Using ARMS Data for Analyses of Antibiotics Use in Livestock

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ERS Work On Antibiotic Use in Livestock

• Collect original survey data through ARMS
• Produce economic research based on that data
  – Extent of use; what types of farms use antibiotics for growth & prevention; impact of use on production outcomes, with controls for other factors;
• Monitor and summarize other data and economic research on the topic
ARMS: The Agricultural Resource Management Survey

• An annual survey of U.S. farms
  – Jointly administered by ERS and NASS
  – Covers farm and farm household finances, field practices and production
  – Designed to be representative of US agriculture

• USDA’s primary source of farm financial data
  – Farm income reporting; and commodity costs & returns
  – About 22,000 full responses each year
  – Not a panel: new farms each year
ARMS is a Complex Survey: Multiple Phases and Multiple Questionnaire Versions

- In most years, special ARMS questionnaire versions are directed to producers of 2 crop & 1 livestock commodity
- Provides baseline for ERS annual costs and returns estimates for that commodity
- Includes detail on expenses, technologies and practices for the commodity enterprise
  - Sample consists of commercial producers in States accounting for at least 90 percent of production
  - We add antibiotics questions to livestock versions
ARMS Livestock Versions

• Broilers: 2006* and 2011*
• Cow-calf: 1996 and 2008
  – * includes antibiotics use questions
• Questionnaires posted at ERS ARMS website:
ARMS Antibiotics Use Questions

• Antibiotics provided in feed or water?
  – For what purpose? (hog version)
    • What stage? (hog version)

• Other production practices & technologies...
  – That may be related to antibiotics decisions

• In a survey primarily focused on whole-farm and commodity finances
Why Use ARMS For Antibiotics Research?

• A large representative sample of producers
• Can link antibiotic use questions
  – to production and financial outcomes...
  – to use of other practices and inputs...
  – to farm, enterprise, and operator attributes.
ARMS Respondents Are Farm Operators

• Contract growers may not know what’s in the feed
  – Because integrators (contractors) provide them with feed
  – We include a “don’t know” option in questionnaire
    • “Don’t know” is common response
  – We separately contact integrators for average feed costs
Findings: Antibiotics Use in Hogs

<table>
<thead>
<tr>
<th>Type of hog</th>
<th>Growth promotion</th>
<th>Disease prevention</th>
<th>Either growth promotion or disease prevention</th>
<th>Disease treatment</th>
<th>Any use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finishing hogs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30%</td>
<td>44%</td>
<td>50%</td>
<td>44%</td>
<td>61%</td>
</tr>
<tr>
<td>Don't know</td>
<td>16%</td>
<td>14%</td>
<td>14%</td>
<td>13%</td>
<td>12%</td>
</tr>
<tr>
<td>Head sold or removed</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>40%</td>
<td>51%</td>
<td>59%</td>
<td>61%</td>
<td>74%</td>
</tr>
<tr>
<td>Don't know</td>
<td>22%</td>
<td>20%</td>
<td>20%</td>
<td>18%</td>
<td>17%</td>
</tr>
</tbody>
</table>

Source: Authors' calculations from ARMS Hogs 2009 data.
# Findings: Antibiotic Use in Broilers

*(From 2011 ARMS Broiler Version)*

Table 10. Antibiotics use, production outcomes, and production practices in broiler grow-out facilities

<table>
<thead>
<tr>
<th>Operation foregoes antibiotics for growth promotion or disease prevention</th>
<th>No/DK</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of farms</td>
<td>7,727</td>
<td>7,163</td>
</tr>
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</table>

## Production outcome

<table>
<thead>
<tr>
<th></th>
<th>No/DK</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average annual production (# birds)</td>
<td>523,579</td>
<td>529,596</td>
</tr>
<tr>
<td>Flock mortality rate (%)</td>
<td>3.66</td>
<td>3.83</td>
</tr>
<tr>
<td>Feed conversion (lbs. of feed per pound of weight)</td>
<td>1.89</td>
<td>1.91</td>
</tr>
</tbody>
</table>

## Production practice

<table>
<thead>
<tr>
<th></th>
<th>No/DK</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water treated to control salmonella after feed withdrawn</td>
<td>23</td>
<td>33</td>
</tr>
<tr>
<td>No animal byproducts in feed</td>
<td>18</td>
<td>27</td>
</tr>
<tr>
<td>Test flocks for avian influenza</td>
<td>51</td>
<td>60</td>
</tr>
<tr>
<td>Test flocks for salmonella</td>
<td>35</td>
<td>50</td>
</tr>
<tr>
<td>Test flocks for campylobacter</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>Breeding flocks vaccinated for salmonella</td>
<td>25</td>
<td>36</td>
</tr>
<tr>
<td>Vehicles cleaned &amp; disinfected before loading birds</td>
<td>27</td>
<td>37</td>
</tr>
<tr>
<td>Litter in houses windrowed and dried between flocks</td>
<td>29</td>
<td>36</td>
</tr>
<tr>
<td>Litter in houses treated to reduce ammonia</td>
<td>65</td>
<td>73</td>
</tr>
</tbody>
</table>
Findings: Impacts on Production Outcomes

• While controlling for size, inputs, & technologies
• For hog finishing and broiler grow-out operations
  – Focus on growth promotion & disease prevention uses

• Routine feeding is associated with small increases in production, given other factors
  – 1-3 percent
  – But, not statistically different from zero
ARMS and NAHMS Compared

• Each covers a periodic rotation of commodities
  – With samples that are representative of commercial producers and production
  – NAHMS covers very small-scale producers, separately.
  – Each elicits qualitative information on antibiotic drug use.
ARMS and NAHMS Compared

• NAHMS has a primary focus on animal health
  – More detailed questions on whether, how, and why specific types of drugs are used, and links to other animal health practices.

• ARMS has a primary focus on farm finance and production
  – Less detailed antibiotics questions, with links to production practices as well as production and financial outcomes.
ARMS & NAHMS Complementarities

• Different primary goals
  – Respondent burden from combining would be high, because the questionnaires would be very long
  – High burden reduces response

• Agencies cooperate & share data
  – Research products at each agency draw on both databases
Beyond NAHMS & ARMS. What’s Needed?

• Annual estimates, by species and stage of production
• Qualitative measures: animals receiving antibiotics, by purpose, by type of drug
• Coverage of integrators, to avoid “don’t know”
• Quantitative measures: how much of which drugs?
Published ERS research

Journal articles:

