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United States Department of Agriculture

# 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)



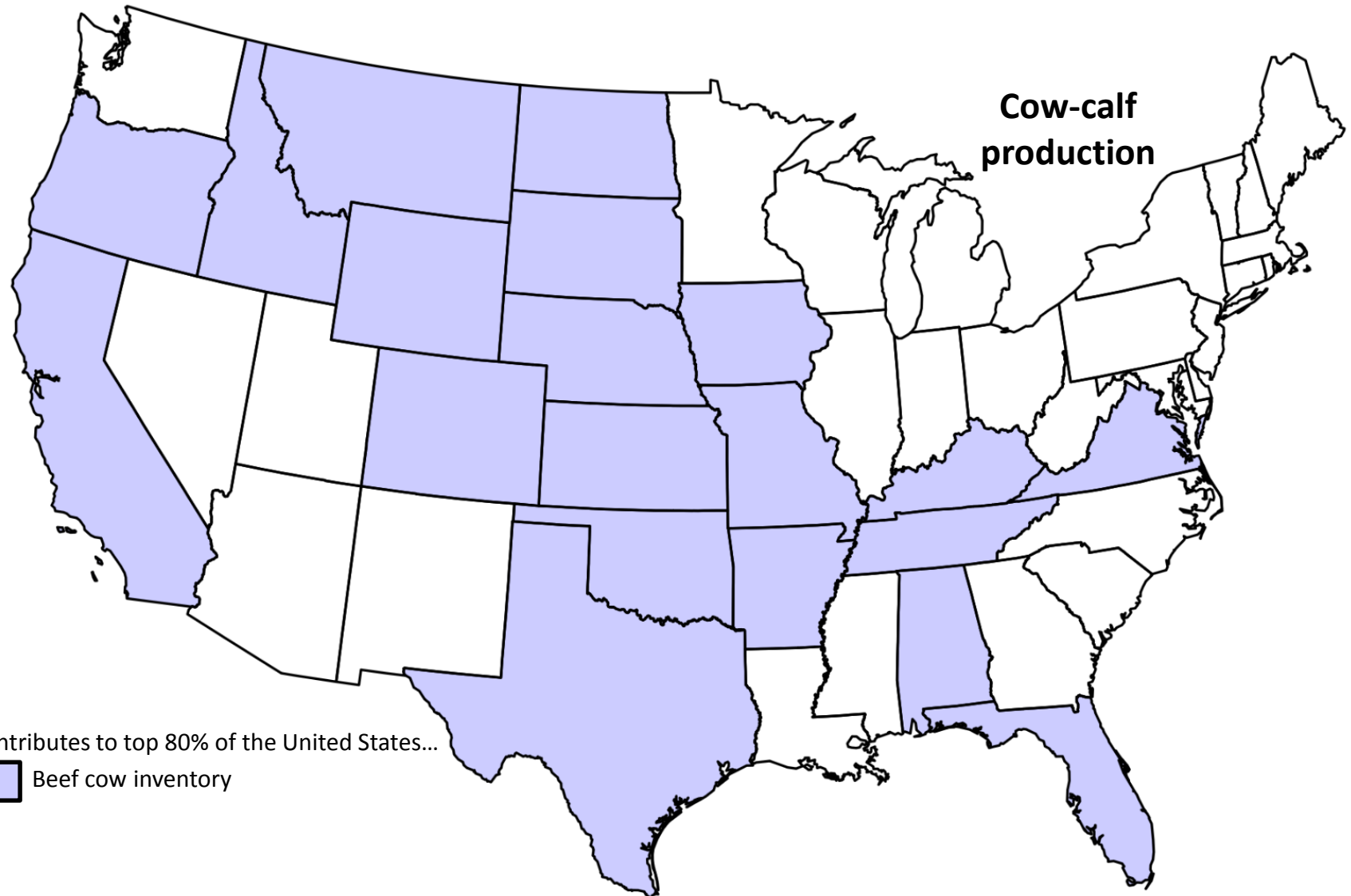
## U.S. Beef Cattle Industry, cont.

- 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

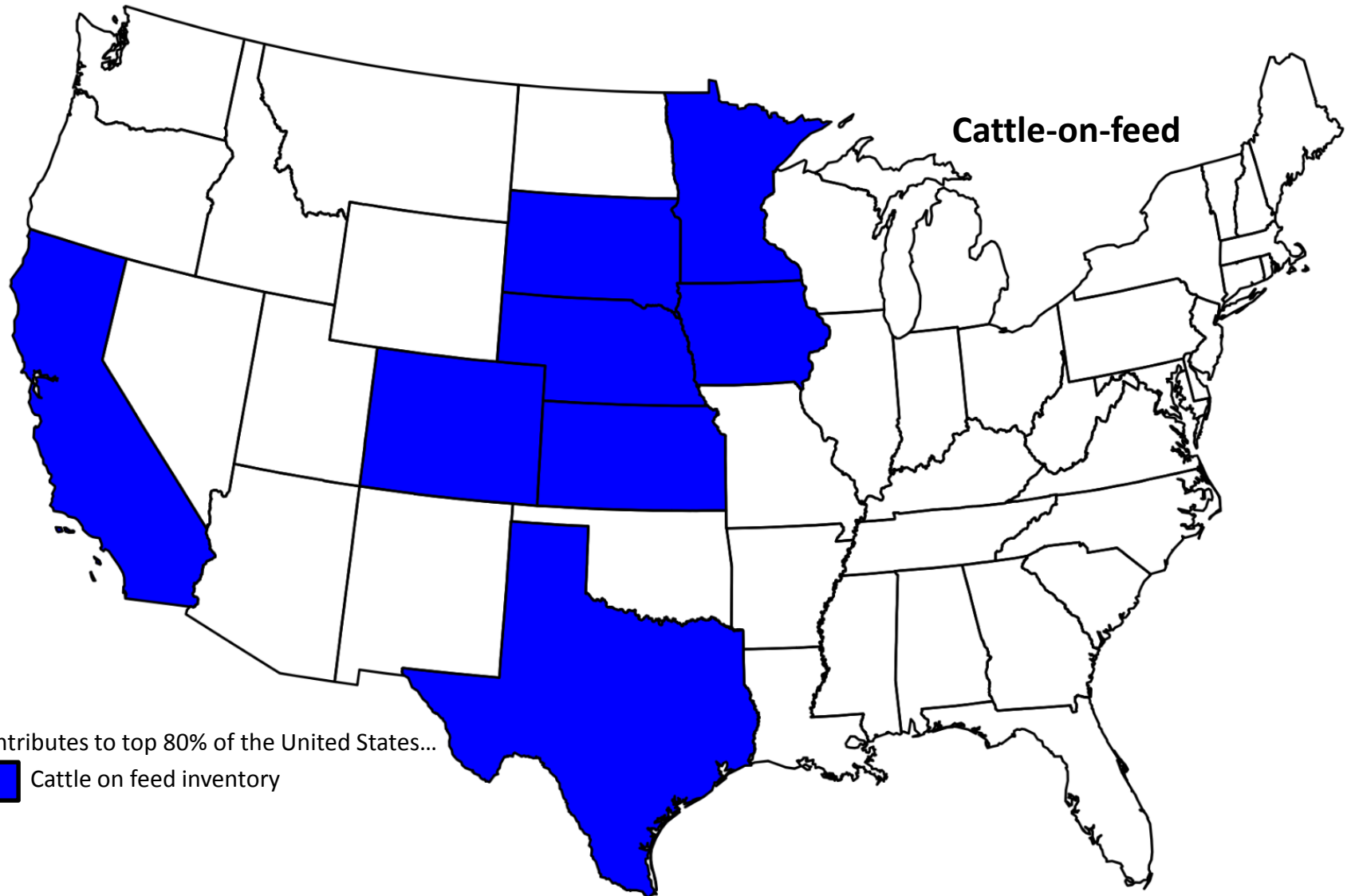


## Cow-calf production is geographically dispersed



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
<b>Inventory (01/2018)</b>	31,723,000 Beef Cows	14,006,400 Cattle on feed
<b># of Operations</b>	729,000 (2018)	30,418 (2017)
<b>Size distribution of operations</b>	<p>28% of beef cows on operations with fewer than 50 beef cows (2012)</p> <p>83% of inventory on operations with fewer than 500 beef cows (2012) census</p>	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)



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# 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 3<sup>rd</sup> 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



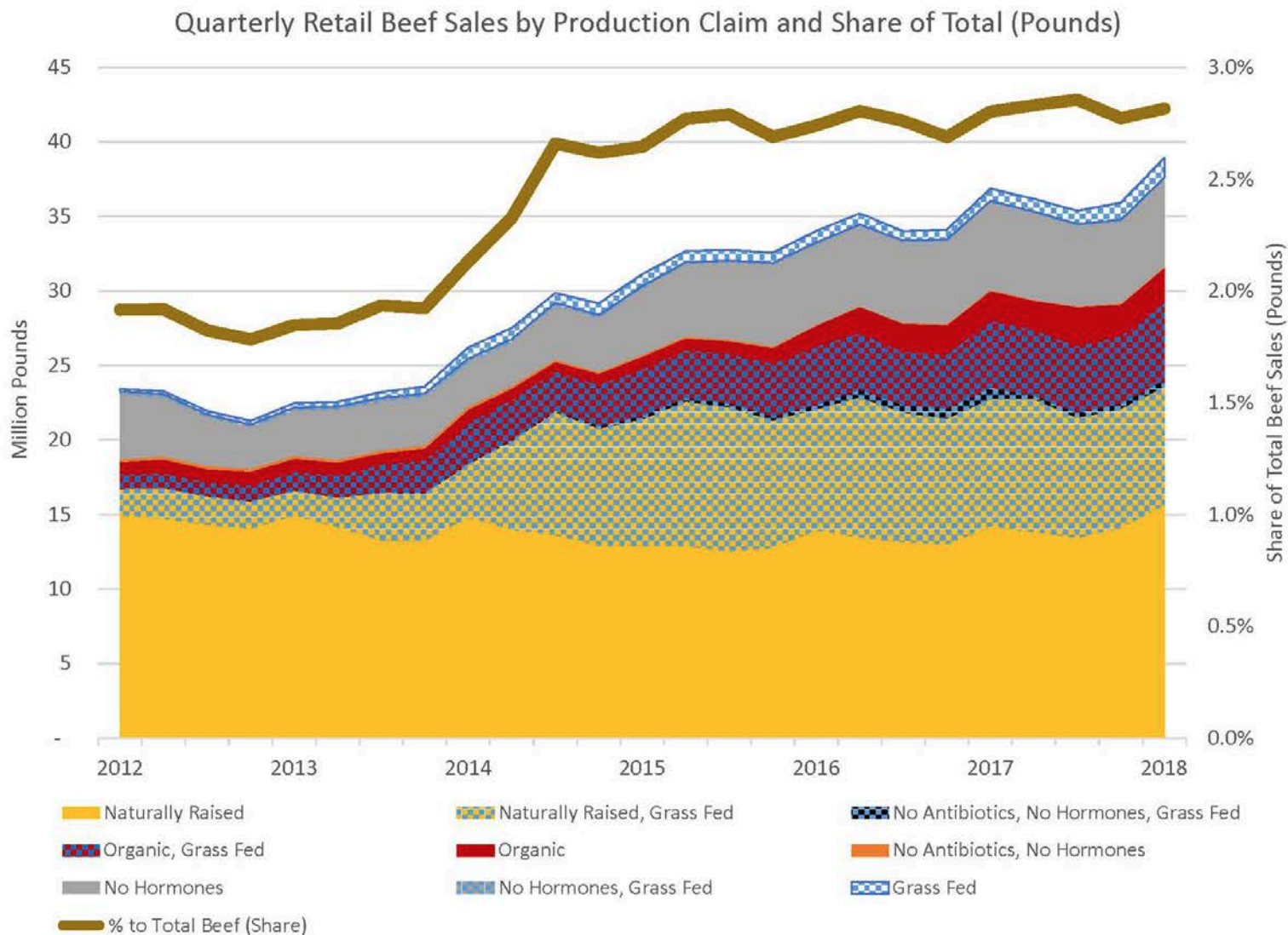
# Overlapping attributes for beef label claims

	"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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