Nebraska Tuberculosis update-USAHA 2019
Tuberculosis infected steer found at slaughter—Tyson at Lexington, NE on 7/16/19
Unfortunately, DNA had been removed from tags by FSIS inspector!
July 18: NVSL reported a likely case of *Mycobacterium bovis* (bovine tuberculosis (TB)), based on histopathology, in a 2 year old steer that was slaughtered on July 16 at the Tyson slaughter plant in Lexington Nebraska.

July 19: The sample was reported PCR (+) for M. TB complex - presumably M. bovis.

July 19: The FSIS Inspector in Charge at the Tyson plant was contacted. Purchase invoices, hot weights, and kill sheets were obtained and confirmed that the positive steer was consigned by a feedlot, in Dawson County Nebraska. A review of the ID correlation procedures was conducted and it was concluded that the ID was properly correlated to the tissue sample.

July 19: The feedlot was contacted. Lot closeout records and purchase invoices were obtained. Feedlot animal ID records backed up conclusions that the ID was properly correlated to the tissue sample. It was determined that the pen of cattle were purchased from the Lexington Livestock Market in Dawson County, NE on 11/30/2018. There were 5 sellers who sold a total of 256 cattle, which were divided between 2 pens at the feedlot. The second pen was scheduled for slaughter the following week.

July 22: The Lexington Livestock Market was contact. Seller invoices were obtained. The identity of the 5 sellers was determined. They were most likely from 4 cow calf herds in south central Nebraska. One seller, listed as out of state, was likely associated with one of the 4 cow calf herds.
Chronology of trace work and herd testing

July 26: Nebraska field staff met with a Dawson County producer, who confirmed that the management tag originated from his herd. The tag was unique, in that it had hand written numbers, which corresponded to the management ID of the dam. The herd, which consisted of approximately 293 pairs, 16 bulls, and 56 replacement heifers was quarantined and plans were made for a complete herd test of all cattle over 2 months of age. 365 adults and 290 calves were disseminated into 7 different pastures. The herd is considered a “closed herd”, except for bull purchases.

August 12: NVSL reported a positive culture and WGS results. The genotype of this isolate is located in group 17B1. Group 17B1 is primarily composed of isolates of Mexican origin. This isolate is 19 SNPs from the most recent common ancestor. The nearest genetic neighbor, in the current database, is 97-2445_MEX_cattle which is 4 SNPs from the same common ancestor.

August 16 - 30: Caudal fold testing of the herd was completed. Seven CFT responders were classified as reactors. The indemnification process was initiated and plans for necropsy were made.

September 11: All seven cattle were necropsied by state and federal personnel at a local rendering establishment. One herd bull had a multifocal purulent lung lesion. The other cattle were NGL.

September 13-16: NVSL reported no significant findings on the histopathology on the 7 necropsied cattle. The diagnosis in the bull was chronic pneumonia.
WG5 Genotyping results

Figure 1. The genotype of the *M. bovis* isolate recovered from tissue collected at slaughter belong to group 1781. The red arrow indicates the location of this group of isolates.
Lesion from bull—CFT responder
Chronology of event after herd testing

September 18: The Nebraska State Veterinarian requested NVSL conduct parentage testing comparing blood samples collected from the purported dam of the TB positive steer and her 2019 calf, with the tissue from the TB positive cow. The producer’s identification system of identifying calves with the management ID of their dam made this a logical step to confirm that we were in the correct herd. This request was approved by Dr. Naugle on September 20th.

September 30: NVSL reported that results of the parentage testing were consistent with the TB infected male identified in 6-35 case being the offspring of the cow from the herd that was quarantined and tested. It was determined that all three animals had at least one allele in common at all 11 loci tested. Additional testing would be required to absolutely confirm parentage, but was not deemed necessary by the Ruminant Health Center Staff.
Blood samples sent to NVSL for parentage DNA (adult cow and 2019 calf)
**Parentage Testing**

A parentage test was requested to determine if the tissue from a 6-35 case with ID 988001003837501 (Accession 19-021396) was a descendant from cow 840003014875957 (Accession 19-027808). The 2019 calf from the same dam was submitted for comparison (840003014875948). Using the Bovine Stockmarks kit (ThermoFisher) it was determined that all three animals had at least one allele in common at all 11 loci tested (see table). These data are consistent with the TB infected male identified in 6-35 case being the offspring of cow 840003014875957. However, this assay is capable of ruling out a parent, and a more precise assay is required to confirm a parent to an exact individual.

**Table 1. Allele report.** The top row contains the name of the loci tested. The second row contains the number of nucleotides in the allele. An ‘x’ is placed in the column if that animal had that allele.
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<th>Info</th>
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<th>BM2113</th>
<th>TGLA53</th>
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<th>SPS115</th>
<th>TGLA126</th>
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Future Plans

• Retest of the Dawson County Producers Herd for release of quarantine. Testing to begin Oct. 21 and be completed by end of November? All cattle over 24 months will be tested. Comparative cervical testing will be done on all CFT responders.

• Additional investigation of the feedlot and conduct any subsequent herd testing deemed appropriate based on those findings.
Late fall and winter TB testing in Nebraska
Lessons learned from this case

- In-depth research of records with “some identification” that is animal specific for herd of origin can be beneficial, even if not “official ID”.
- Owners who are truthful can eliminate a lot of un-necessary trace work.
- Lineage testing of parentage and siblings is valuable to prove herd of origin, especially when FSIS removes DNA from infected animal’s identification tags.
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