>
<thead>
<tr>
<th>Producer Group Characteristics</th>
<th>$/cwt per choice scenario</th>
<th>Annual per cow welfare impacts for cow size level:</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Producers</td>
<td>$0.20</td>
<td>$17.20 - $18.30</td>
</tr>
<tr>
<td>Producers using rbST in 2007</td>
<td>$0.32</td>
<td>$16.80 - $17.20</td>
</tr>
<tr>
<td>Producers not using rbST in 2007</td>
<td>$0.18</td>
<td>$17.40 - $17.80</td>
</tr>
</tbody>
</table>

Testing if statistically significant differences in welfare impacts between: Value Interpretation (0.05 Significance Level)

<table>
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<tr>
<th>Difference Based upon rbST Use in 2007</th>
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<tbody>
<tr>
<td>All producers using rbST in 2007 versus all producers not using rbST in 2007</td>
</tr>
<tr>
<td>Small producers (herd size of 100 cows) using rbST versus small producers (herd size of 100 cows) not using rbST</td>
</tr>
<tr>
<td>Large producers (herd size 500 cows) using rbST in 2007 versus large producers (herd size 500 cows) not using rbST in 2007</td>
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</tbody>
</table>

Recognition of the heterogeneity of welfare impacts across producers, depending on whether or not a producer used rbST prior to the disadoption of rbST by the market, is important for determining the impacts of such market change on the industry.

Random Parameters Logit Model

The RPL model estimated in this analysis specified the systematic portion of utility as:

\[ v_i = \beta_0 + \beta_1 \text{rbST} + \beta_2 \text{rbST} \times \text{Gen} + \beta_3 \text{rbST} \times \text{Prod} + \beta_4 \text{rbST} \times \text{Age} + \beta_5 \text{rbST} \times \text{Prod} \times \text{Age} + \beta_6 \text{rbST} \times \text{Prod} \times \text{Size} \]

where, Prod is identifying the production practice (conventional or rbST free). Interactions between operator age, whether rbST was used in 2007 and herd size in 2007 with Prod were included. At the increase in herd milk production presented in the choice experiment (increase of 1.5% 25% or 100% per year). C is a constant included to capture producer sentiment regarding milking cows and C = 1 if opting out is selected. \( \text{EPC} \) is the income over feed cost that is calculated by incorporating the corn price and milk price presented in the choice experiment. Three variables were interacted with the constant to include whether there is a next generation expected to return to the farm (Gen=1 if next generation is expected), herd size in 2007 (Size), and whether or not that herd used rbST in 2007 (rbST=1 if rbST used in 2007, respectively).