Structural Challenges of Supplying U.S. Beef Raised with Fewer Antibiotics

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Challenges to Changing Antibiotic Use in Food Animal Production:
Economics, Data & Policy
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Overview

• Structure of beef cattle industry
• Antibiotic use in beef cattle production
• How structure interacts with antibiotic use (structural challenges)
• Alternative supply chains in the beef cattle industry
• Costs and benefits of reducing use
U.S. Beef Cattle Industry

• Cattle and calves was #1 commodity by value of production in 2017 ($50.2 billion)
• Cow-calf production and finishing beef cattle (feeding until they reach slaughter weight) are usually separate enterprises
• Calves weaned around 500 lbs. or 8 mo. and are started on forage
• Calves then usually sold at auction to stockers or directly to feedyard
• Steers and heifers on feedlots spend 120-180 days on feed before slaughter

Sources: Cattlemen’s Beef Board, USDA NASS, Waggoner (2018)
U.S. Beef Cattle Industry, cont.

• Top four firms slaughtered 85% of steers and heifers in 2015 (up from 80% in 2005)
• 13 largest plants slaughtered 57% of total cattle in 2017
• 12.9% of production was exported in 2017; top destinations were Japan, South Korea, Mexico, Hong Kong, and Canada

Sources: USDA (2016), USDA (2018), U.S. Meat Export Federation, 2018
Cow-calf production is geographically dispersed

Beef cow inventory

State contributes to top 80% of the United States...
Cattle on feed inventory

State contributes to top 80% of the United States...

Cattle-on-feed

Source: USDA Economic Research Service using data from the National Agricultural Statistics Service January, 2018 Cattle Inventory Survey
Characteristics of cow-calf and feedlot sectors

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Cow-calf sector</th>
<th>Feedlot sector</th>
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</thead>
<tbody>
<tr>
<td>Inventory (01/2018)</td>
<td>31,723,000 Beef Cows</td>
<td>14,006,400 Cattle on feed</td>
</tr>
<tr>
<td>Size distribution of operations</td>
<td>28% of beef cows on operations with fewer than 50 beef cows (2012)</td>
<td>82% of cattle on feed in feedlots larger than 1000 head (01/2018)</td>
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<tr>
<td></td>
<td>83% of inventory on operations with fewer than 500 beef cows (2012) census</td>
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Sources: USDA National Agricultural Statistics Service; data from Cattle Inventory Survey, Cattle on Feed Survey, and 2012 Census of Agriculture and retrieved from https://quickstats.nass.usda.gov/
From the cow-calf operation...

USDA Photo by Preston Keres
...to the feedyard

Texas A&M AgriLife photos by Kay Ledbetter
(photo used with permission from the photographer)
Antibiotic use in U.S. beef cattle production

• Cow-calf producers use antibiotics to prevent and treat several diseases, for example:
  – Pinkeye
  – Foot rot
  – Anaplasmosis (tickborne bacterial disease)
  – Infections (such as respiratory infections) in calves at weaning

• In feedlots, antibiotics are used to prevent and treat several diseases, for example:
  – Bovine respiratory disease (BRD)
  – Liver abscesses (tylosin commonly used)

• Ionophore class of antibiotics used for feed efficiency/to improve rate of gain, and to control coccidiosis
Antibiotic use, cont.

• Most cow-calf operations don’t use antibiotics in feed
  – 81.3% did not use antibiotics in feed in 2008 (USDA, 2012)

• Antibiotic use in feed more common on feedlots (USDA, 2013)
  – 71.2% of cattle placed in feedlots larger than 1,000 head received tylosin in feed
  – 18.4% of cattle placed in feedlots larger than 1,000 head received chlortetracycline in feed

• According to 2016 FDA data, 43% of domestic sales (by volume) of medically important antibiotics were for cattle, including 51% of aminoglycosides and 80% of cephalosporins
Structure of the industry can present challenges for animal health

• Good management and timing of vaccination is key to preventing disease on cow-calf operations, but management practices are diverse
• Co-mingling of animals at auctions or in feedyards can contribute to disease exposure and outbreaks
• Shipping distance (time) and conditions are stressful for cattle, which can make them more vulnerable to disease
• Processing at feedyard and adjusting to feed (depending upon age/history of cattle) can also contribute to stress
• High grain diet in feeding phase contributes to acidosis and liver abscesses
Changes to production practices needed to raise cattle without antibiotics

• Eliminate any preventive antibiotic use in calves and beef cows
  – e.g. CTC in feed at weaning, or medicated mineral

• Eliminate any preventive antibiotic use in feedlots
  – e.g. CTC in feed or macrolide injection for cattle at high risk of developing BRD
  – Eliminate use of tylosin in feed to prevent liver abscesses

• Eliminate ionophore use in feed

• Animals that are treated with antibiotics need to be identified and separated at sale

• All of these changes have costs, and require substituting other inputs and management practices to raise healthy animals
Economics costs to producers of raising cattle without antibiotics

• Slower growth/ higher morbidity or mortality at cow-calf stage?
  – Hormone implants also impact growth rates, so difficult to separate from effect of no antibiotic use

• Increased morbidity/mortality due to BRD?

• Increased time on lot and costs of feed during finishing stage due to decreased feed efficiency/rate of gain when Tylosin and ionophores are removed

• Separation and traceability
Economics benefits to producers of raising cattle without antibiotics

• Blank et al. (2016) analyze data from Western Video Market
  – 33% of calf lots and 26% of yearling lots sold as “Natural”
  – Estimated “Natural” premium is $1.14/cwt for calves, $3.04/cwt for yearlings; $6.51/cwt premium for Global Animal Partnership 3rd party certification for calves

• Schumacher et al. (2012) find 3.2% of 159 feedlots surveyed had a “Naturally raised” program

• Less information on premiums for “natural” beef at retail or feedlot levels
Examples of existing supply chains for beef products raised without antibiotics

- Cow-calf producers raise calves without hormones and antibiotics (and in accordance with Global Animal Partnership standard) for Whole Foods suppliers
- Packers source calves raised in “Natural” program which requires no hormones, antibiotics, or feeding of animal by-products
- Use of contracting or vertical integration to control management practices and herd health in supply chain (e.g. Niman Ranch model)
- Direct-to-consumer or to restaurants/local markets
Examples of Companies offering RWA beef products

Tyson’s “Natural” Beef line

JBS has several “Natural” beef lines

Perdue owns several “Natural”/RWA beef brands
Antibiotics claims on beef products often coupled with other types of animal raising label claims
### Overlapping attributes for beef label claims

<table>
<thead>
<tr>
<th></th>
<th>“Natural” or “Naturally Raised” (Industry convention)</th>
<th>USDA Organic*</th>
<th>Grass fed/Grass finished</th>
<th>No antibiotics/raised without antibiotics</th>
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<tbody>
<tr>
<td>No antibiotics</td>
<td>√</td>
<td>√</td>
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<td>√</td>
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<tr>
<td>No hormones</td>
<td>√</td>
<td>√</td>
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<td>Pasture requirement</td>
<td>√</td>
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<tr>
<td>100% grass fed</td>
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<tr>
<td>Organic grain</td>
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*Note: For a summary of all organic production requirements for livestock, see: [https://www.ams.usda.gov/publications/content/organic-livestock-requirements](https://www.ams.usda.gov/publications/content/organic-livestock-requirements)
Quarterly Retail Beef Sales by Production Claim and Share of Total (Pounds)

Discussion: Possible opportunities for reducing antibiotic use

- **Investments in herd health on cow-calf operations**
  - Vaccination protocols
  - Disease prevention through improved management practices
  - Early detection and treatment of infection

- **Sourcing healthy cattle**
  - Already started on and adjusted to feed
  - Heavier
  - Vaccination record

- **Reducing shipping stress**

- **Balancing feed efficiency and tylosin use**
  - Role for other feed additives?
  - Can tylosin usage be reduced?
Discussion, cont.

• Challenge: unclear if no antibiotic use is optimal for society, but there is an incentive (price premium) associated with it for producers and companies

• What are the economic incentives for reducing use without retail price premium?
  – Certification of calves that conform to health protocols may reduce need for antibiotics or re-vaccination, and reduce information asymmetries (Crespi and Saitone, 2018)
  – Investments in herd health and prevention could be cost-saving if they reduce need for more expensive antibiotics

• Preventive antibiotic use likely to continue to be an important tool for producers to manage disease risk
References


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Questions?

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