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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

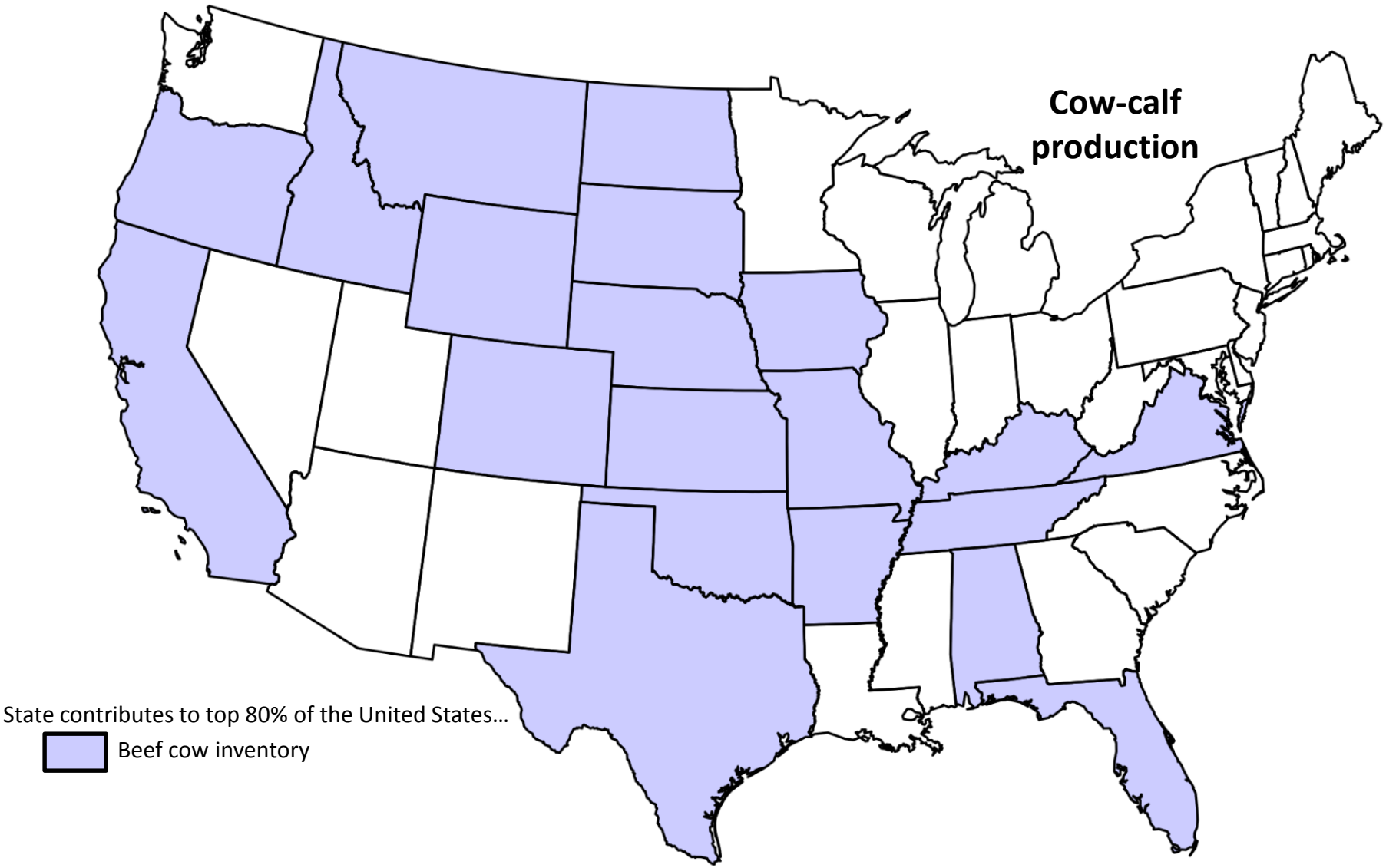
Sources: Cattlemen's Beef Board, USDA NASS, Waggoner (2018)

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

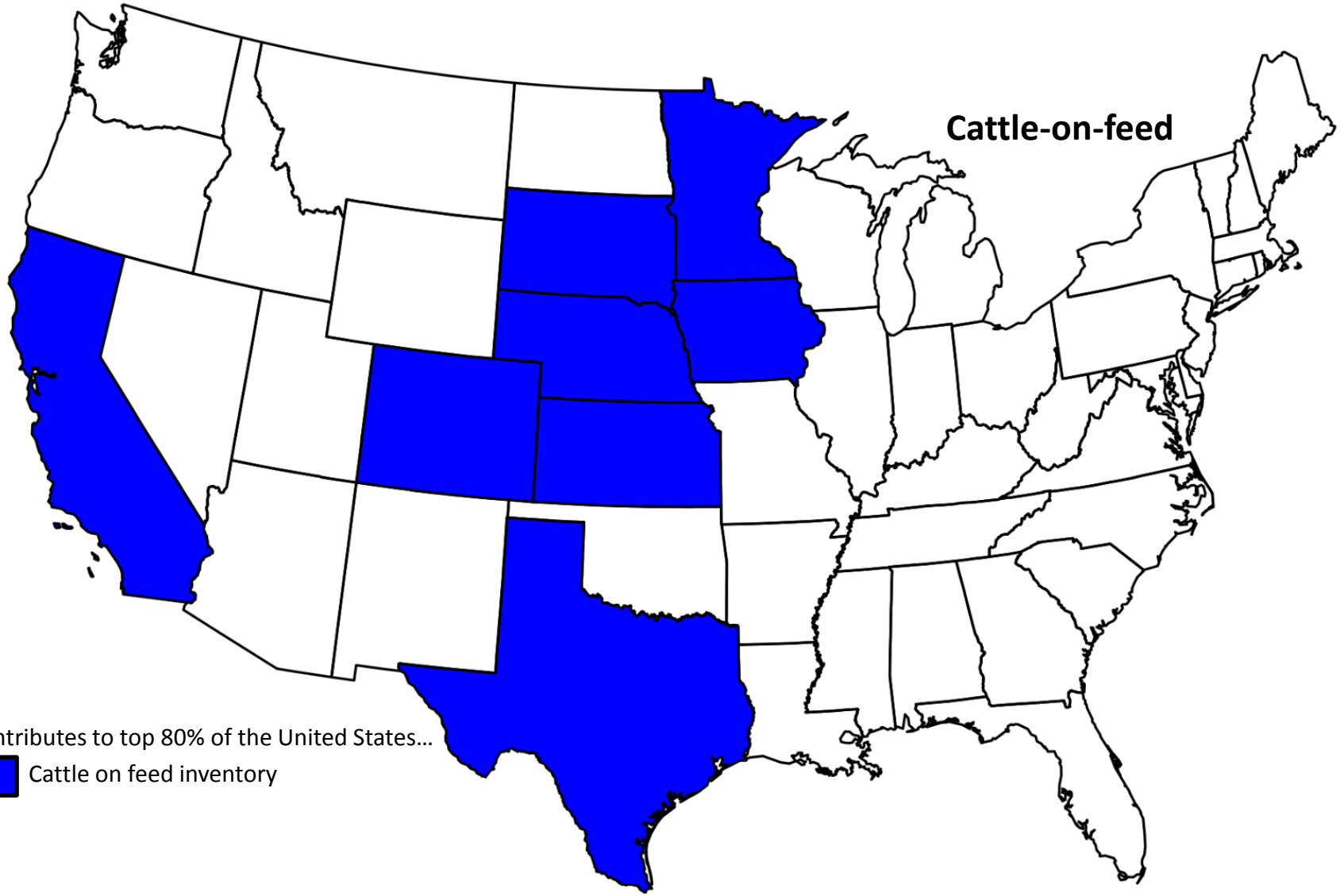
Sources: USDA (2016), USDA (2018), U.S. Meat Export Federation, 2018

Cow-calf production is geographically dispersed



Source: USDA Economic Research Service using data from the National Agricultural Statistics Service January, 2018 Cattle Inventory Survey

Cattle on feed are concentrated in midwest



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

	Cow-calf sector	Feedlot sector
Inventory (01/2018)	31,723,000 Beef Cows	14,006,400 Cattle on feed
# of Operations	729,000 (2018)	30,418 (2017)
Size distribution of operations	28% of beef cows on operations with fewer than 50 beef cows (2012) 83% of inventory on operations with fewer than 500 beef cows (2012) census	82% of cattle on feed in feedlots larger than 1000 head (01/2018)

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

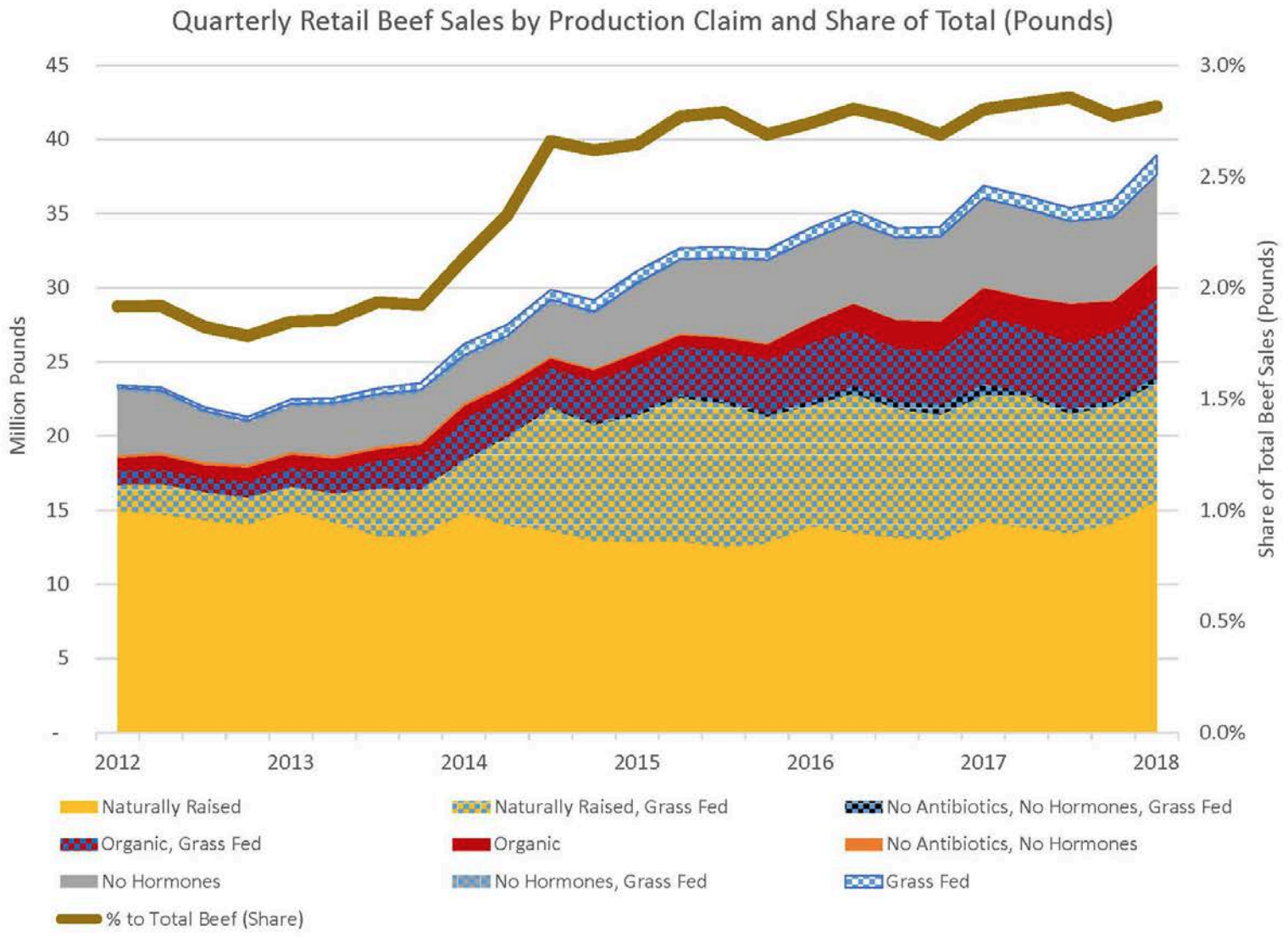
Perdue owns several "Natural"/RWA beef brands

Antibiotics claims on beef products often coupled with other types of animal raising label claims

Overlapping attributes for beef label claims

	"Natural" or "Naturally Raised" (Industry convention)	USDA Organic*	Grass fed/Grass finished	No antibiotics/raised without antibiotics
No antibiotics	✓	✓		✓
No hormones	✓	✓		
Pasture requirement		✓	✓	
100% grass fed			✓	
Organic grain		✓		

*Note: For a summary of all organic production requirements for livestock, see: https://www.ams.usda.gov/publications/content/organic-livestock-requirements



Source: Sales Data compiled by Cattlemen's Beef Board & National Cattlemen's Beef Association http://www.beefretail.org/salesdata.aspx

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

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Questions?

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