Overview of Bovine TB in South Dakota 2017-2019

USAHA
October 27, 2019
Review of *Mycobacterium bovis* Activity in South Dakota

1. Harding County  
   – Two herds associated with the index herd  
     (Harding County and Butte County)  
   Feb 2017

2. Tripp County  
   – Three herds associated with the index herd  
     (NE herd, SD and IA feedlots)  
   Nov 2017

3. SD feedlot slaughter trace from SD plant  
   June 2018

4. IA slaughter trace from WI plant  
   June 2018

5. ND slaughter trace through SD auction market  
   Nov 2018

6. SD feedlot slaughter trace from SD plant  
   Dec 2018

7. MT slaughter trace through SD cow feedlot  
   Mar 2019
TB affected counties in South Dakota

- Harding
- Butte
Harding County Index Herd

- **2/7/2017** one cow histo-compatible/PCR positive at NE plant from NE feedlot. Official tag traced to SD premises in Harding County.
- **2/15/2017** two cows histo-compatible/PCR positive at NE plant from SD feedlot. ID’s traced to same SD ranch in Harding County.
- **2/24/2017** whole herd TB test completed on 656 animals
  - 38 total TB positive animals (35 of 78 CFT responders, 3 CFT negative animals)
- **3/14/2017** WGS suggests MX origin, not previously isolated in US
- **4/19/2017** depopulation complete
- **6/21/2017** C & D complete and quarantine released
- **Nov 2018** CFT test on restocked animals. TB negative.
Harding County TB investigation

- Herd #2 (Harding) – Contact herd---
  - 1 infected animal, Negative herd test
  - Test and removal program - final herd test Fall 2022

- Herd #3 (Butte) – Trace-out herd---
  - 1 infected animal, Negative herd test
  - Dispersed in Fall 2017
Harding County TB Investigation

- **Trace Outs** – 561 traces involving 12 states
  - Private Sales and auction market sales
  - 3,647 cattle tested, 84 exposed animals removed
- **Adjacent Herds** – 20 herds total for 3 affected herds
  - Fence line and neighbors
  - Nearly 10,000 animals tested
- **Trace In Herds** – 21
  - Several tested as adjacent herds
  - One female source herd in SD tested
TB affected counties in South Dakota
Tripp County Index Herd

- **10/26/2017** one cow histo-compatible/PCR positive at TX. Official ID traced through SD auction market to SD cow/calf ranch in Tripp County.
- **11/7/2017** whole herd TB test completed on 338 adults
  - 51 TB positive animals found on the ranch
- **11/19/2017** WGS results suggested a new strain, most commonly related to known Mexican strains. Similar to strains isolated from a beef cow slaughtered in TX in 2013, a human case that was identified in NM, and an isolate from a NM dairy.
- **12/13/2017** depopulation complete on adult animals
- **2/8/2018** CFT applied to 283 home-raised feeder calves
  - Two calves histo-compatible
- **7/6/2018** all feeder calves (1,138 hd) sent to slaughter
- **8/13/2018** C & D complete and quarantine released
- **10/22/2019** CFT test on restocked animals scheduled
Tripp County TB investigation

• Index herd---Depopulated
• Herd #2 (Wheeler County Nebraska)
  – 1 infected animal on herd test---Depopulated
• Herd #3 (SD Feedlot) – Trace-out herd
  – 1 infected animal out of 3 purchased
• Herd #4 (IA Feedlot) – Trace-out
  – 1 infected animal from index herd
  – 6 within feedlot transmission.
Tripp County TB Investigation

- **Trace Outs** – 173 traces involving 6 states
  - Auction Markets
- **Contact Herds** – 10
  - Fence line and neighbors
  - Over 4000 animals tested
- **Trace In Herds** – 1 NE
  - Sole source for herd bulls

Exposed cattle traced to 6 states
2,534 head
Potter County Feedlot

• 6/8/2018: PCR positive results on an Angus steer at SD plant
  – Originated from a SD terminal feedlot
  – No ID
• 40 animals were the last load from the pen
• 294 animals in the group purchased over 3 week period in fall 2017
• Feedlot records narrowed it to a group of 63 purchased from a SD backgrounder
• That SD backgrounder had purchased ~500 steers in early 2017
• 7/5/2018: WGS found that the isolate shared common ancestry with MX strains and had not been previously found in the US
Potter County Feedlot

63 head of calves purchased from backgrounder

- Part of ~500 head total
- Sale records for black steers narrowed the possible sources to 99
- SD, ND, MT, WY, MN producers
- 47 producers in South Dakota
- Testing started late November, 2018
Potter County Feedlot

Testing of possible source herds

- 36 herds with animals eligible to test
- 13 herds do not have cattle to test
- 22 herd tests completed
  - One premises has completed CFT on partial herd
- 5,065 animals tested
Iowa Feeder Heifer

• 6/22/2018: Red heifer slaughtered in WI
  – WGS matches Harding County isolate
  – No ID
• Purchased at IA auction market and kept ~10 days before sent to slaughter (sick pen)
• Purchased through the same IA auction market in November, 2017
• Rest of the pen tested negative
• Multiple purchases and potential sources
• One trace through SD-All animals tested negative
ND TB 19

• 11/15/2018: Histo-compatible/PCR positive results on a cow owned by SD licensed dealer and slaughtered at a SD plant
  – Backtag indicates cow was sold through a SD auction market
  – Official ID indicates ND origin. Initial DNA analysis indicates non-match between lesion and eartag exudate. Lab confirms tissues do match on 12/7/2018.

• 12/6/2018 Histo-compatible/PCR positive results on a cow slaughtered at MN plant.
  – Official tag placed at SD auction market indicates ND origin (multiple SD auction markets listed on VS Form 6-35)
  – Ranch tag matches ranch tag collected on Nov case

• ND conducts whole herd test – herd is confirmed TB affected

• WGS found the isolate to be unrelated to any other isolates previously found in the US
ND TB 19 Trace-Outs

• ND affected herd sold cattle through SD auction market
• Exposed cattle found to be present on 7 SD premises
  – One breeding cow necropsied and sampled – TB negative, premises released from quarantine
  – Six SD feedlots remain under quarantine until exposed feeding cattle are sent to slaughter in Fall 2019
• 68 premises in 6 states involved in trace-outs
  – Most moved through feeding/slaughter channels
Kingsbury County Feedlot Steer

- 12/14/2018: Histo-compatible/PCR positive results on a steer at SD plant
- 38 head in the lot from a SD feedlot
- Positive animal was a black steer (no ID)
- Lot consisted of 11 home raised calves and 27 purchased calves
- Home herd consisted of 82 cows
- WGS found the isolate to be unrelated to any other isolates previously found in the US
Kingsbury County Feedlot

Testing of possible source herds

• 1/10/2019: Negative whole herd test on home herd. Two CCT negative animals necropsied and sampled – no TB found.

• Feedlot records show purchased steers originated from two sites:
  – 93 head red steers from a SD beef herd
    • Negative whole herd test June 2019 on 407 head
  – 165 head black steers from a MT beef herd
    • MT reported negative results on whole herd test
MT Trace

• 3/12/2019: Histo-compatible/PCR positive results on a cow owned by a SD terminal feedlot, slaughtered at a NE plant
  – Feedlot records indicate the cow was one of 43 head purchased at a MT auction market
  – Official ID collected at slaughter and recorded at feedlot entry indicated MT origin

• Whole herd test by MT – negative results

• WGS found the isolate shares common ancestry with isolates in MX and is unrelated to any other isolates previously found in the US
Figure 1. Low resolution tree of *M. bovis* isolates. The isolate of interest is located in Group 23, identified by the red arrow. The current isolate is not related to the *M. bovis* isolated in 2011 from South Dakota. Red circles with date indicate the location of historical isolates from South Dakota on the *M. bovis* phylogenetic tree.
Lesson Learned

• Our experience with *M. bovis* in SD beef herds is a collaborative project with neighboring states, USDA, and industry partners.

• Identification works, and is dependent on accurate record keeping.

• Recent cases in SD beef herds included multiple novel strains, and common risk factors were not present:
  – Mexican cattle
  – Dairy cattle
  – Wildlife reservoir
  – International workers
Questions?