USDA

United States Department of Agriculture

Current Issues in Bovine Brucellosis and Tuberculosis

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USDA's Field Epidemiologic Investigation Unit (FEIS)

National Animal Health Monitoring System

August 2013

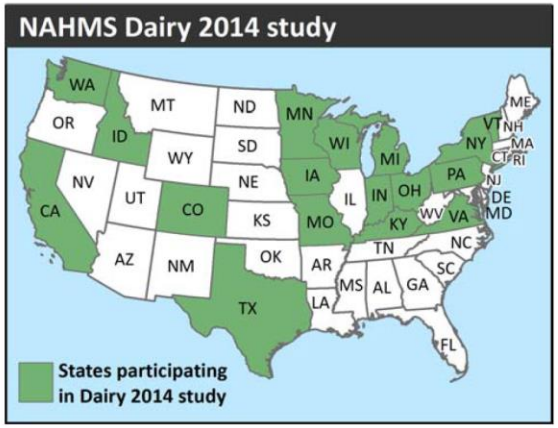
NAHMS Dairy 2014 Study

In January 2014, the USDA's National Animal Health Monitoring System (NAHMS) will launch its sixth national dairy study. Dairy 2014 will take an in-depth look at U.S. dairy operations, and provide the industry with new and valuable information regarding trends in the dairy industry from 1991 to 2014.

Study focus

For the study, NAHMS asked dairy producers, industry stakeholders, and government officials to provide input and define the information needs of the dairy industry. During this process, six study objectives were identified:

- Describe trends in dairy cattle health and management practices.
- Describe management practices and production measures related to animal welfare.
- Estimate the prevalence of lameness, and evaluate housing and management factors associated with lameness.
- Evaluate calf health from birth to weaning.
- Describe antibiotic use and residue prevention methods used to ensure milk and meat quality.
- Estimate the prevalence and antimicrobial resistance patterns of select foodborne pathogens.



What your participation involves

In January 2014, representatives from the USDA's National Agricultural Statistics Service (NASS) will contact selected producers in 17 States. NASS representatives will conduct personal interviews with all participating operations with 30 or more cows. NASS will mail a brief questionnaire to all other participating operations (fewer than 30 cows). Operations that do not respond to the mail-in questionnaire by the

APHIS Info Sheet

Veterinary Services
Center for Epidemiology and Animal Health

October 2019

Determining U.S. Milk Quality Using Bulk-Tank Somatic Cell Counts, 2018

Summary

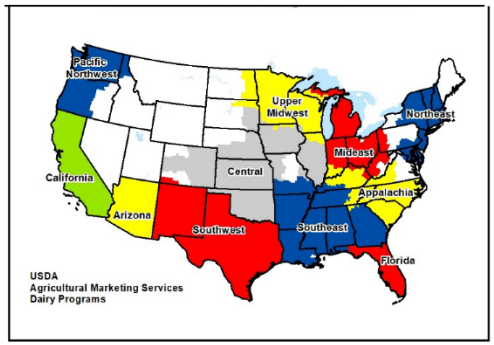
Bulk-tank somatic cell counts (BTSCCs) from monitored Federal Milk Marketing Orders (FMMOs) are indicative of the quality of the Nation's milk supply. In 2018, the milk-weighted geometric BTSCC mean in the United States was 172,000 cells/mL, a decrease from 181,000 in 2017. Milk-weighted BTSCCs take into account the amount of milk shipped by a producer, resulting in an overall BTSCC mean of monitored milk. The producer BTSCC—which is a geometric, nonmilk-weighted mean of all shipments—was 206,000 cells/mL, a decrease from the 211,000 cells/mL calculated in 2017. Overall, BTSCCs have decreased since 2002.

The BTSCCs for three of the four FMMOs decreased from 2017 to 2018. Seven of the 12 States shipping 60 percent or more of their milk through the 4 monitored FMMOs had lower BTSCCs in 2018 than in 2017. Producers that shipped 500,000 lb of milk or more per month had lower BTSCCs than producers that shipped fewer than 500,000 lb per month. In summer, BTSCCs increased, whereas the percentages of fat and protein in milk decreased. Improvements in U.S. dairy management practices are responsible for the decrease in BTSCCs and the corresponding improvement in milk quality since 2002.

Background

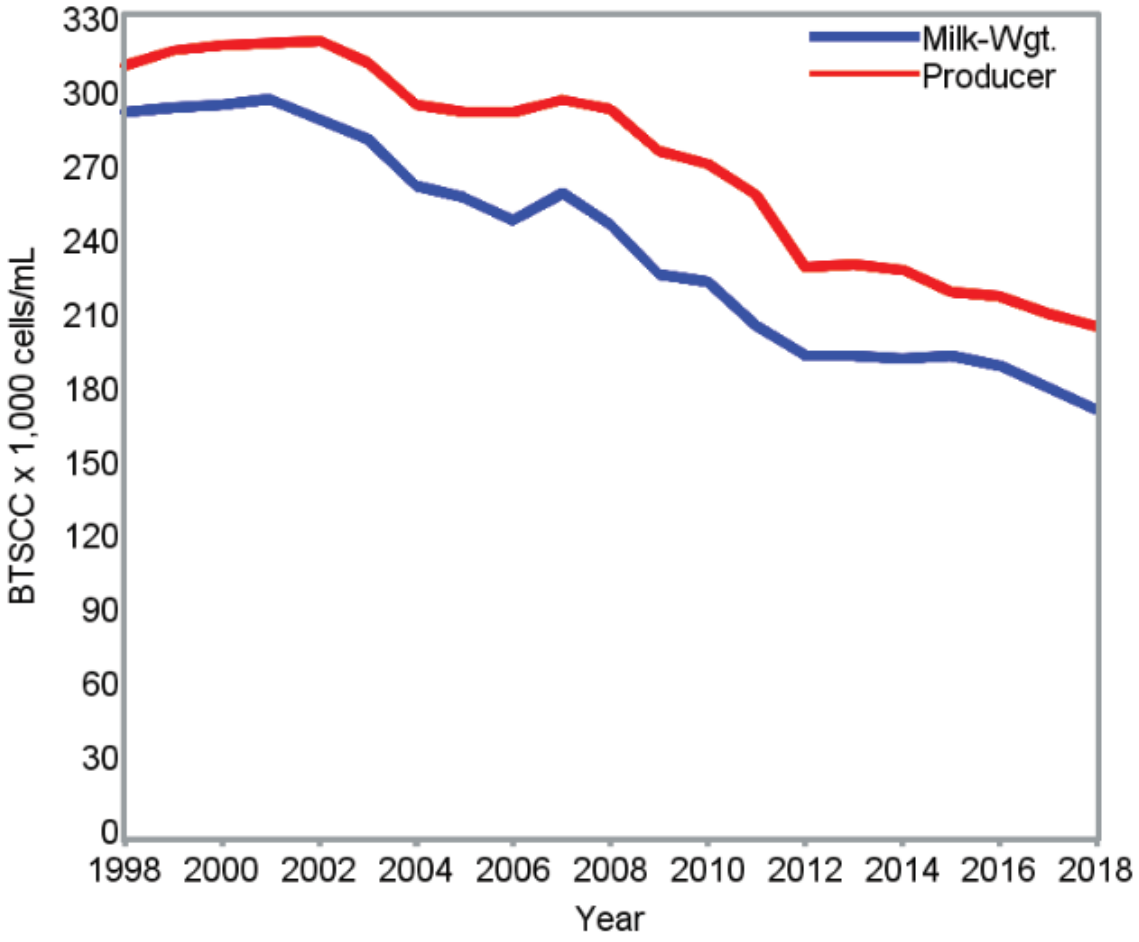
The USDA's Animal and Plant Health Inspection Service's Center for Epidemiology and Animal Health, in conjunction with the USDA's Agricultural Marketing Service and the National Mastitis Council's Milk Quality Monitoring Committee, monitor U.S. milk quality using data from BTSCCs. Data are provided by 4 of the Nation's 11 FMMOs*): Central, Mideast, Southwest, and Upper Midwest (figure 1). The remaining seven FMMOs do not collect data on BTSCCs.

Figure 1. Federal Milk Marketing Orders



By definition, BTSCCs are the number of white blood cells (primarily macrophages and leukocytes), secretory cells, and squamous cells per milliliter of raw milk.[1] BTSCCs are used as measures of milk quality and as indicators of overall udder health. There is an inverse relationship between BTSCCs and cheese yield and the quality/shelf life of pasteurized fluid milk.[2 3 4] Multiple studies have shown that operations with increased BTSCCs are more likely to have milk that violates antibiotic residue standards.[5 6 7] The most frequently cited reason for antibiotic residues in milk is inadvertently placing cows treated with antibiotics in the milking string before completing the recommended withdrawal period.[6]

U.S. Bulk-Tank Somatic Cell Counts 2018



Outline

- Bovine brucellosis overview
  - Brucellosis Eradication Program
  - Bovine *Brucella abortus* RB51 vaccine
  - Bovine *Brucella abortus* strain RB51 cases
  - USDA recommendations
- Bovine tuberculosis overview
  - Human to cattle transmission

Sir David Bruce (1855 – 1931)

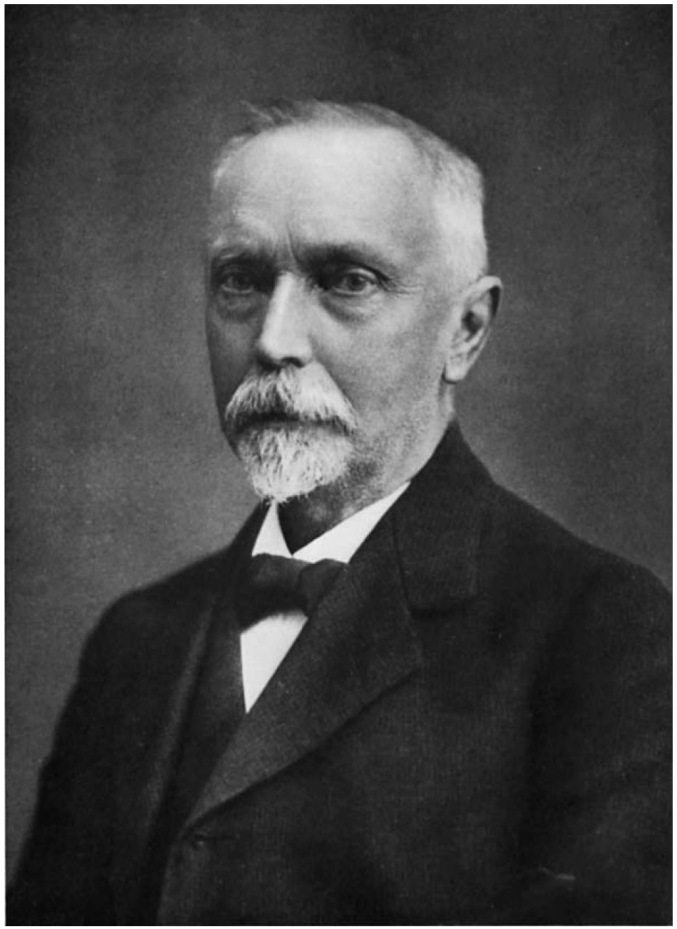
- Army physician and microbiologist
- 1887 – Isolated the cause of Malta Fever
- Goats milk implicated
- *Micrococcus melitensis*

  → *Brucella melitensis*

Bernard Bang (1848 – 1932)

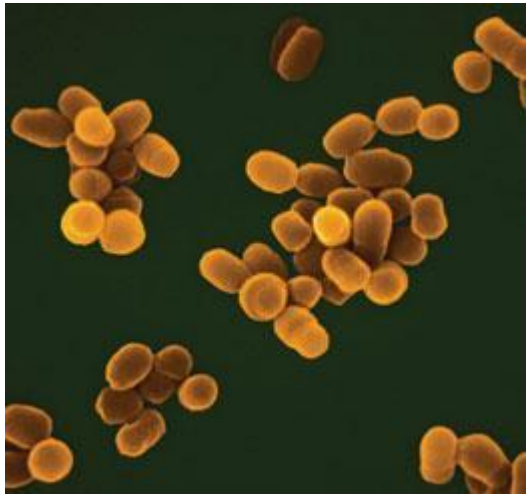
- Physician and veterinarian
- 1885 – Isolated TB from milk w/o ‘udder infection’
- 1897 – Isolated *Bacillus abortus* from “contagious abortion”

→ *Brucella abortus*



Brucellosis

- Zoonotic disease found worldwide
- Gram negative coccobacilli
  - ***Brucella abortus***
  - *B. melitensis*
  - *B. suis*
  - *B. ovis*
  - *B. canis*

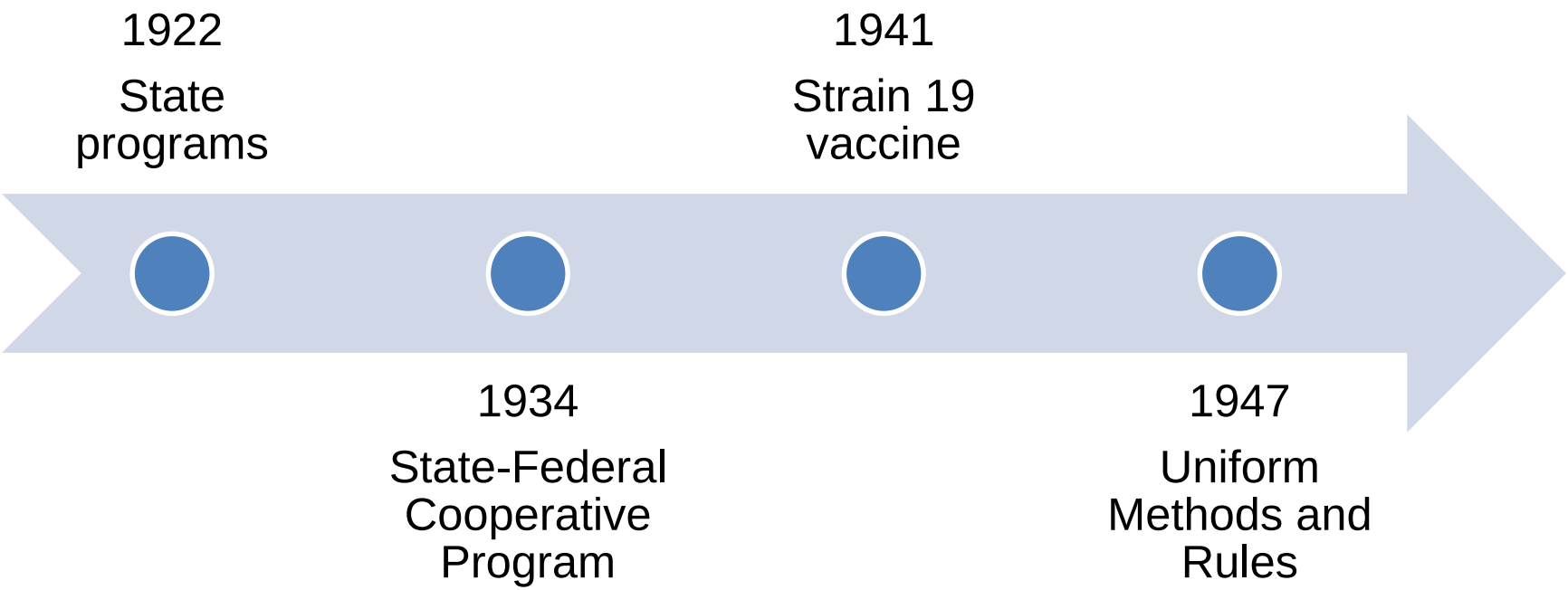


- *B. abortus aka* 'contagious abortion', 'Bang's disease', and 'undulant fever'

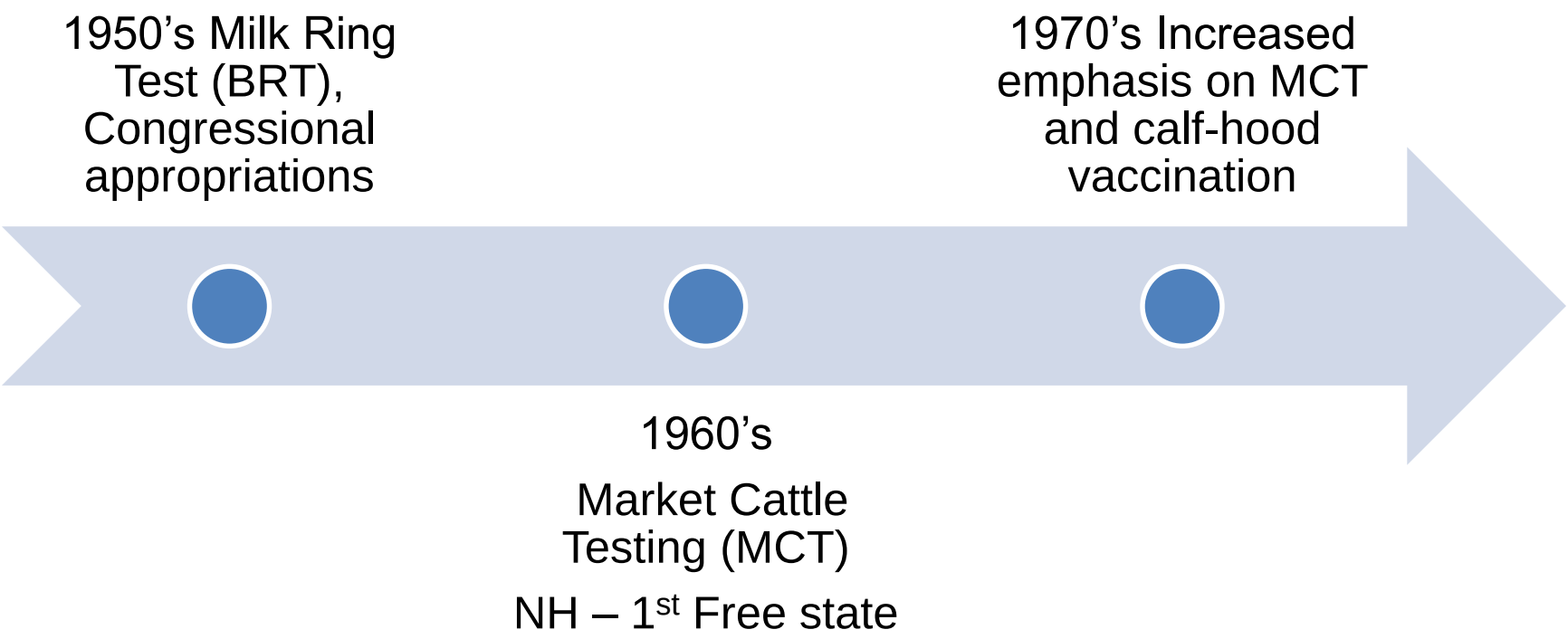
Bovine Brucellosis

- Ingestion is the primary route of infection
- Predilection for reproductive organs
- Present in aborted fetuses, placenta, fetal fluids and milk
- Abortion storms
  - 30-80% cows abort

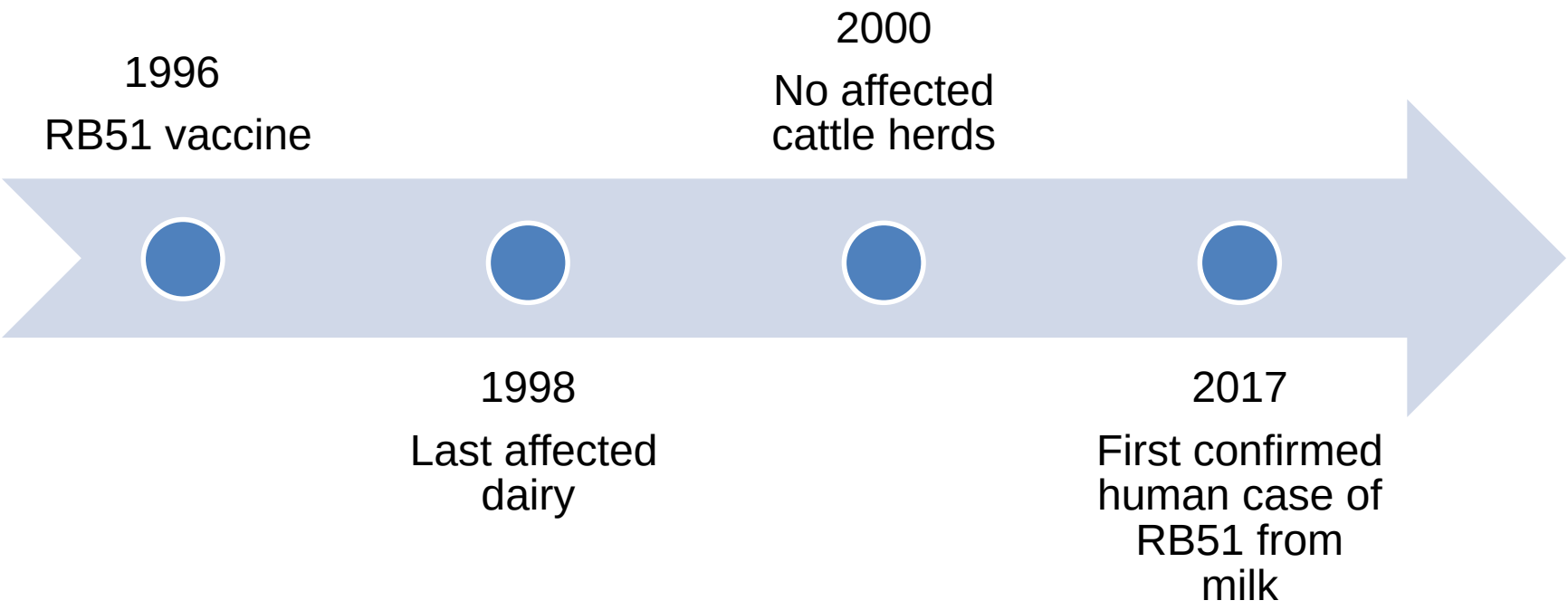
Brucellosis Eradication Program Timeline



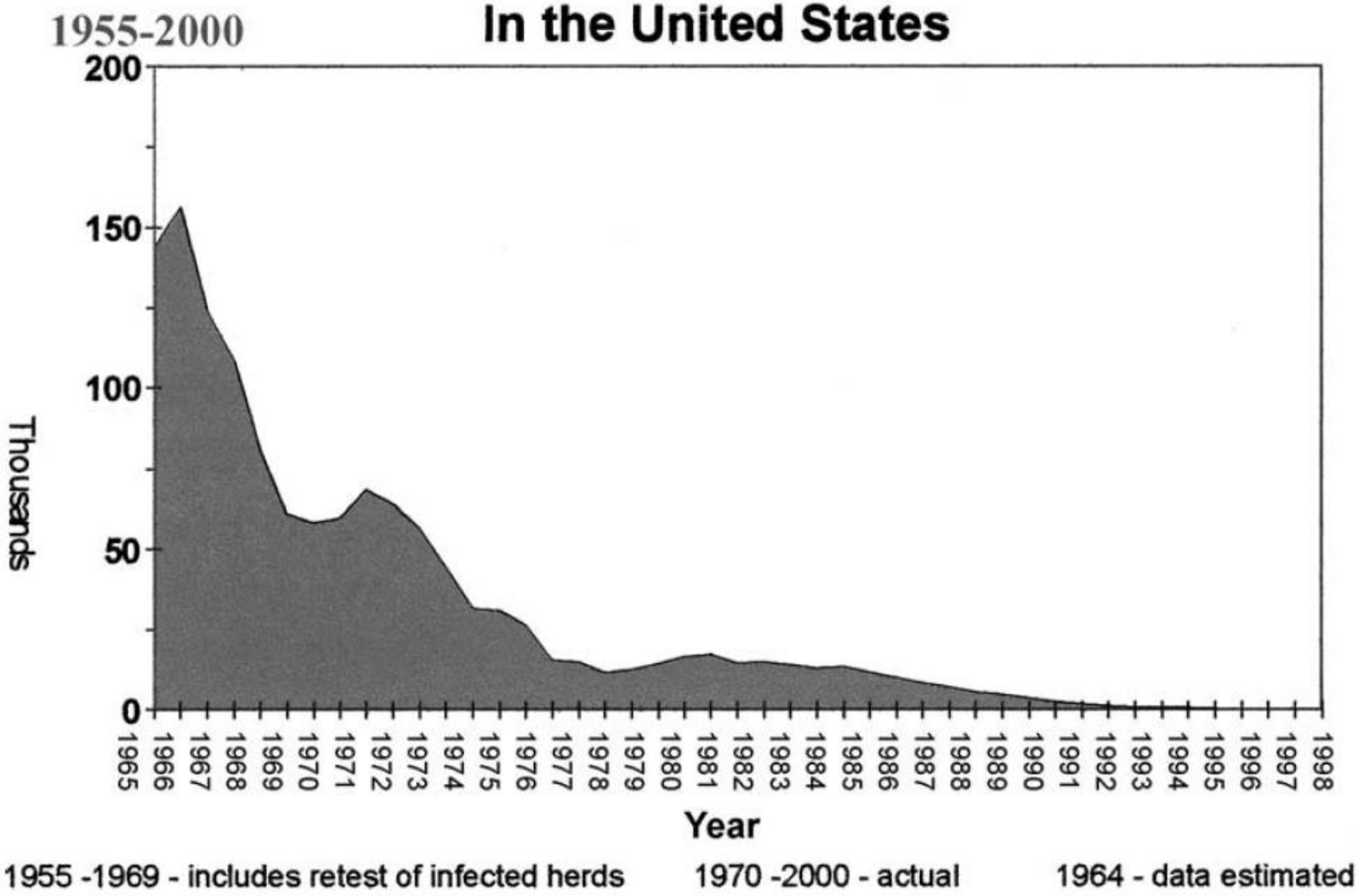
Brucellosis Eradication Program Timeline (cont)



Brucellosis Eradication Program Timeline (cont)

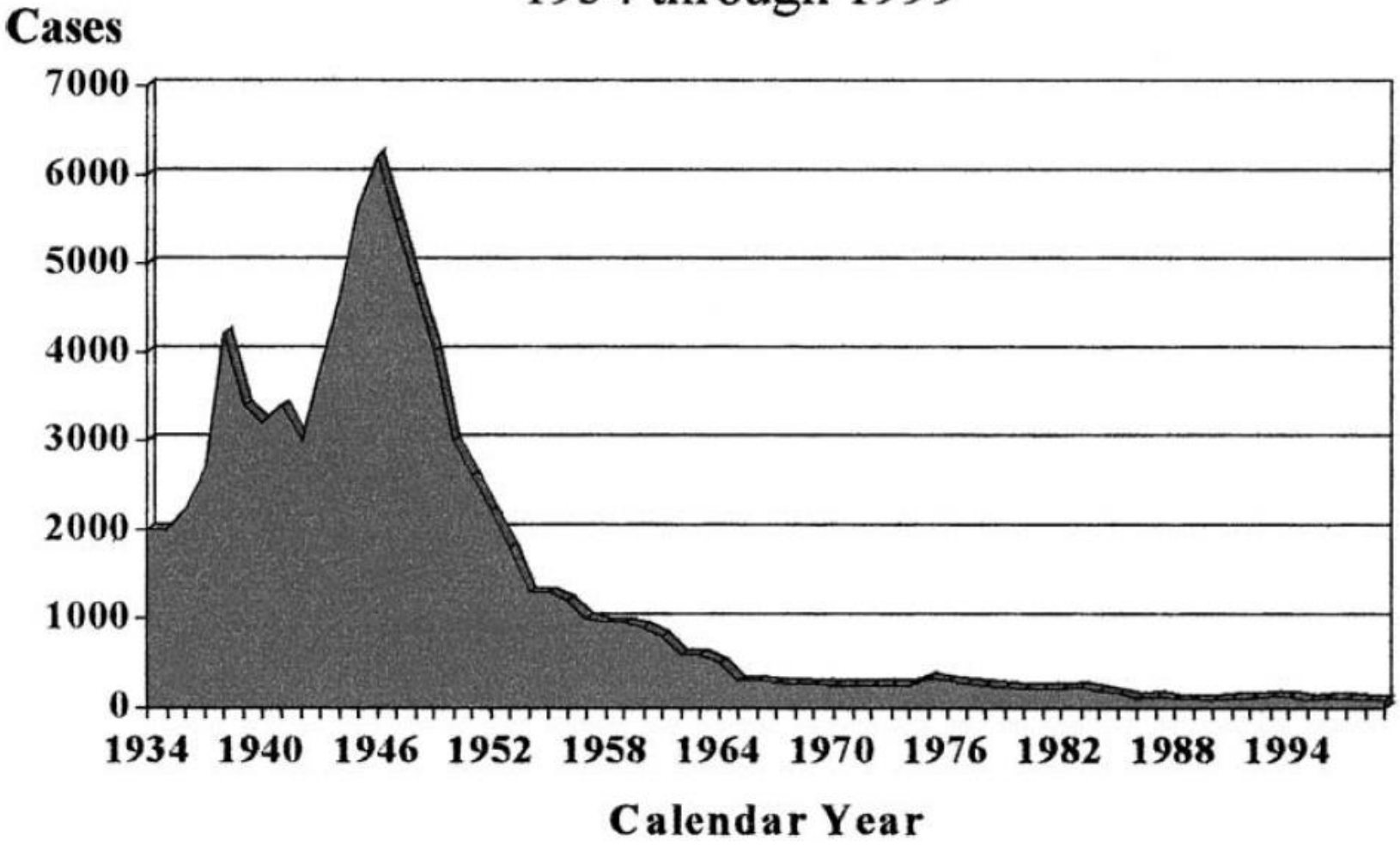


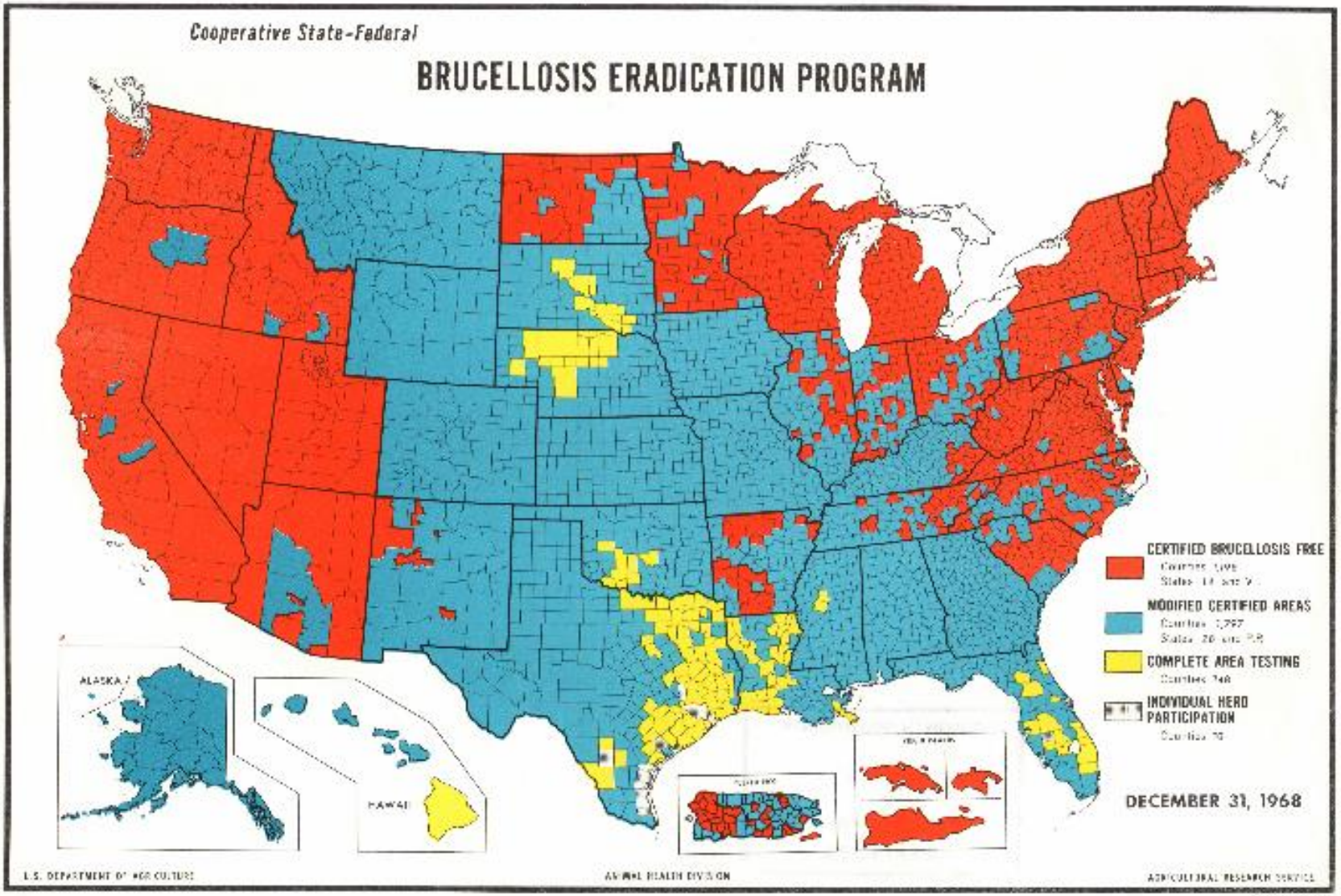
Brucellosis Infected Cattle Herds In the United States



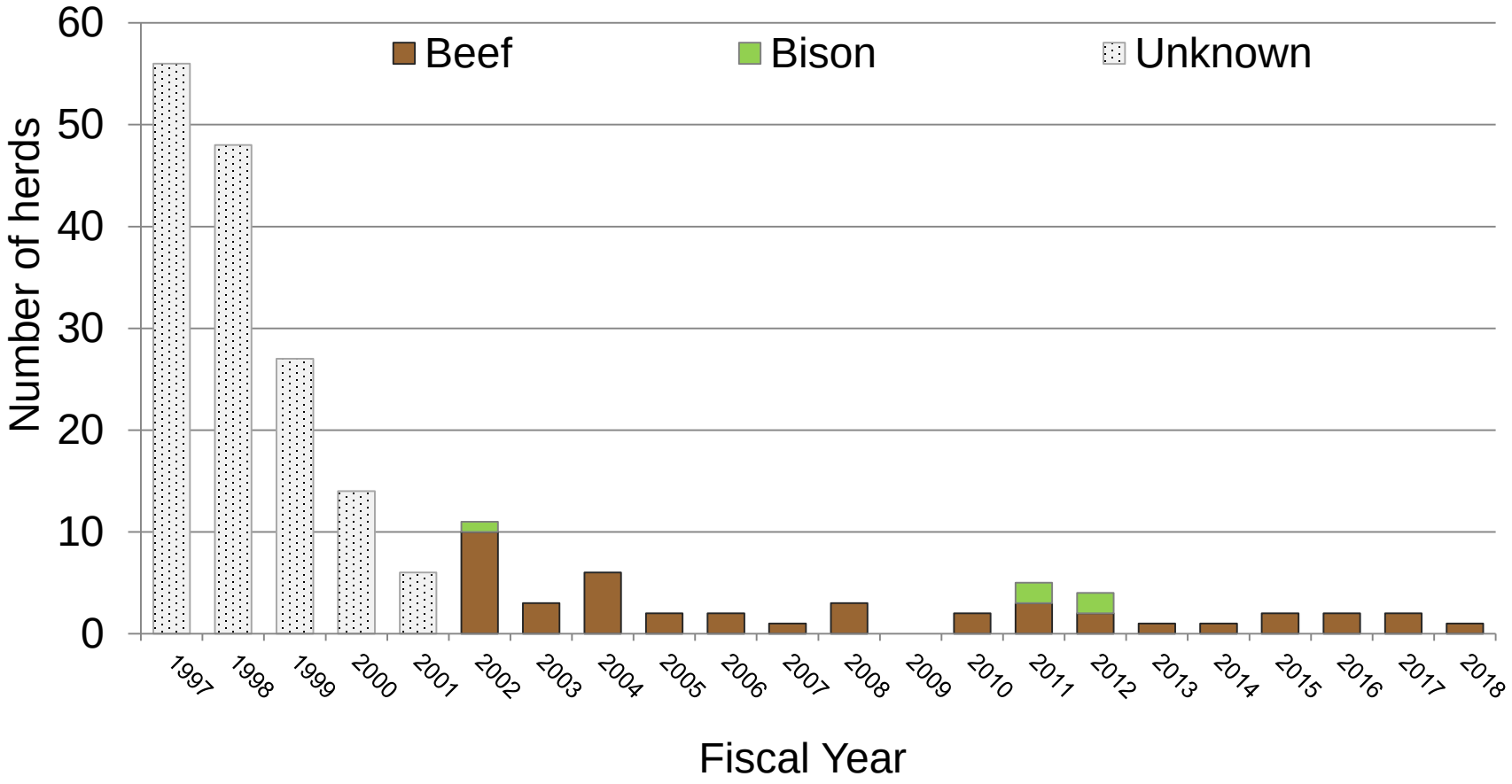
1955 -1969 - includes retest of infected herds 1970 -2000 - actual 1964 - data estimated

Human Brucellosis in the United States
1934 through 1999




Cooperative State-Federal
BRUCELLOSIS ERADICATION PROGRAM
CERTIFIED BRUCELLOSIS FREE
MODIFIED CERTIFIED AREAS
COMPLETE AREA TESTING
INDIVIDUAL HERD PARTICIPATION
DECEMBER 31, 1968
ALASKA
HAWAII
U.S. DEPARTMENT OF AGRICULTURE
ANIMAL HEALTH DIVISION
AGRICULTURAL RESEARCH SERVICE

Brucellosis Affected Cattle/Bison Herds, FY 1997-2018



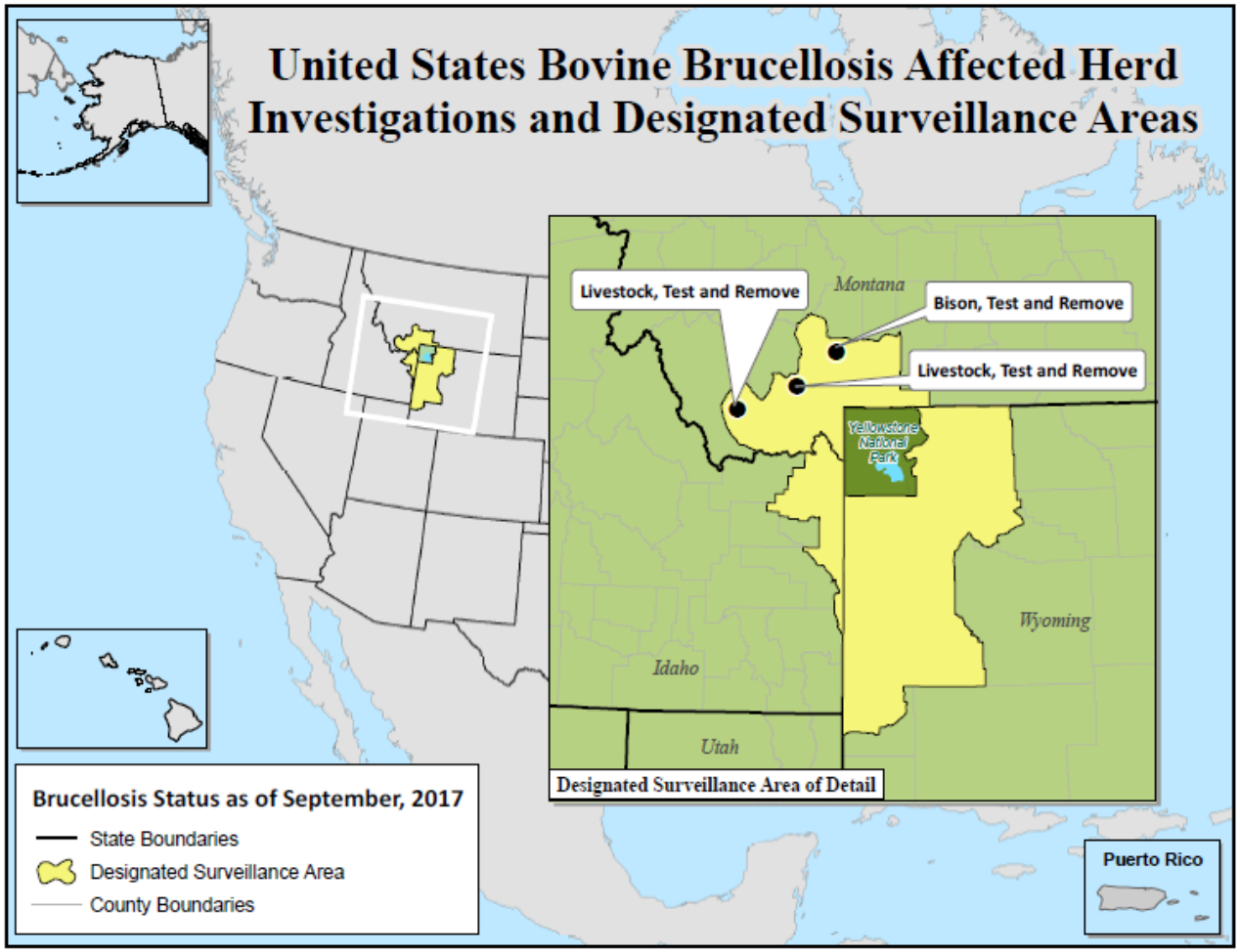
Current Brucellosis Status

- Geographic disease – Greater Yellowstone Area (GYA)
  - Wildlife reservoir in elk and bison
- 2018 – 1 newly affected herd/913,000 total herds
- No affected dairies since 1998 and no affected herds outside GYA since 2011 and counting…
- All 50 states considered free

GYA Nidus
DSAs began - 2010

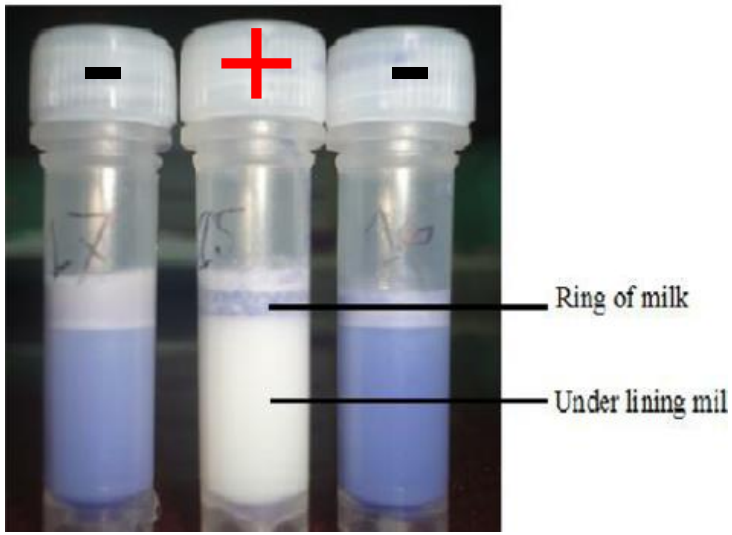
Enhanced surveillance in high risk areas
State-managed, APHIS oversight

17 affected herds in the 3 GYA states since 2010



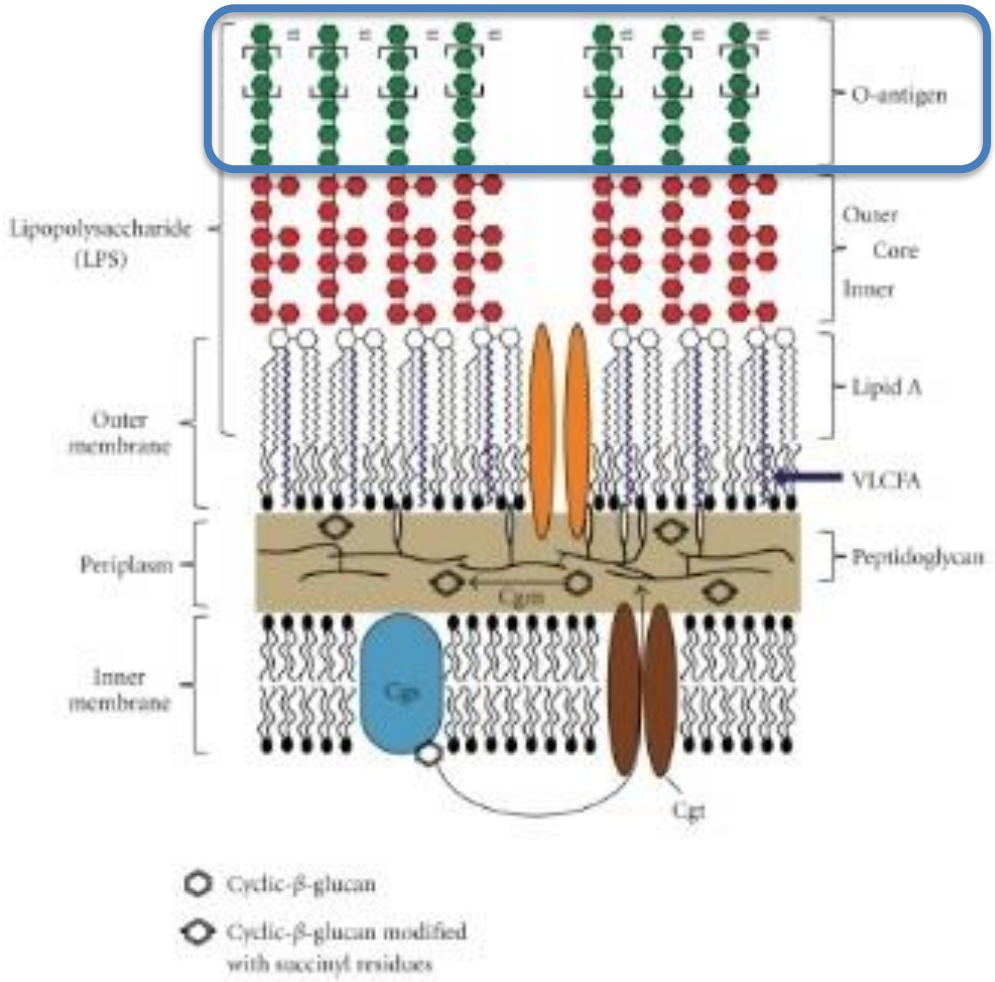
Brucellosis Eradication Program

- Identify infected cattle/herds
  - Surveillance
  - Testing (e.g., BRT)
  - Trace investigations
- Vaccination



Brucella

- *B. abortus* wild type
  - O antigen
  - Smooth colonies
  - Antibodies produced
  - Serological tests detect
  - Susceptible to Rifampin



Brucella abortus RB-51

- Attenuated, live virus vaccine strain
  - developed by serial passage in media containing penicillin and rifampin and selecting rough colonies
- Implemented in 1996; replaced Strain 19
- Stimulates cell-mediated immunity
- Not recognized by routine serological tests

Brucella abortus RB-51

- Administered at 4-12 months of age
- Tattooed with ‘R’ and last digit of year
- ~ 4 million calves vaccinated annually
- ~32% of dairy operations[1]
- ~42% of dairy cows[1]
- ~24% of beef operations[2]
- ~38% of beef cows[2]

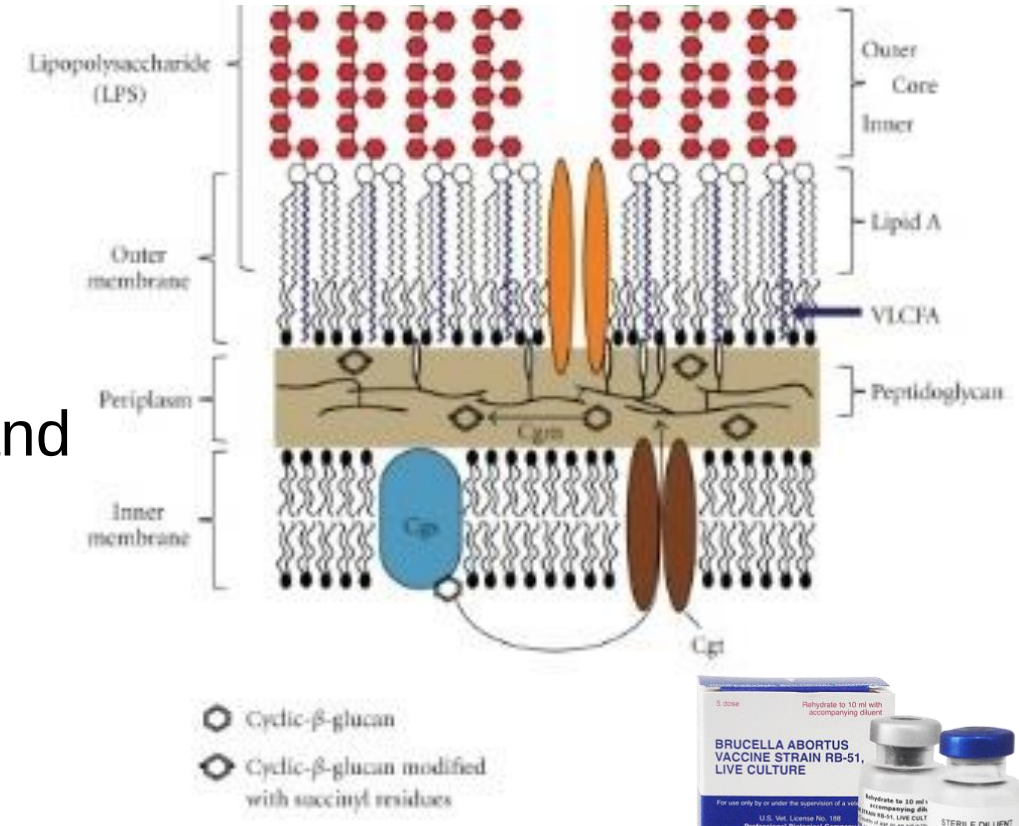
[1] NAHMS Dairy 2014
[2] NAHMS Beef cow-calf 2007-8

Brucella abortus RB-51

- Generally not pathogenic in cattle and other livestock
- Can cause persistent infection in cattle
- Pathogenic in humans
  - Pregnant
  - Immunocompromised

Brucella

- *B. abortus* strain RB51
  - No O antigen
  - Undetectable with serologic tests
  - Organism identification tests – Culture, PCR
  - Resistant to Rifampin and Penicillin



Investigation of Bovine Cases

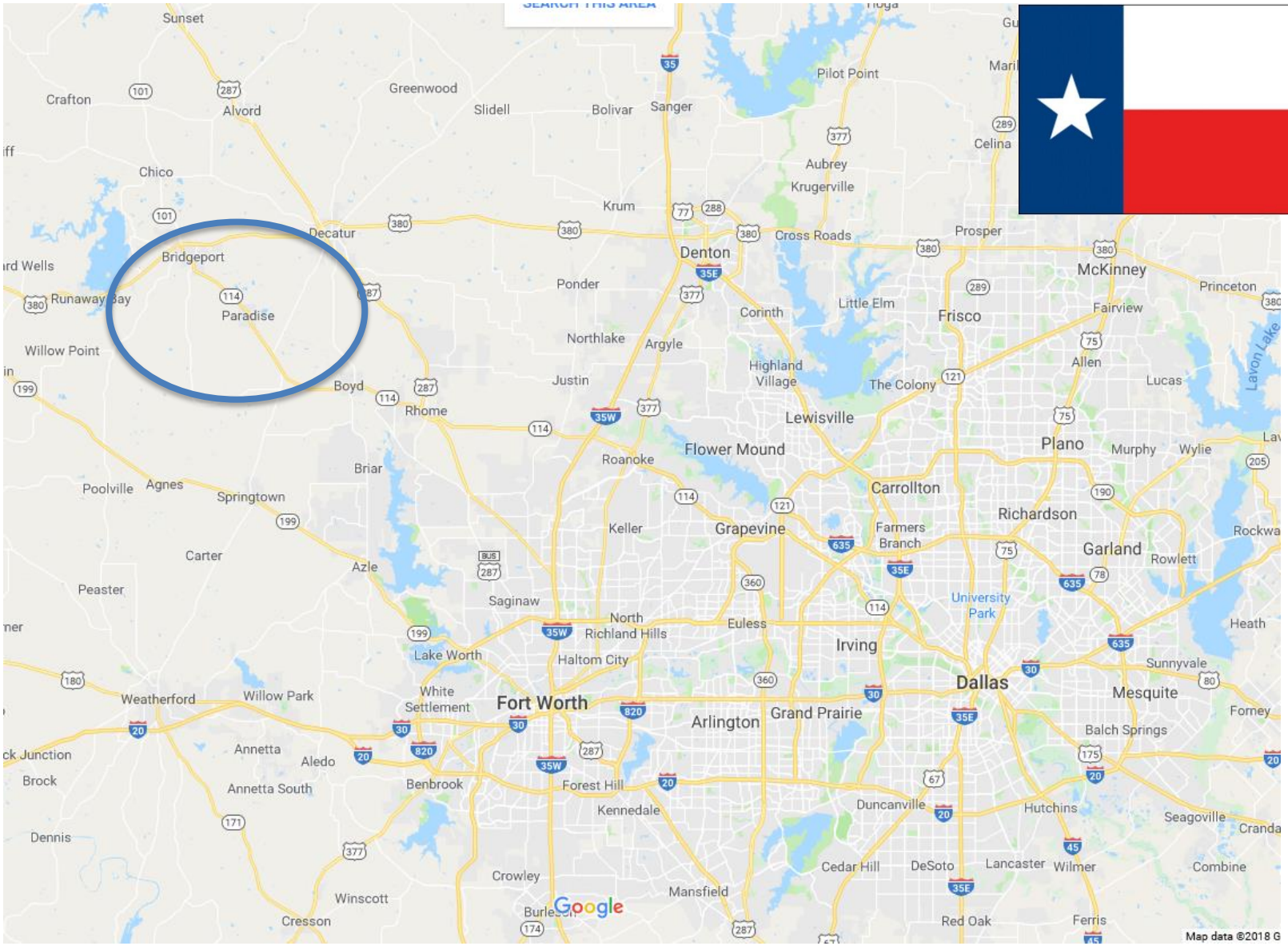
TX

Human Case

July 26, 2017

- Pregnant woman
- Febrile
- RB51 infection confirmed August 7, 2017
- Lived in Texas

- Consumed raw milk from K-Bar Dairy


Sunset
Crafton
Alvord
Greenwood
Slidell
Bolivar
Sanger
Pilot Point
Celina
Aubrey
Krugerville
Chico
Krum
Decatur
Bridgeport
Runaway Bay
Paradise
Willow Point
Boyd
Rhome
Ponder
Northlake
Argyle
Justin
Denton
Cross Roads
Prosper
McKinney
Princeton
Corinth
Little Elm
Frisco
Fairview
Highland Village
The Colony
Allen
Lucas
Lewisville
Flower Mound
Roanoke
Plano
Murphy
Wylie
Briar
Poolville
Agnes
Springtown
Carrollton
Richardson
Keller
Grapevine
Farmers Branch
Garland
Rowlett
Carter
Azle
Peaster
Saginaw
North Richland Hills
Euless
University Park
Irving
Heath
Lake Worth
Haltom City
Sunnyvale
Dallas
Weatherford
Willow Park
White Settlement
Fort Worth
Arlington
Grand Prairie
Mesquite
Forney
Balch Springs
Annetta
Aledo
Brock
Annetta South
Benbrook
Forest Hill
Kennedale
Duncanville
Hutchins
Seagoville
Dennis
Crowley
Cedar Hill
DeSoto
Lancaster
Wilmer
Combine
Winscott
Cresson
Mansfield
Red Oak
Ferris
Google
Map data ©2018 G

Texas Raw Milk Dairy: Regulations

Texas Department of State Health Services (DSHS)

- Regulates milk and milk products
  - Issues permits: “Grade A Raw for Retail”
  - Must sell direct to public, maintain records of sales
  - Inspection by registered sanitarian twice yearly
  - Requires bulk tank milk samples testing every 6 weeks for aflatoxin and pathogens (*Salmonella, Campylobacter*)
  - Requires annual brucellosis and TB herd test

Texas Animal Health Commission (TAHC)

- Regulates animal health and administers milk ring test required by DSHS

Texas Raw Milk Dairy: History

- K- Bar Dairy
  - "Raw to Retail" licensed since October 2013
  - Family owned and operated
  - 43 Jersey cows, replacements both raised and purchased
  - Most heifers vaccinated with RB51
  - Last routine bulk milk test 5/25/2017 - 1 tube BRT positive, HIRT negative

Texas Raw Milk Dairy: Investigation

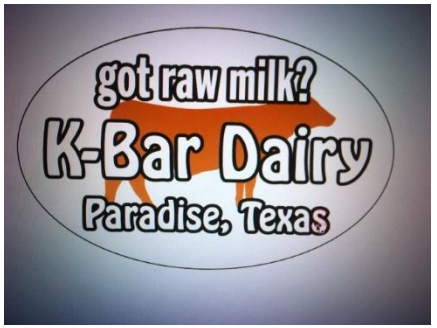
- 7/27/2017
  - Herd tested by private DVM
    - Negative on serological tests
- 8/10/2017
  - Individual milk samples collected by TAHC
    - Culture, PCR, BRT, ELISA
    - Culture yielded *B. abortus* strain RB51 in 2 cows

Texas Raw Milk Dairy: Investigation

- *B. abortus* strain RB51-positive cows
  - Both born on dairy in 2014
  - Both second lactation, recently fresh
  - Both vaccinated as heifers with RB51
  - Both Jersey breed

Texas Raw Milk Dairy: Investigation

- Cow 120
  - Calved August 2017, retagged, not on vaccination chart but presumed vaccinated with birth cohorts
- Cow 124
  - Calved June 2017, vaccinated at 5 months of age



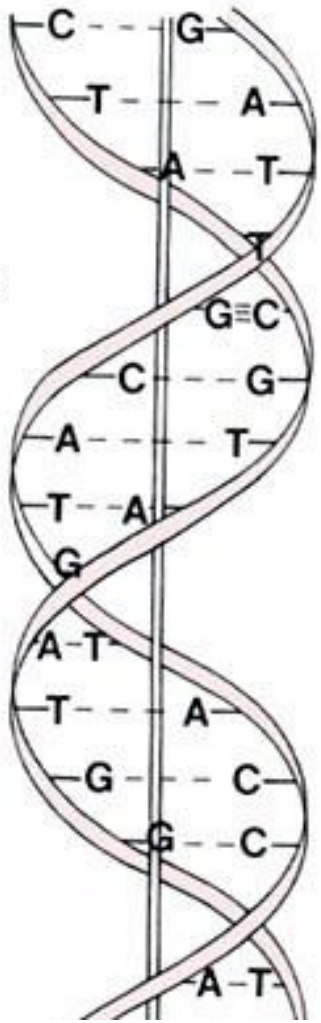
Texas Raw Milk Dairy: Investigation

- 9/11/2017
  - Cow 120 and 124 necropsied and tissues collected
    - 120 – *B. abortus* strain RB51
      - 3/20 tissue samples culture positive
      - Milk – 10 CFU/mL
    - 124 – *B. abortus* strain RB51
      - 15/20 tissue samples culture positive
      - Milk – 37,000 CFU/mL

  - Whole genome sequencing was performed

Whole Genome Sequencing

- Provides a method of comparing bacterial or viral strains
- Based on reference strain with nucleotides at specific locations
  - **T**hymine, **C**ytosine, **A**denine, and **G**uanine
- Single Nucleotide Polymorphism (SNP)
  - Change in a nucleotide from reference strain or other known strains
  - Displayed in a SNP Table



SNP Table

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reference nucleotide call	A	A	C	G	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C
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B-REF-RB51_Vaccine_Seed	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	K	R	C	K	C	T	C
B17-0771_Vaccine_Serial_TX_Dairy	G	G	C	G	G	G	G	T	A	A	A	C	C	K	C	K	C	M	K	R	S	K	Y	T	C
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B17-0575_Milk_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y
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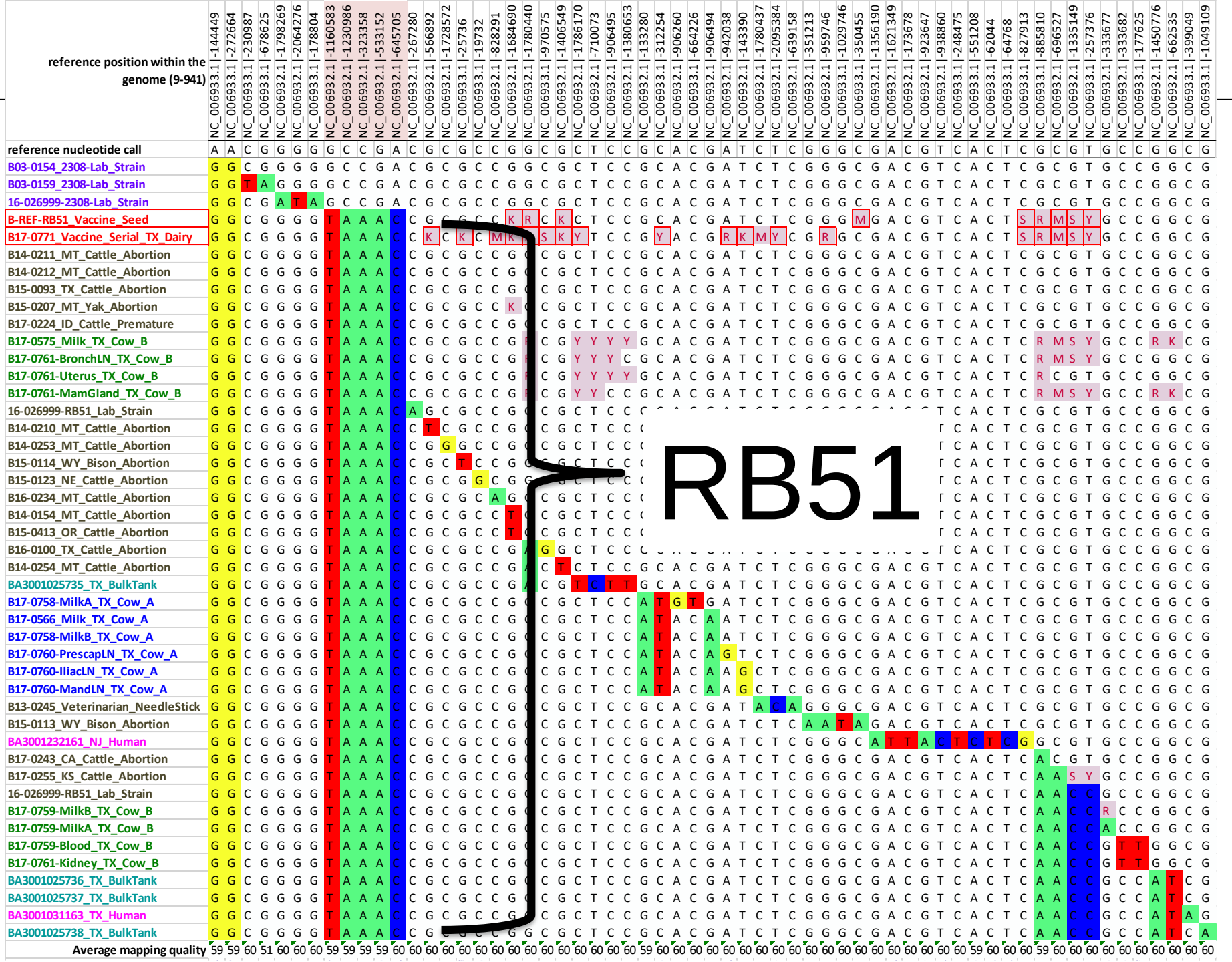
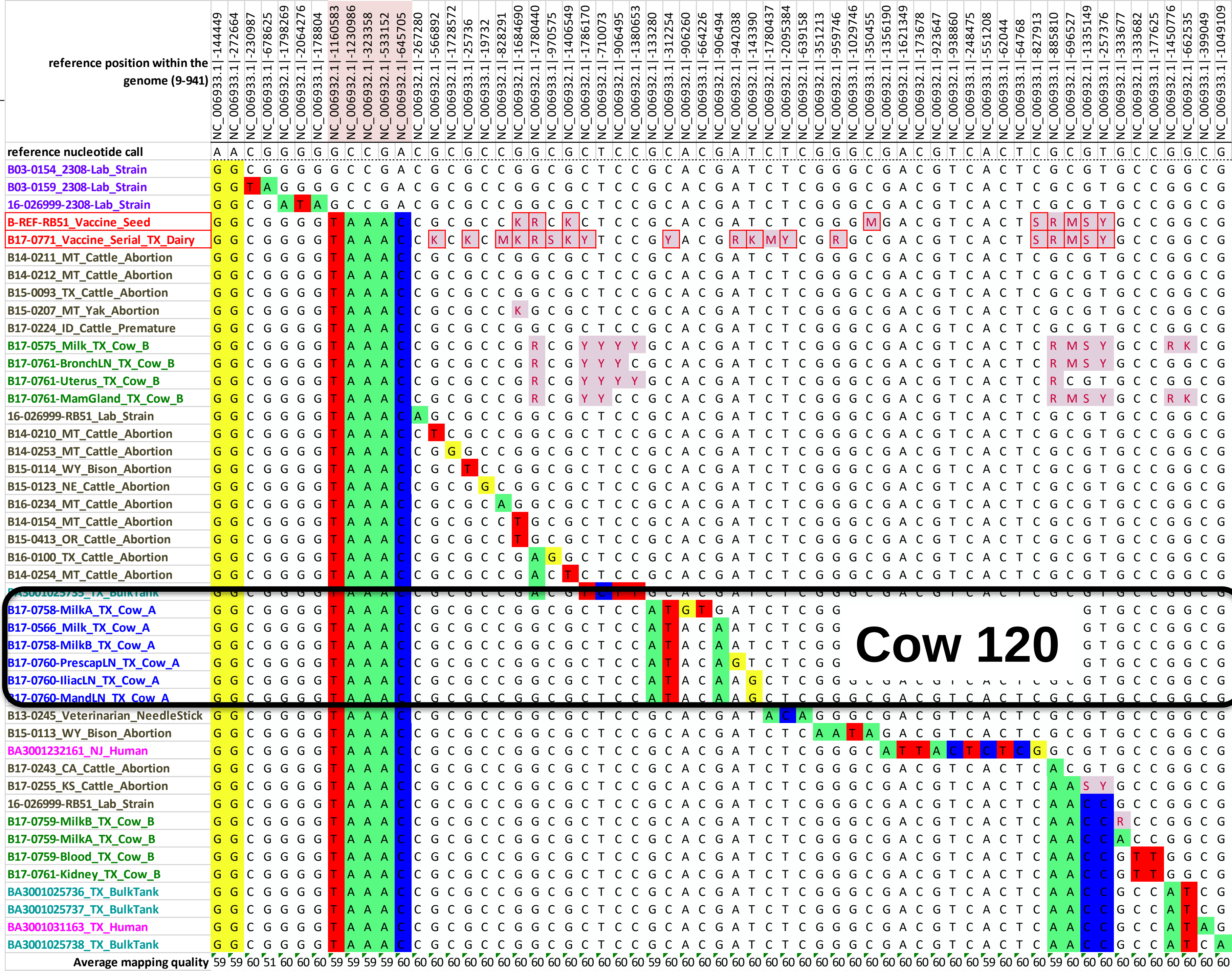
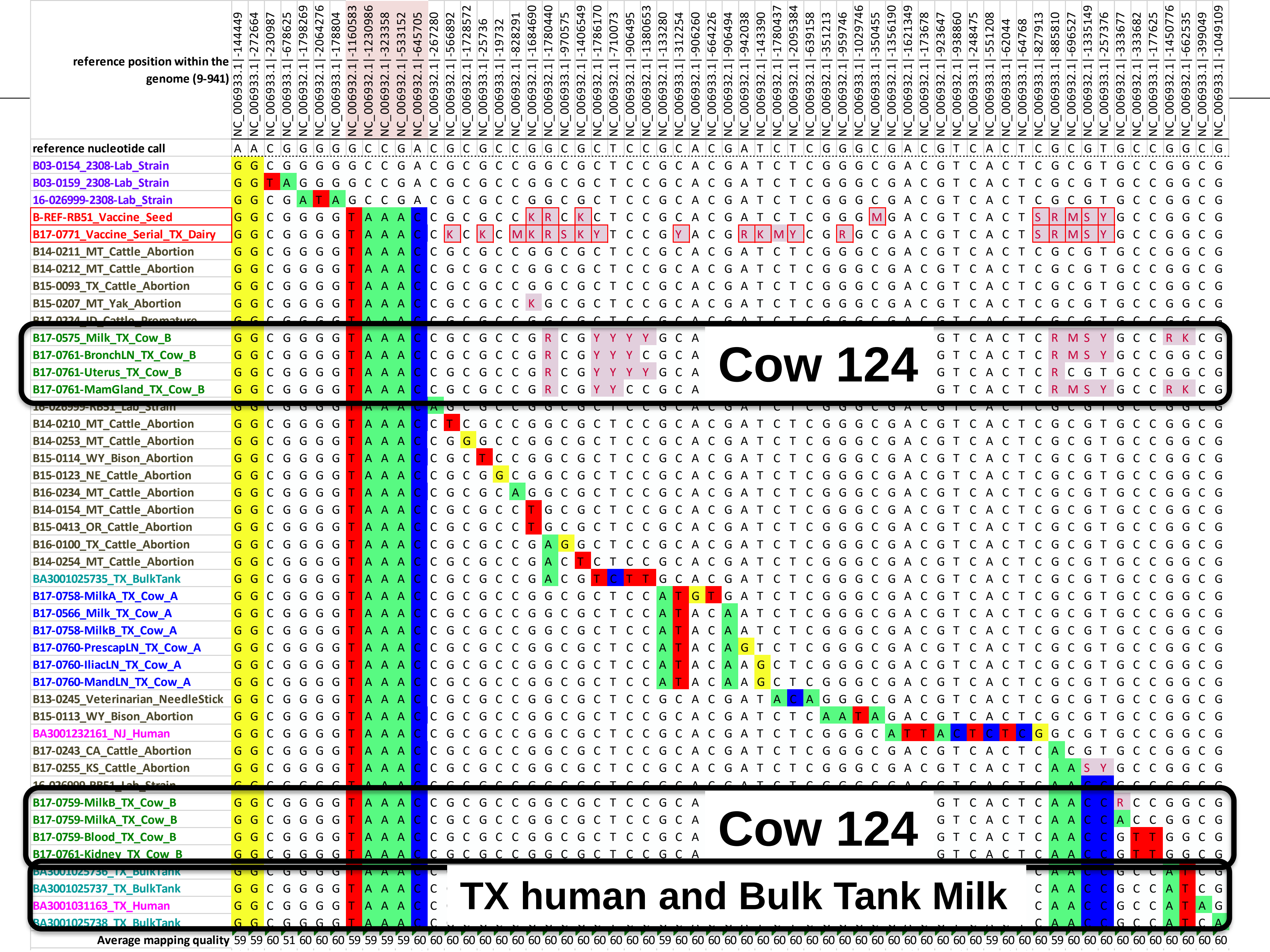
reference position within the genome (9-941)	NC_006933.1|-144449	NC_006933.1|-272664	NC_006933.1|-230987	NC_006933.1|-678625	NC_006932.1|-1798269	NC_006932.1|-2064276	NC_006933.1|-178804	NC_006932.1|-1160583	NC_006932.1|-1230986	NC_006932.1|-323358	NC_006932.1|-533152	NC_006932.1|-645705	NC_006932.1|-267280	NC_006932.1|-566892	NC_006932.1|-1728572	NC_006933.1|-25736	NC_006933.1|-19732	NC_006932.1|-828291	NC_006932.1|-1684690	NC_006932.1|-1780440	NC_006933.1|-970575	NC_006932.1|-1406549	NC_006932.1|-1786170	NC_006932.1|-710073	NC_006932.1|-906495	NC_006932.1|-1380653	NC_006932.1|-133280	NC_006933.1|-312254	NC_006932.1|-906260	NC_006933.1|-664226	NC_006932.1|-906494	NC_006932.1|-942038	NC_006932.1|-143390	NC_006932.1|-1780437	NC_006932.1|-2095384	NC_006932.1|-639158	NC_006932.1|-351213	NC_006932.1|-959746	NC_006933.1|-1029746	NC_006933.1|-350455	NC_006932.1|-1356190	NC_006932.1|-1621349	NC_006932.1|-173678	NC_006932.1|-923647	NC_006932.1|-938860	NC_006933.1|-248475	NC_006933.1|-551208	NC_006933.1|-62044	NC_006933.1|-64768	NC_006933.1|-827913	NC_006933.1|-885810	NC_006932.1|-696527	NC_006932.1|-1335149	NC_006933.1|-257376	NC_006932.1|-333677	NC_006932.1|-333682	NC_006933.1|-177625	NC_006932.1|-1450776	NC_006932.1|-662535	NC_006933.1|-399049	NC_006933.1|-1049109
reference nucleotide call	A	A	C	G	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B03-0154_2308-Lab_Strain	G	G	C	G	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B03-0159_2308-Lab_Strain	G	G	T	A	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
16-026999-2308-Lab_Strain	G	G	C	G	A	T	A	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B-REF-RB51_Vaccine_Seed	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	K	R	C	K	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	M	G	A	C	G	T	C	A	C	T	S	R	M	S	Y	G	C	C	G	G	C	G
B17-0771_Vaccine_Serial_TX_Dairy	G	G	C	G	G	G	G	T	A	A	A	C	C	K	C	K	C	M	K	R	S	K	Y	T	C	C	G	Y	A	C	G	R	K	M	Y	C	G	R	G	C	G	A	C	G	T	C	A	C	T	S	R	M	S	Y	G	C	C	G	G	C	G
B14-0211_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0212_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0093_TX_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0207_MT_Yak_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	K	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0224_ID_Cattle_Premature	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0575_Milk_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y	Y	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	M	S	Y	G	C	C	R	K	C	G
B17-0761-BronchLN_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	M	S	Y	G	C	C	G	G	C	G
B17-0761-Uterus_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y	Y	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	C	G	T	G	C	C	G	G	C	G
B17-0761-MamGland_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	M	S	Y	G	C	C	R	K	C	G
16-026999-RB51_Lab_Strain	G	G	C	G	G	G	G	T	A	A	A	C	A	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0210_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	T	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0253_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	G	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0114_WY_Bison_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	T	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0123_NE_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	G	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B16-0234_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	A	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0154_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	T	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0413_OR_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	T	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B16-0100_TX_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	A	G	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0254_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	A	C	T	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
BA3001025735_TX_BulkTank	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	A	C	G	T	C	T	T	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0758-MilkA_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	G	T	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0566_Milk_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0758-MilkB_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0760-PrescapLN_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	G	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0760-IliacLN_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	G	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0760-MandLN_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	G	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B13-0245_Veterinarian_NeedleStick	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	A	C	A	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0113_WY_Bison_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	A	A	T	A	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
BA3001232161_NJ_Human	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	A	T	T	A	C	T	C	T	C	G	G	C	G	T	G	C	C	G	G	C	G
B17-0243_CA_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	C	G	T	G	C	C	G	G	C	G
B17-0255_KS_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	S	Y	G	C	C	G	G	C	G
16-026999-RB51_Lab_Strain	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	C	C	G	G	C	G
B17-0759-MilkB_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	R	C	C	G	G	C	G
B17-0759-MilkA_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	A	C	C	G	G	C	G
B17-0759-Blood_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	T	T	G	G	C	G
B17-0761-Kidney_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	T	T	G	G	C	G
BA3001025736_TX_BulkTank	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	C	C	A	T	C	G
BA3001025737_TX_BulkTank	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	C	C	A	T	C	G
BA3001031163_TX_Human	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	C	C	A	T	A	G
BA3001025738_TX_BulkTank	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	C	C	A	T	C	A
Average mapping quality	59	59	60	51	60	60	60	59	59	59	59	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	59	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	59	60	60	60	59	60	60	60	60	60	60	60	60	60	60


RB51



reference position within the genome (9-941)
reference nucleotide call
B03-0154_2308-Lab_Strain
B03-0159_2308-Lab_Strain
16-026999-2308-Lab_Strain
B-REF-RB51_Vaccine_Seed
B17-0771_Vaccine_Serial_TX_Dairy
B14-0211_MT_Cattle_Abortion
B14-0212_MT_Cattle_Abortion
B15-0093_TX_Cattle_Abortion
B15-0207_MT_Yak_Abortion
B17-0224_ID_Cattle_Premature
B17-0575_Milk_TX_Cow_B
B17-0761-BronchLN_TX_Cow_B
B17-0761-Uterus_TX_Cow_B
B17-0761-MamGland_TX_Cow_B
16-026999-RB51_Lab_Strain
B14-0210_MT_Cattle_Abortion
B14-0253_MT_Cattle_Abortion
B15-0114_WY_Bison_Abortion
B15-0123_NE_Cattle_Abortion
B16-0234_MT_Cattle_Abortion
B14-0154_MT_Cattle_Abortion
B15-0413_OR_Cattle_Abortion
B16-0100_TX_Cattle_Abortion
B14-0254_MT_Cattle_Abortion
B17-0758-MilkA_TX_Cow_A
B17-0566_Milk_TX_Cow_A
B17-0758-MilkB_TX_Cow_A
B17-0760-PrescapLN_TX_Cow_A
B17-0760-IliacLN_TX_Cow_A
Cow 120
B13-0245_Veterinarian_NeedleStick
B15-0113_WY_Bison_Abortion
BA3001232161_NJ_Human
B17-0243_CA_Cattle_Abortion
B17-0255_KS_Cattle_Abortion
16-026999-RB51_Lab_Strain
B17-0759-MilkB_TX_Cow_B
B17-0759-MilkA_TX_Cow_B
B17-0759-Blood_TX_Cow_B
B17-0761-Kidney_TX_Cow_B
BA3001025736_TX_BulkTank
BA3001025737_TX_BulkTank
BA3001031163_TX_Human
BA3001025738_TX_BulkTank
Average mapping quality


reference position within the genome (9-941)
reference nucleotide call
B03-0154_2308-Lab_Strain
B03-0159_2308-Lab_Strain
16-026999-2308-Lab_Strain
B-REF-RB51_Vaccine_Seed
B17-0771_Vaccine_Serial_TX_Dairy
B14-0211_MT_Cattle_Abortion
B14-0212_MT_Cattle_Abortion
B15-0093_TX_Cattle_Abortion
B15-0207_MT_Yak_Abortion
B17-0575_Milk_TX_Cow_B
B17-0761-BronchLN_TX_Cow_B
B17-0761-Uterus_TX_Cow_B
B17-0761-MamGland_TX_Cow_B
Cow 124
B14-0210_MT_Cattle_Abortion
B14-0253_MT_Cattle_Abortion
B15-0114_WY_Bison_Abortion
B15-0123_NE_Cattle_Abortion
B16-0234_MT_Cattle_Abortion
B14-0154_MT_Cattle_Abortion
B15-0413_OR_Cattle_Abortion
B16-0100_TX_Cattle_Abortion
B14-0254_MT_Cattle_Abortion
BA3001025735_TX_BulkTank
B17-0758-MilkA_TX_Cow_A
B17-0566_Milk_TX_Cow_A
B17-0758-MilkB_TX_Cow_A
B17-0760-PrescapLN_TX_Cow_A
B17-0760-IliacLN_TX_Cow_A
B17-0760-MandLN_TX_Cow_A
B13-0245_Veterinarian_NeedleStick
B15-0113_WY_Bison_Abortion
BA3001232161_NJ_Human
B17-0243_CA_Cattle_Abortion
B17-0255_KS_Cattle_Abortion
B17-0759-MilkB_TX_Cow_B
B17-0759-MilkA_TX_Cow_B
B17-0759-Blood_TX_Cow_B
B17-0761-Kidney_TX_Cow_B
Cow 124
BA3001025737_TX_BulkTank
BA3001031163_TX_Human
BA3001025738_TX_BulkTank
TX human and Bulk Tank Milk
Average mapping quality

Texas Raw Milk Dairy: Current status

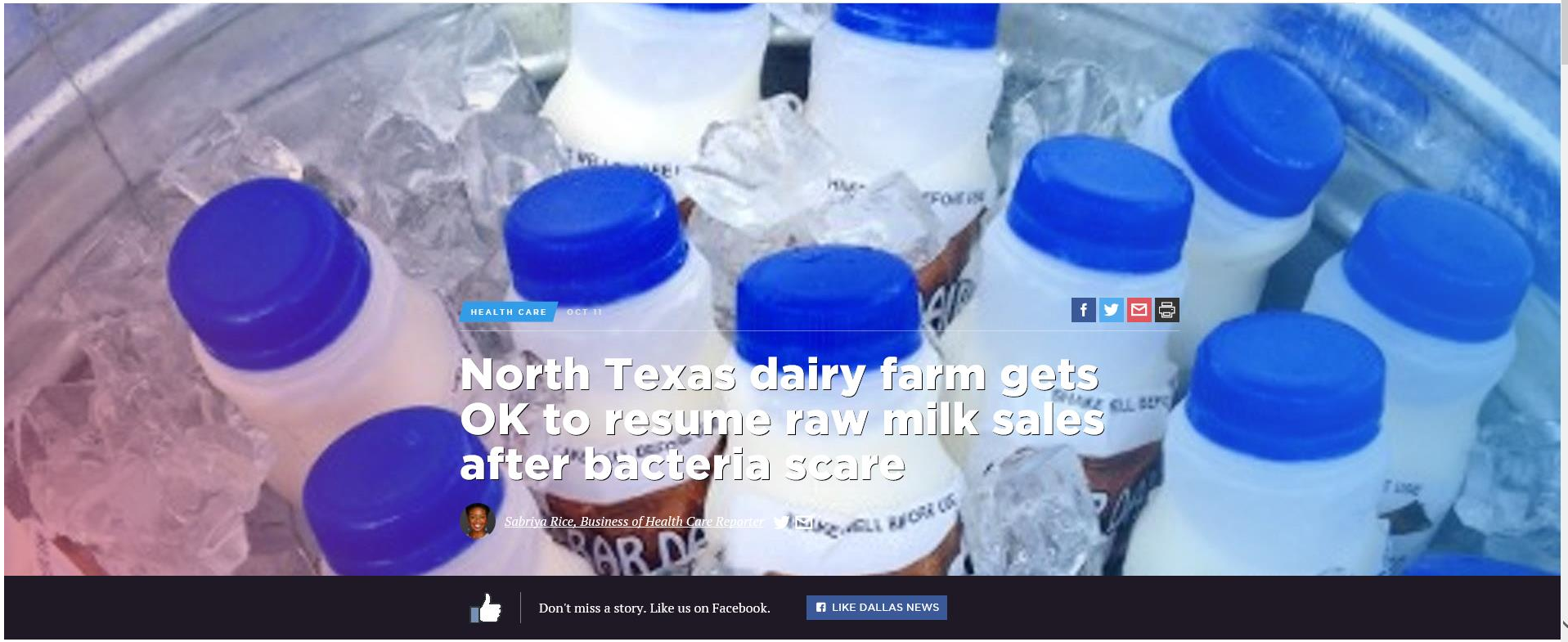
- Dairy completed requirements of DSHS Control Order, including:
  - Removal of Brucellosis reactors
  - Sanitizing of equipment
  - Individual milk testing of herd by culture and PCR with negative results

- Reapproved to sell milk in October 2017, under monthly bulk tank BRT and PCR testing by DSHS.

- USDA/ APHIS/ VS is proposing additional testing plan of individual cows.

State OKs raw milk dairy to resume sales; Brucella risk remains

BY CORAL BEACH | OCTOBER 12, 2017



quickly as five days after exposure, but can also take up to six months to develop in some people.

"Initially, people with brucellosis experience fever, sweats, aches and fatigue," according to the CDC's most recent update on the situation.

Investigation of Bovine Cases

NJ

Human Case

September 18, 2017

- Female
- Neck pain and headache of 3 days duration
- RB51 infection confirmed October 23, 2017
- Lived in New Jersey

- Consumed raw milk from Udder Milk

USDA

United States Department of Agriculture

Notice of Private Memebership Association

By logging into this site you are agreeing that all Transactions are Private and final, only, and that there are no Public activities within this Private Memebership Association regulatable under any State or Federal Codes, Statutes or Regulations, including but not limited to, all perishable food code, statutes and regulations.

All sales are Private by nature and not subject to any Public scrutiny. It is also understood that at the time of Transaction it is agreed that the inspection of the food from any participating farm has been satisfied and the responsibility for the food safety firmly falls to recipient from the time of transaction.

Investigation of Bovine Cases

NJ

reference position within the genome (9-941)	NC_006933.1|-144449	NC_006933.1|-272664	NC_006933.1|-230987	NC_006933.1|-678625	NC_006932.1|-1798269	NC_006932.1|-2064276	NC_006933.1|-178804	NC_006932.1|-1160583	NC_006932.1|-1230986	NC_006932.1|-323358	NC_006932.1|-533152	NC_006932.1|-645705	NC_006932.1|-267280	NC_006932.1|-566892	NC_006932.1|-1728572	NC_006933.1|-25736	NC_006933.1|-19732	NC_006932.1|-828291	NC_006932.1|-1684690	NC_006932.1|-1780440	NC_006933.1|-970575	NC_006932.1|-1406549	NC_006932.1|-1786170	NC_006932.1|-710073	NC_006932.1|-906495	NC_006932.1|-1380653	NC_006932.1|-133280	NC_006933.1|-312254	NC_006932.1|-906260	NC_006933.1|-664226	NC_006932.1|-906494	NC_006932.1|-942038	NC_006932.1|-143390	NC_006932.1|-1780437	NC_006932.1|-2095384	NC_006932.1|-639158	NC_006932.1|-351213	NC_006932.1|-959746	NC_006933.1|-1029746	NC_006933.1|-350455	NC_006932.1|-1356190	NC_006932.1|-1621349	NC_006932.1|-173678	NC_006932.1|-923647	NC_006932.1|-938860	NC_006933.1|-248475	NC_006933.1|-551208	NC_006933.1|-62044	NC_006933.1|-64768	NC_006933.1|-827913	NC_006933.1|-885810	NC_006932.1|-696527	NC_006932.1|-1335149	NC_006933.1|-257376	NC_006932.1|-333677	NC_006932.1|-333682	NC_006933.1|-177625	NC_006932.1|-1450776	NC_006932.1|-662535	NC_006933.1|-399049	NC_006933.1|-1049109
reference nucleotide call	A	A	C	G	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B03-0154_2308-Lab_Strain	G	G	C	G	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B03-0159_2308-Lab_Strain	G	G	T	A	G	G	G	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
16-026999-2308-Lab_Strain	G	G	C	G	A	T	A	G	C	C	G	A	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
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B17-0771_Vaccine_Serial_TX_Dairy	G	G	C	G	G	G	G	T	A	A	A	C	C	K	C	K	C	M	K	R	S	K	Y	T	C	C	G	Y	A	C	G	R	K	M	Y	C	G	R	G	C	G	A	C	G	T	C	A	C	T	S	R	M	S	Y	G	C	C	G	G	C	G
B14-0211_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
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B15-0093_TX_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0207_MT_Yak_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	K	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0224_ID_Cattle_Premature	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0575_Milk_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y	Y	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	M	S	Y	G	C	C	R	K	C	G
B17-0761-BronchLN_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	M	S	Y	G	C	C	G	G	C	G
B17-0761-Uterus_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	Y	Y	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	C	G	T	G	C	C	G	G	C	G
B17-0761-MamGland_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	R	C	G	Y	Y	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	R	M	S	Y	G	C	C	R	K	C	G
16-026999-RB51_Lab_Strain	G	G	C	G	G	G	G	T	A	A	A	C	A	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0210_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	T	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0253_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	G	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0114_WY_Bison_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	T	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0123_NE_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	G	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B16-0234_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	A	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0154_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	T	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B15-0413_OR_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	T	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B16-0100_TX_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	A	G	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B14-0254_MT_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	A	C	T	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
BA3001025735_TX_BulkTank	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	A	C	G	T	C	T	T	G	C	A	C	G	A	T	C	[illegible]	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0758-MilkA_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	G	T	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0566_Milk_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0758-MilkB_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0760-PrescapLN_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	G	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0760-IliacLN_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	G	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
B17-0760-MandLN_TX_Cow_A	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	A	T	A	C	A	A	G	C	[illegible]	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
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B15-0113_WY_Bison_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C														G	A	T	C	T	C	A	A	T	[illegible]	G	A	C	G	T	C	A	C	T	C	G	C	G	T	G	C	C	G	G	C	G
BA3001232161_NJ_Human	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C														G	A	T	C	T	C	G	G	G	C	A	T	T	A	C	T	C	T	C	G	G	C	G	T	G	C	C	G	G	C	G
B17-0243_CA_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	[illegible]	G	A	C	G	T	C	A	C	T	C	A	C	G	T	G	C	C	G	G	C	G
B17-0255_KS_Cattle_Abortion	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	S	Y	G	C	C	G	G	C	G
16-026999-RB51_Lab_Strain	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	G	C	C	G	G	C	G
B17-0759-MilkB_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	T	C	A	A	C	C	R	C	C	G	G	C	G
B17-0759-MilkA_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	[illegible]	C	A	A	C	C	A	C	C	G	G	C	G
B17-0759-Blood_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	[illegible]	C	A	A	C	C	G	T	T	G	G	C	G
B17-0761-Kidney_TX_Cow_B	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	[illegible]	C	A	A	C	C	G	T	T	G	G	C	G
BA3001025736_TX_BulkTank	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	[illegible]	C	A	A	C	C	G	C	C	A	T	C	G
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BA3001031163_TX_Human	G	G	C	G	G	G	G	T	A	A	A	C	C	G	C	G	C	C	G	G	C	G	C	T	C	C	G	C	A	C	G	A	T	C	T	C	G	G	G	C	G	A	C	G	T	C	A	C	[illegible]	C	A	A	C	C	G	C	C	A	T	A	G
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NJ human

Investigation of Bovine Cases

NY/PA

Human Case

November 2018

- Child
- Febrile and respiratory signs
- Lived in New York
- Dog became ill and veterinarian convinced owners to report raw milk source

- Consumed raw milk from Miller's Biodiversity Farm in PA


RAW MILK
– Whole unpasteurized milk –
– rBST free –
– Soy free –
– Grass fed –
GOVERNMENT WARNING
FRANK WHITE
659 Magnolia Lane
Monongahela, PA 15063
724-258-6564
HALF GALLON
RAW MILK
– Whole unpasteurized milk –
– rBST free –
– Soy free –
– Grass fed –
GOVERNMENT WARNING
FRANK WHITE
659 Magnolia Lane
Monongahela, PA 15063
724-258-6564
HALF GALLON

Miller's Biodiversity Farm

- Lancaster, PA
- Organic and raw milk
- 48 cattle, 46 Jersey and 2 Dutch Belted
- No infertility or abortions
- Did not brucellosis vaccinate calves
- Purchased 14 Jersey cattle since 2015
  - Some had evidence of vaccination

Miller's Biodiversity Farm

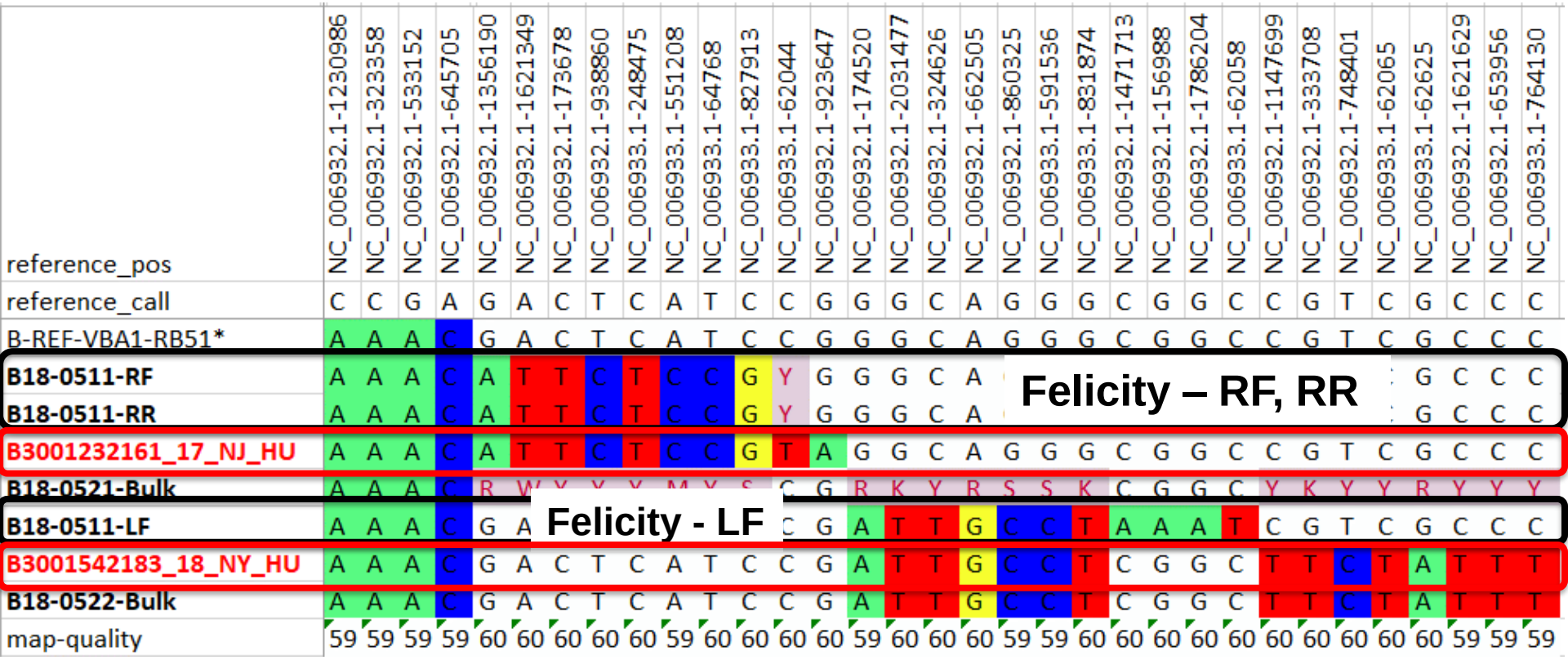
- Started testing 14 purchased cattle
- All were lactating
- Collected milk from individual quarters
- All cattle tested by culture and/or serology

Miller's Biodiversity Farm

- "Felicity" #122 had RB51 detected in all 4 quarters at high levels

USDA

United States Department of Agriculture



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B-REF-VBA1-RB51*	A	A	A	C	G	A	C	T	C	A	T	C	C	G	G	G	C	A	G	G	G	C	G	G	C	C	G	T	C	G	C	C	C
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B18-0521-Bulk	A	A	A	C	R	W	Y	Y	Y	M	Y	S	C	G	R	K	Y	R	S	S	K	C	G	G	C	Y	K	Y	Y	R	Y	Y	Y
B18-0511-LF	A	A	A	C	G	A							C	G	A	T	T	G	C	C	T	A	A	A	T	C	G	T	C	G	C	C	C
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B18-0522-Bulk	A	A	A	C	G	A	C	T	C	A	T	C	C	G	A	T	T	G	C	C	T	C	G	G	C	T	T	C	T	A	T	T	T
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HOLY COW!

RAW MILK OUTBREAKS ARE ON THE RISE IN THE U.S.

150x

The risk of an outbreak caused by raw milk is at least 150 times higher than the risk of an outbreak caused by pasteurized milk.

4x

The average number of outbreaks linked to raw milk was 4 times higher from 2007-2012 compared to 1993-2006.

81

In all, 81 outbreaks in 26 states were linked to raw milk from 2007-2012.

FDA Consumer Health Information
www.fda.gov/consumer

Raw Milk May Pose Health Risk

What's a building block in the food pyramid that's important for building and maintaining bone mass? It's milk.

Whether it's from cows, goats, sheep

2000
Raw milk available in 27 states

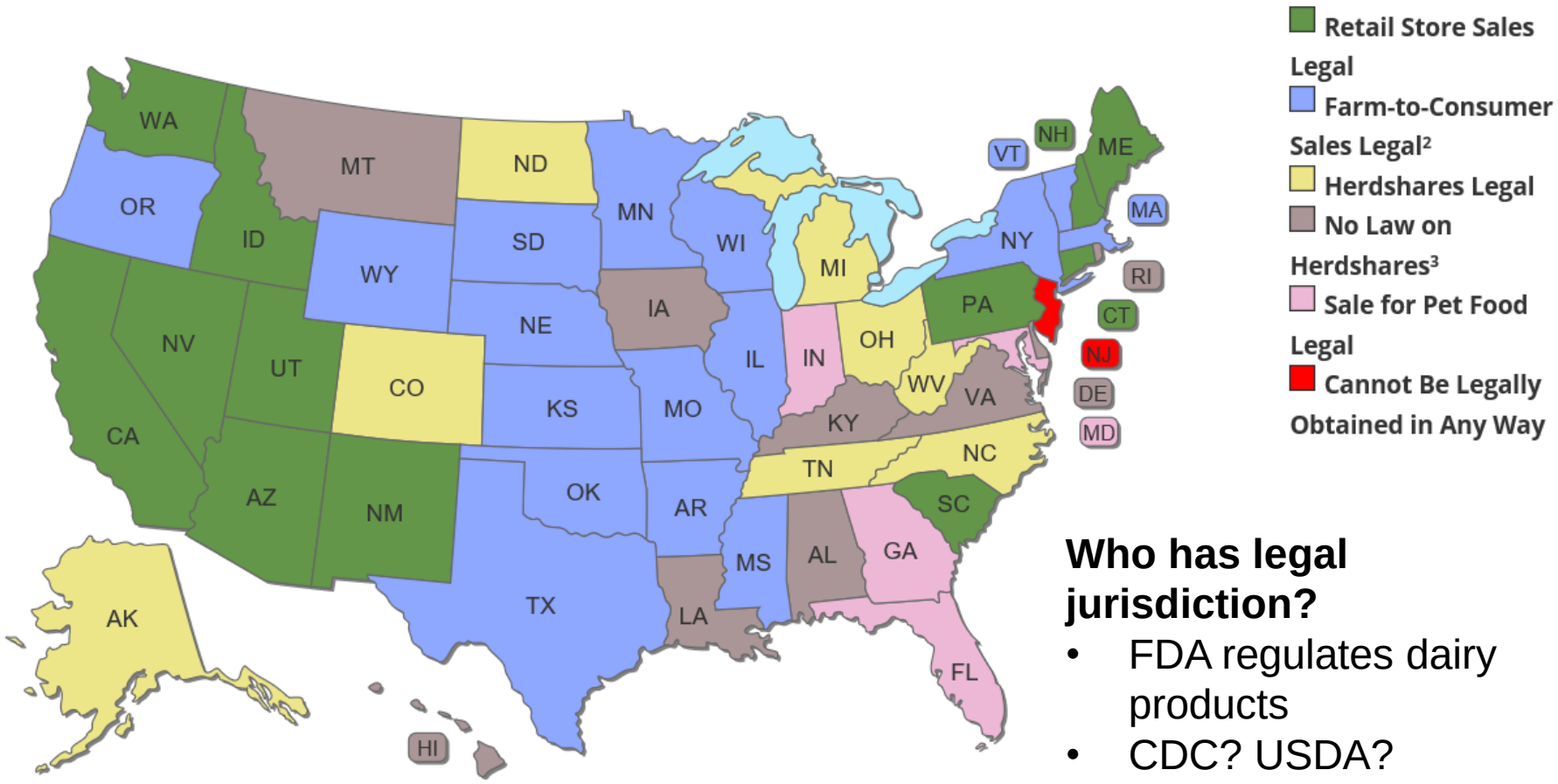
2017
Raw milk available in 43 states
(thanks to the efforts of A Campaign for Real Milk)

Our Goal
Raw milk available in all 50 states by 2020!
Help us make raw milk sales legal in the remaining 7 states:

PASTURE-FED UNPROCESSED FULL-FAT
A Campaign for Real Milk
NATURE'S PERFECT FOOD

Raw Milk Nation – Interactive Map

State-by-State[1] Review of Raw Milk Laws



February 14, 2019

Who has legal jurisdiction?

- FDA regulates dairy products
- CDC? USDA?
- Local and state health departments

Increased Outbreaks Associated with Nonpasteurized Milk, United States, 2007–2012

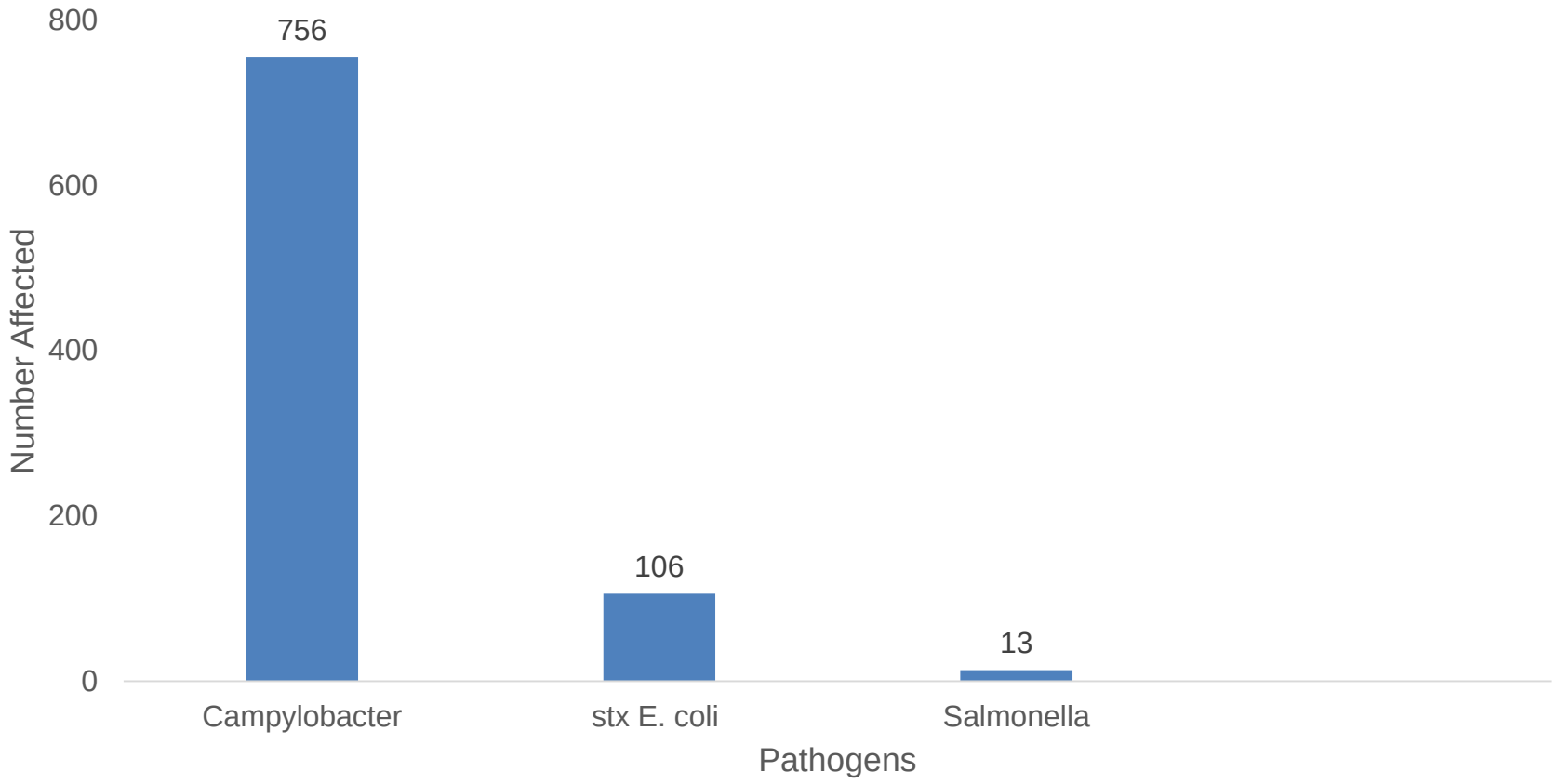
Elisabeth A. Mungai, Casey Barton Behravesh, and L. Hannah Gould

The number of US outbreaks caused by nonpasteurized milk increased from 30 during 2007–2009 to 51 during 2010–2012. Most outbreaks were caused by *Campylobacter* spp. (77%) and by nonpasteurized milk purchased from states in which nonpasteurized milk sale was legal (81%). Regulations to prevent distribution of nonpasteurized milk should be enforced.

Emerging Infectious Diseases • www.cdc.gov/eid • Vol. 21, No. 1, January 2015

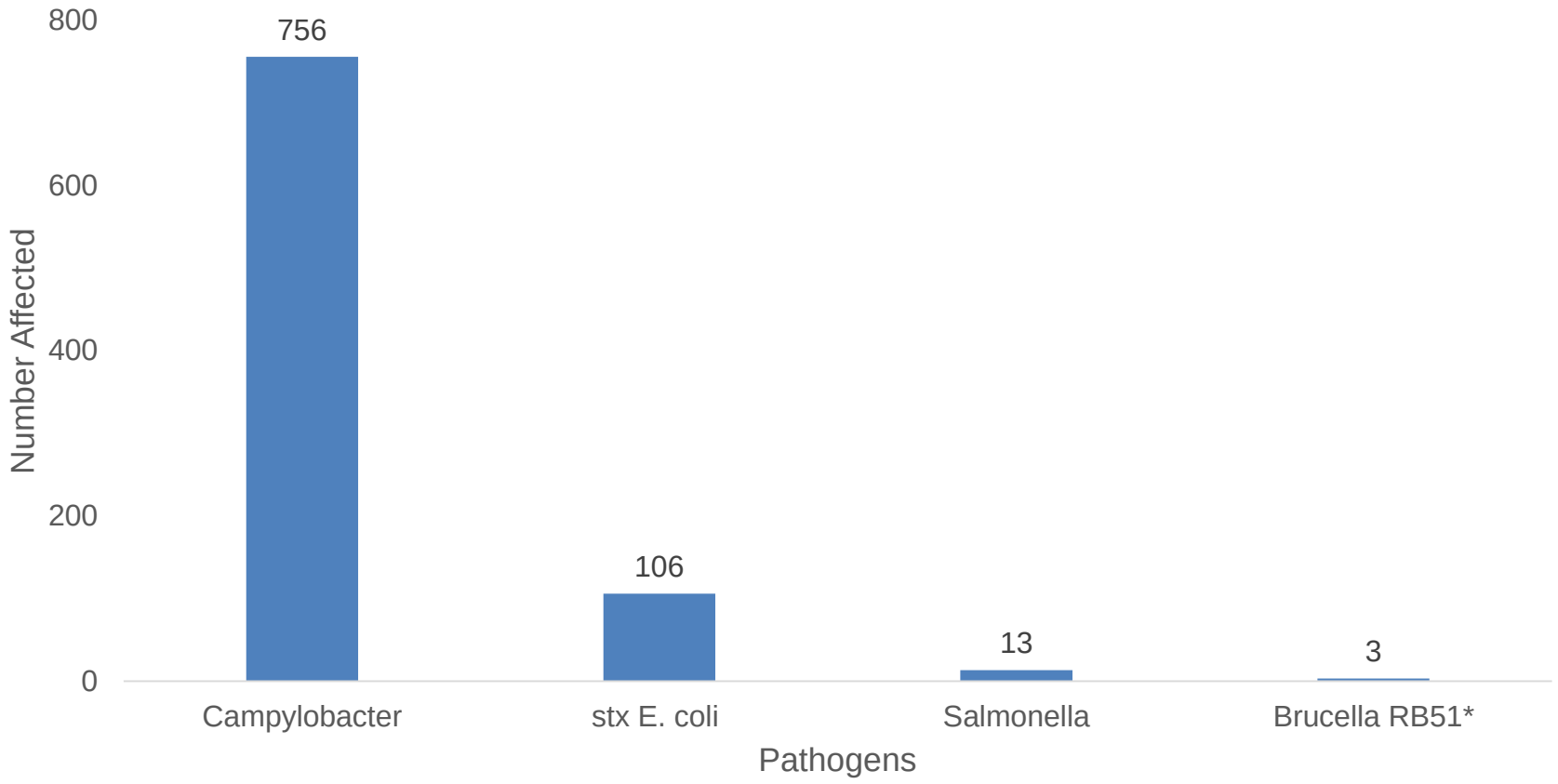
Human illness from non-pasteurized milk

2007-2012



Human illness from non-pasteurized milk

2007-2012



* Since 2017

USDA United States De

December 2017

cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

Dairy Cattle Entry Requirements

California requires an **Interstate Livestock Entry Permit** for **all** dairy breed cattle (including steers and slaughter cattle).

To obtain an Interstate Livestock Entry Permit, please call the California Department of Food and Agriculture (CDFA) **Animal Health Branch (AHB) permit line at (916) 900-5052.** Permits are valid for 15 days after being issued.

California requires a **Certificate of Veterinary Inspection**

Trichomonosis

California requires a negative individual trichomonosis test on bulls 18 months of age and over and non-virgin bulls less than 18 months of age, sampled 10 days after last contact with sexually mature cows, and within 60 days before movement into California. California requires the **CVI** to include the statement, **"Trichomonosis has not been diagnosed in the herd of origin within the past 24 months."**

Brucellosis

California requires official brucellosis calfhood vaccination and a legible brucellosis tattoo for all female cattle over 4 months of age before movement into the state. If the tag is lost, a "silver brite" tag is acceptable with the tattoo. Sexually intact cattle of any age moving from a **Designated Brucellosis Surveillance Area** require a negative brucellosis blood test obtained within 30 days before movement and a special entry permit.

- Registration tattoos if the animal health officials in the shipping and receiving state agree on their use

Note: Brand inspection requirements remain in effect.

Brucellosis

California requires official brucellosis calfhood vaccination and a legible brucellosis tattoo for all female cattle over 4 months of age before movement into the state. If the tag is lost, a "silver brite" tag is acceptable with the tattoo. Sexually intact cattle of any age moving from a **Designated Brucellosis Surveillance Area** require a negative brucellosis blood test obtained within 30 days before movement and a special entry permit.

Animal Health and Food Safety Services
Animal Health Branch
Headquarters - (916) 900-5002
Redding District - (530) 225-2140
Modesto District - (209) 491-9350
Tulare District - (559) 685-3500
Ontario District - (909) 947-4462

For California entry requirements of other livestock and animals, please visit the following:
Information About Livestock and Pet Movement or
Animal Health Entry Requirement Interactive Website

For more information on the Animal Health Branch, please visit: www.cdfa.ca.gov/ah

www.cdfa.ca.gov

Am I required to vaccinate for brucellosis?

All intact female cattle and domestic bison **must** be vaccinated against brucellosis between the ages of 4 and 12 months unless being fed for slaughter in an Idaho approved feedlot. If your Idaho-origin animal is over 12 months and has not been vaccinated for brucellosis, contact Dr. Debra Lawrence at (208) 332-8540 for information on adult vaccination.

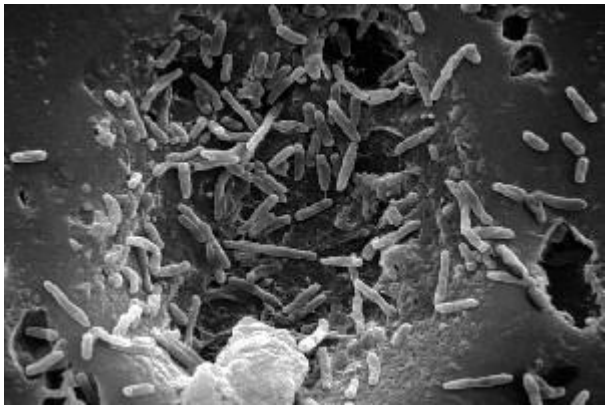
Current U.S. Strategies

- Enhanced Surveillance where the disease is endemic in wildlife
  - Slaughter & On Farm
- Vaccinate populations at risk
  - GYA cattle
- Quarantine affected herds and Test & Remove
- Pasteurization of milk products

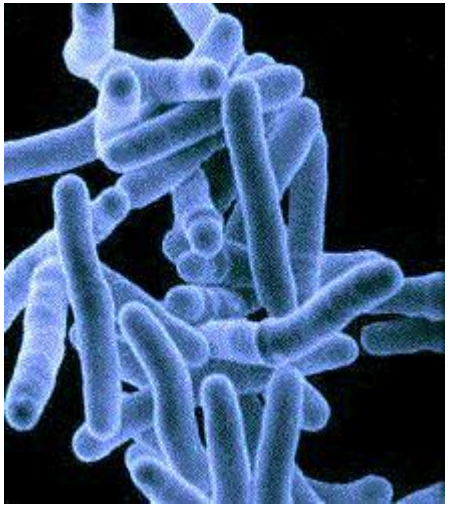
New VS Guidance

- RB51 vaccine should only be used in populations at risk
- Milk products from animals that are vaccinated with RB51 should be pasteurized

Human to Cattle TB



Mycobacterium bovis



Mycobacterium tuberculosis

North Dakota Dairy 2013

- Dairy worker infected and alerted to State by Public Health in October 2013
- Herd volunteered for testing in November 2013
  - ≥ 6 months of age tested
    - 319 tested; 11 Caudal fold test (CFT) responders; 1 comparative cervical test (CCT) suspect
    - 1 CCT suspect - necropsy – mediastinal lymph node lesion – POSITIVE
    - 10 CFT responder – slaughter – 1 cow was PCR POSITVE
    - WGS matched worker with some SNP changes suggesting cattle were more recently infected.

Texas dairy-cross heifer 2018

- Transported from NM at 1 day of age
- Regs required testing after 60 days in TX
- Raised at a heifer raising facility in TX
- CFT responder and CCT reactor → necropsy
  - *Mycobacterium tuberculosis*
  - Doesn't normally occur in cattle, human exposure

Wisconsin Dairy – 2015-18

- Dairy worker infected and alerted to DATCP by DHS in April 2015
  - Herd volunteered for testing in May 2015
  - ~1500 tested; 31 CFT responders, 1 CCT suspect
    - CCT suspect – necropsy – NEGATIVE
  - ~1500 tested in September 2015; 28 CFT responders, 0 CCT suspects
- Slaughter plant – 2018
  - Lesion – POSITIVE
  - Traced back to WI dairy, testing repeated
    - ~2000 tested (≥2 mo old): 48 CFT responders; 10 CCT S/R
    - 7 CCT responders – slaughter - POSITIVE
    - Currently on Test and Remove Program

Acknowledgements

USDA

- Dr. Sara Ahola
- Dr. Mark Camacho
- Dr. Mike Pruitt
- Dr. Suelee Robbe-Austerman
- Dr. Leslie Seraphin

State Animal Health Officials

- Dr. Elisabeth Patton – WI
- Dr. Susan Rollo – TX
- Dr. Susan Keller – ND
- Dr. Beth Carlson – ND


Questions?