

# Re-emergence of *Mycobacterium bovis* in Wisconsin

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Wisconsin Department of Health Services

October 8, 2019



# Agenda

- Bovine tuberculosis (TB) in Wisconsin
- How does bovine TB spread?
- Contact investigations
- TB screening and testing
- Investigating tuberculosis in cattle



## Slaughter begins in California dairy herd exposed to TB

# Bovine TB in the News

OCTOBER 30, 2018

### Wisconsin Confirms Case of Bovine Tuberculosis

NEWS | BY: JIM DICKRELL



FRESNO, Calif. (AP) — More than 4,800 dairy cows at risk of carrying tuberculosis are being slaughtered this week in central California, where nearly 16,000 cattle in the country's largest milk-producing region have been quarantined, federal officials said.

Undersecretary of Agriculture Bruce Knight met privately with local dairy operators Tuesday along with the state veterinarian and other industry officials monitoring three new cases of TB recently discovered in Fresno County dairies.

Federal and state officials were still tightlipped about the identities and locations of the three dairies where the TB was found, which can be transmitted to humans and other mammals.

The discovery of TB on an interstate shipment of cattle from California to Wisconsin is a significant finding.

Pasteurization of milk is a key factor in preventing the spread of TB.

### Bovine TB Detected in Large Alcona County Beef Cattle Herd

Michigan officials say bovine tuberculosis recently was confirmed in a large beef herd in Alcona County.

LANSING, MICH. (AP) — Michigan officials say bovine tuberculosis recently was confirmed in a large beef herd in Alcona County.

It's the 73rd cattle herd to be identified with bovine TB. Bovine TB is a bacterial disease that also has been found in the northeastern Lower Peninsula.

Cattle in Alcona, Alpena, Montmorency and Oscoda counties were found to have the illness from the farm, which can help prevent the illness from spreading.

Assistant State Veterinarian Nancy Barr says the Michigan Department of Agriculture and Natural Resources announced the findings Oct. 29 in Mio and Nov. 1 in Hillman.

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### State Confirms Bovine TB in Another South Dakota Beef Herd

Authorities have confirmed bovine tuberculosis in another South Dakota beef herd.

Confirmed bovine tuberculosis in another South Dakota beef herd.

(OH'-dih-koh-ven) said Friday that inspectors found an outbreak of the disease at a Texas slaughterhouse last month. Records linked the outbreak to a herd of southwestern South Dakota. Tests found additional cases of the disease in South Dakota in six years.

Confirmed bovine TB in Harding County of northwestern South Dakota is a safety threat, thanks to milk pasteurization and meat inspection. The state is working closely with area herd owners and wildlife officials, to determine the extent of the disease.

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#### NEWS

### State confirms rare bovine tuberculosis in Waunakee cows

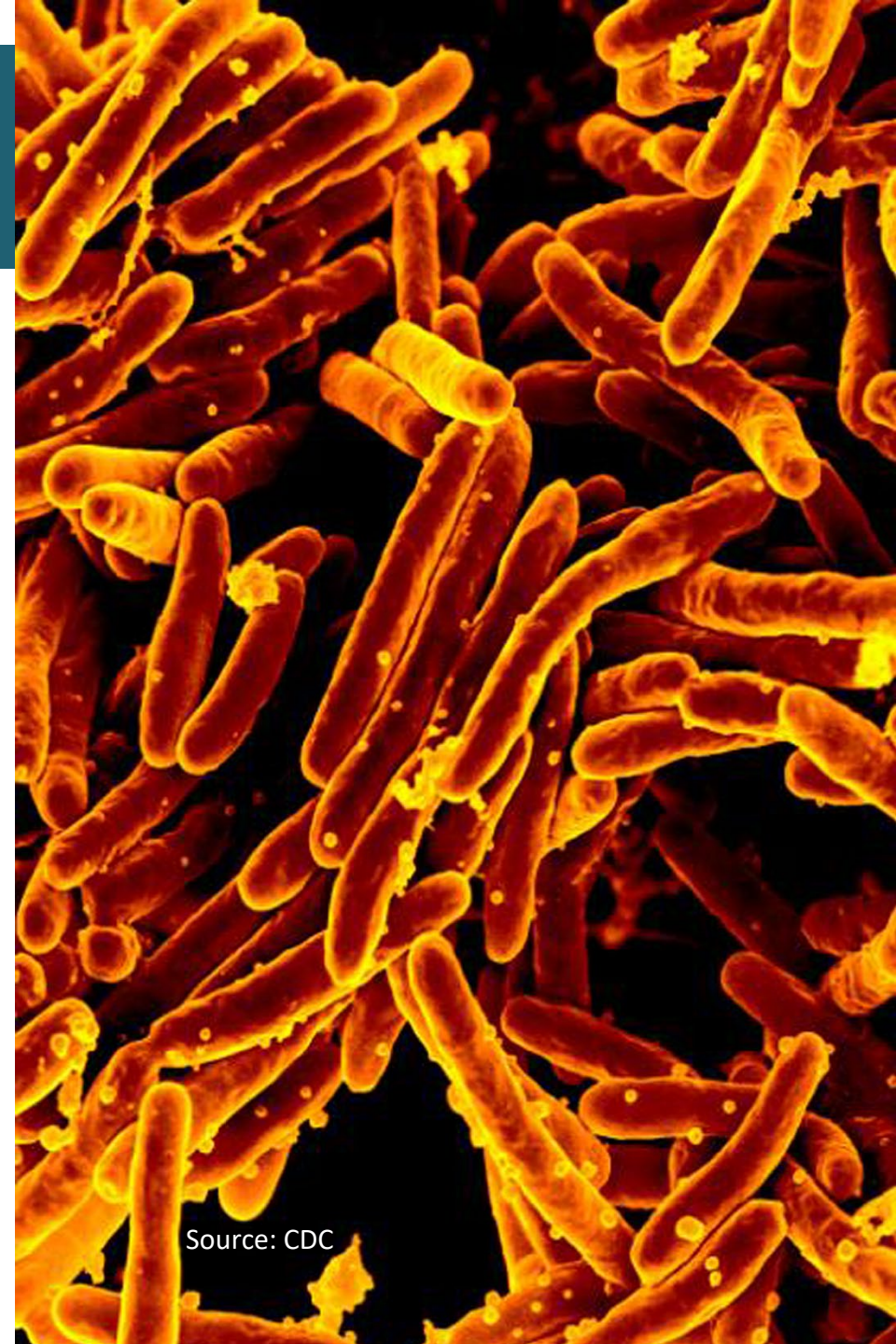


ASSOCIATED PRESS  
October 30, 2018 - 10:45 AM

MADISON, Wis. — Wisconsin agriculture officials are investigating a rare outbreak of bovine tuberculosis on a Waunakee farm.

# Tuberculosis

- Named after nodules or “tubercles” in lymph nodes of affected animals
- Caused by bacteria in the *Mycobacterium tuberculosis* complex (MTBC)
- Requires a mammalian host to optimally survive



Source: CDC



# *Mycobacterium tuberculosis* Complex (MTBC)

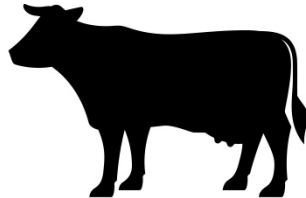
*M. tuberculosis*



*M. caprae*



*M. bovis*



*M. pinnipedii*



*M. microti*

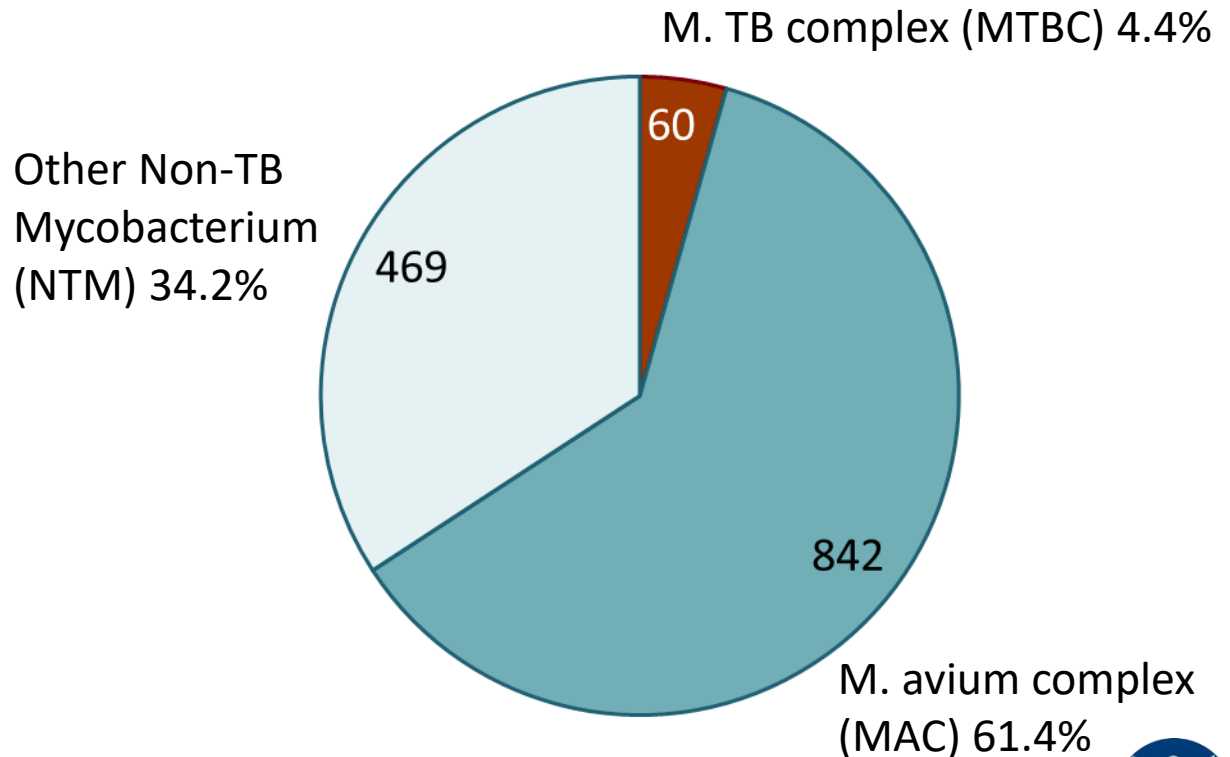


# Tuberculosis in Wisconsin

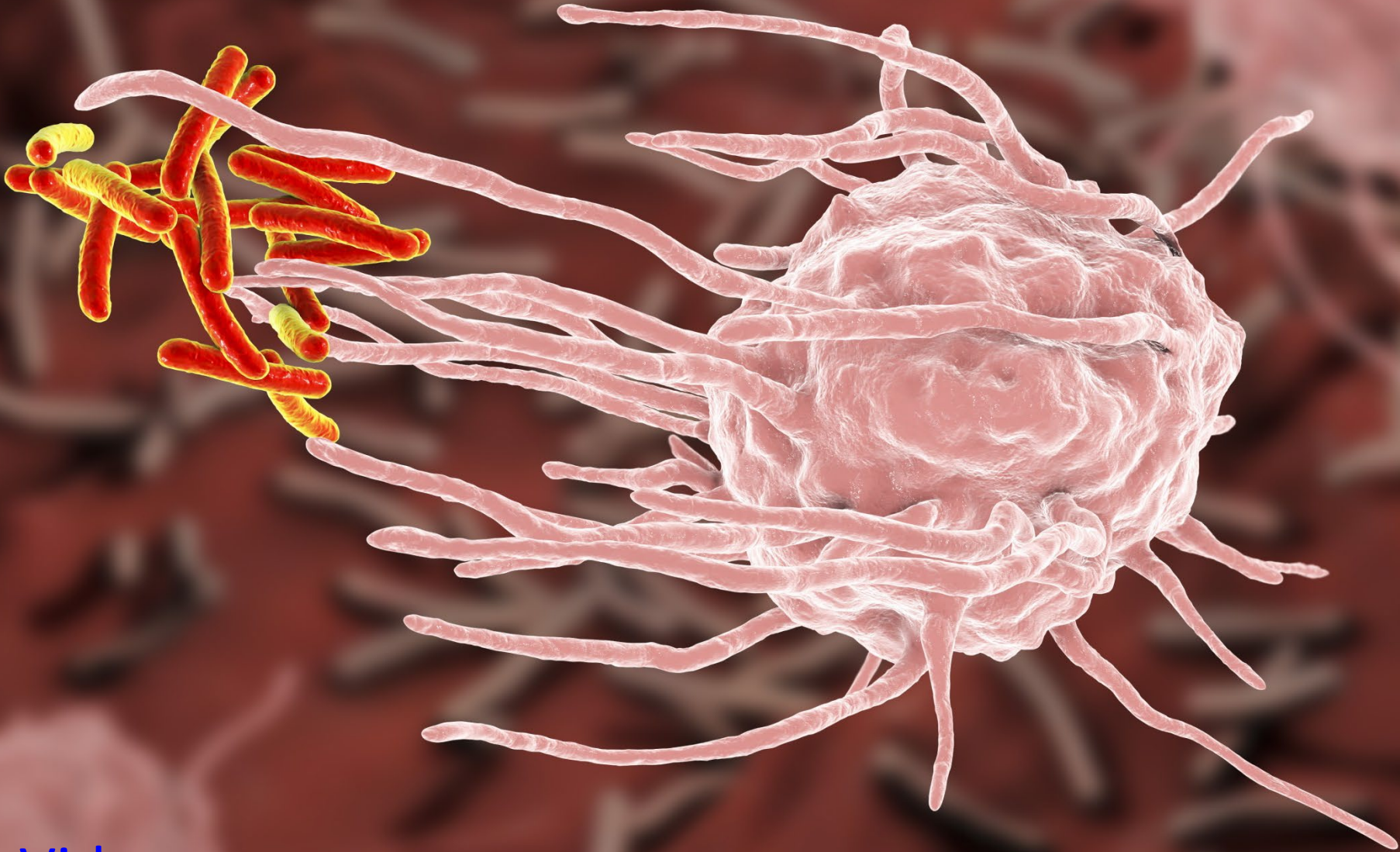
Number of Mycobacteria isolates identified by Wisconsin State Lab of Hygiene during 2015

< 1 in 20  
isolates  
were MTBC

One *M. bovis*  
isolated every  
2 years

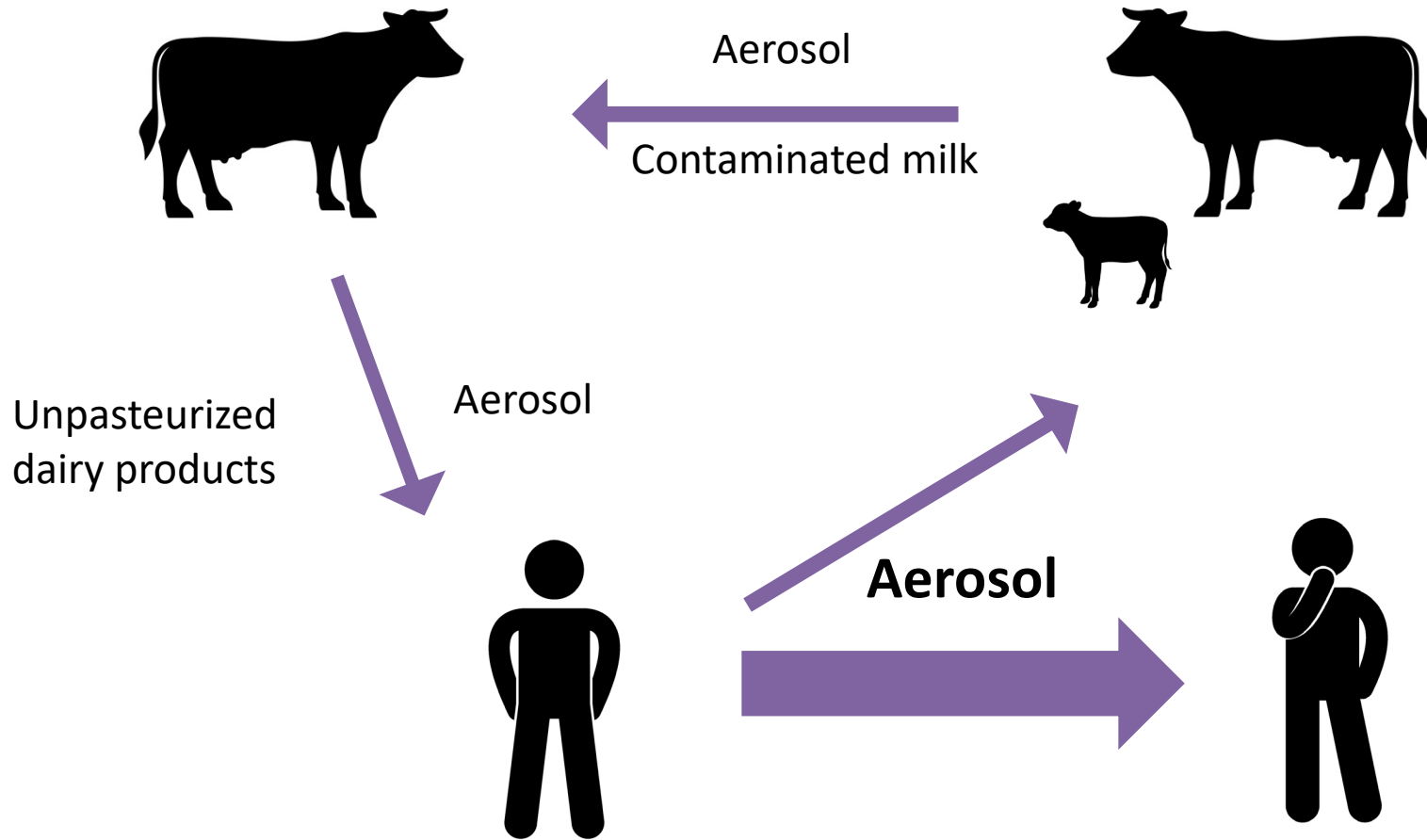


# How does TB infection progress to disease?



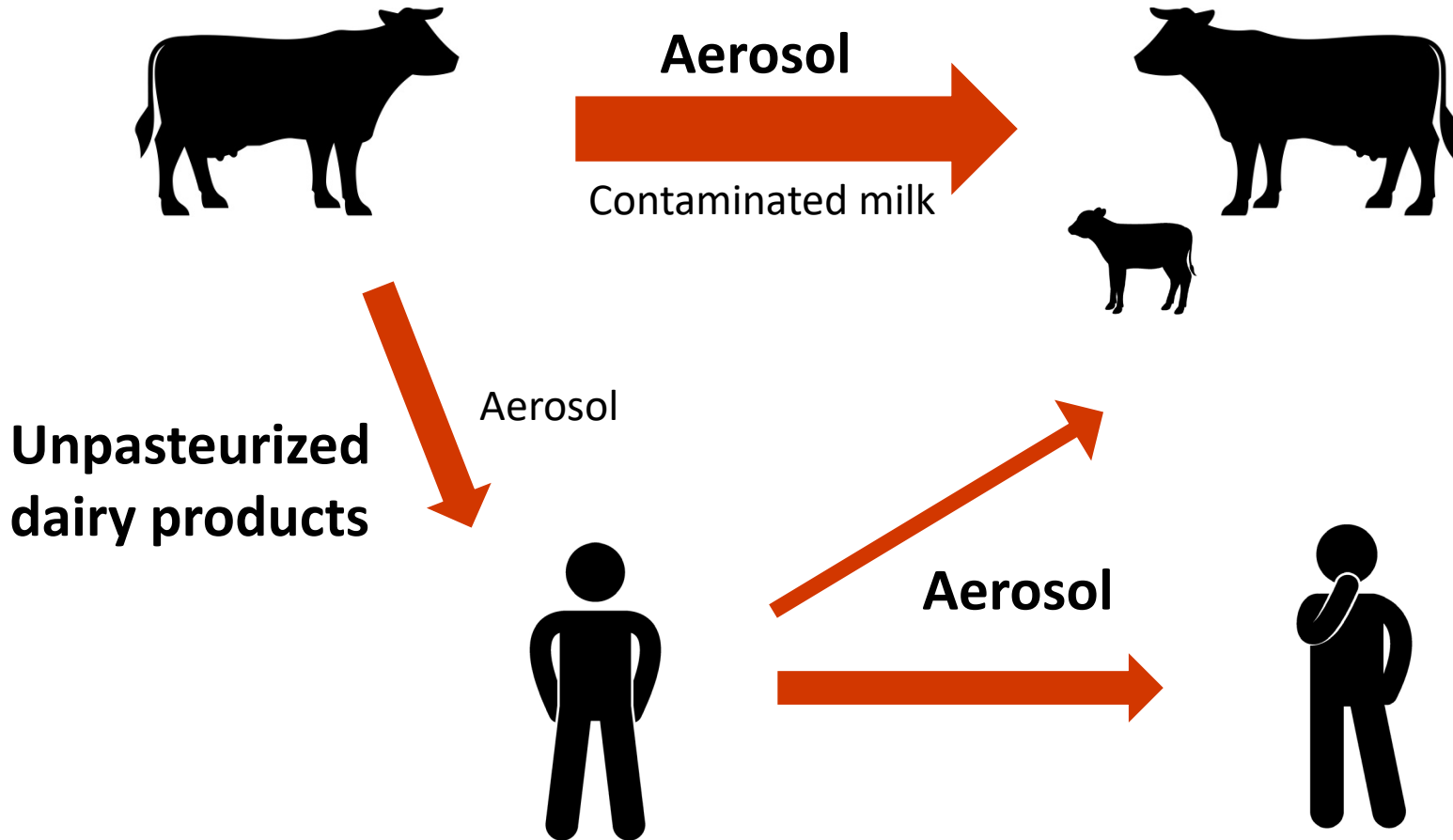
[Video](#)

# *M. tuberculosis* Transmission

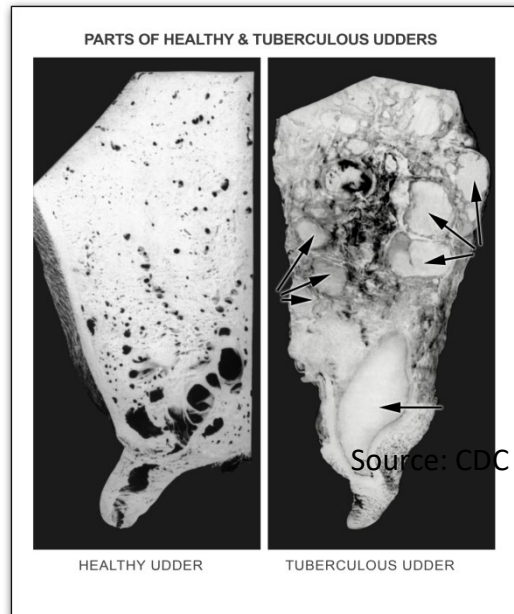
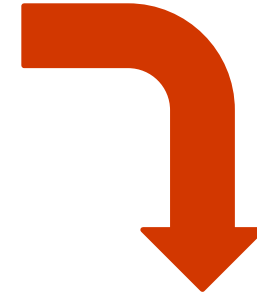




# *M. bovis* Transmission



# *M. bovis* in Unpasteurized Dairy Products



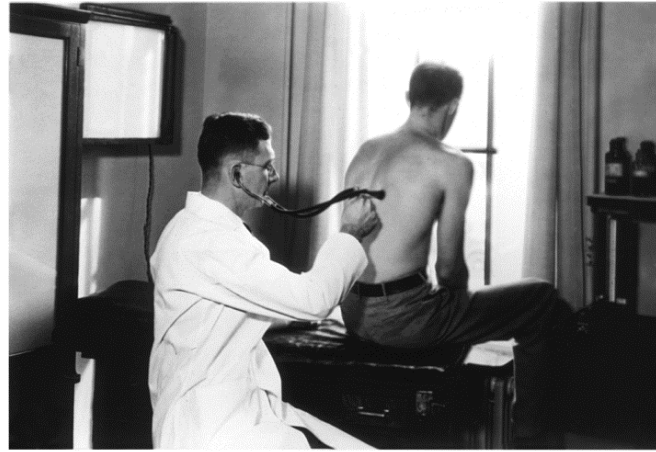
MINNESOTA DEPARTMENT OF HEALTH

Division of Sanitation

# ESSENTIALS FOR A SAFE MILK SUPPLY



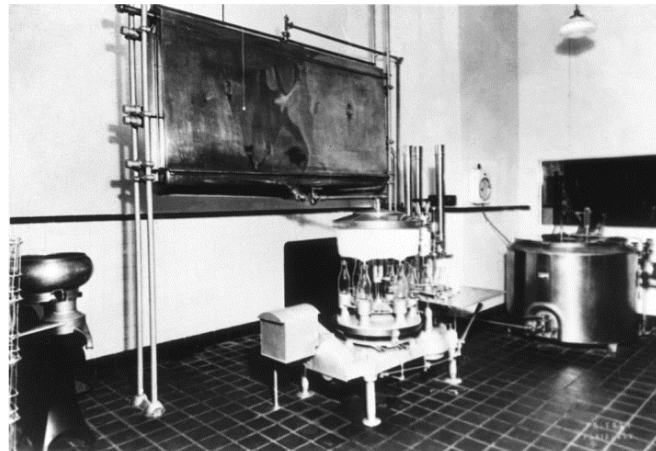
Healthy Dairy Cows



Healthy Dairy Workers



Sanitary Production



Pasteurization

# Century of Bovine TB Eradication

Source: CDC





# Animal to Human Aerosol Transmission of *M. bovis*





# Farm Activities Posing Minimal Risk for Human *M. bovis* Infection

- Handling calves < 2 months of age
- Handling manure and urine
- Milking
- Feeding
- Cleaning
- Maintenance

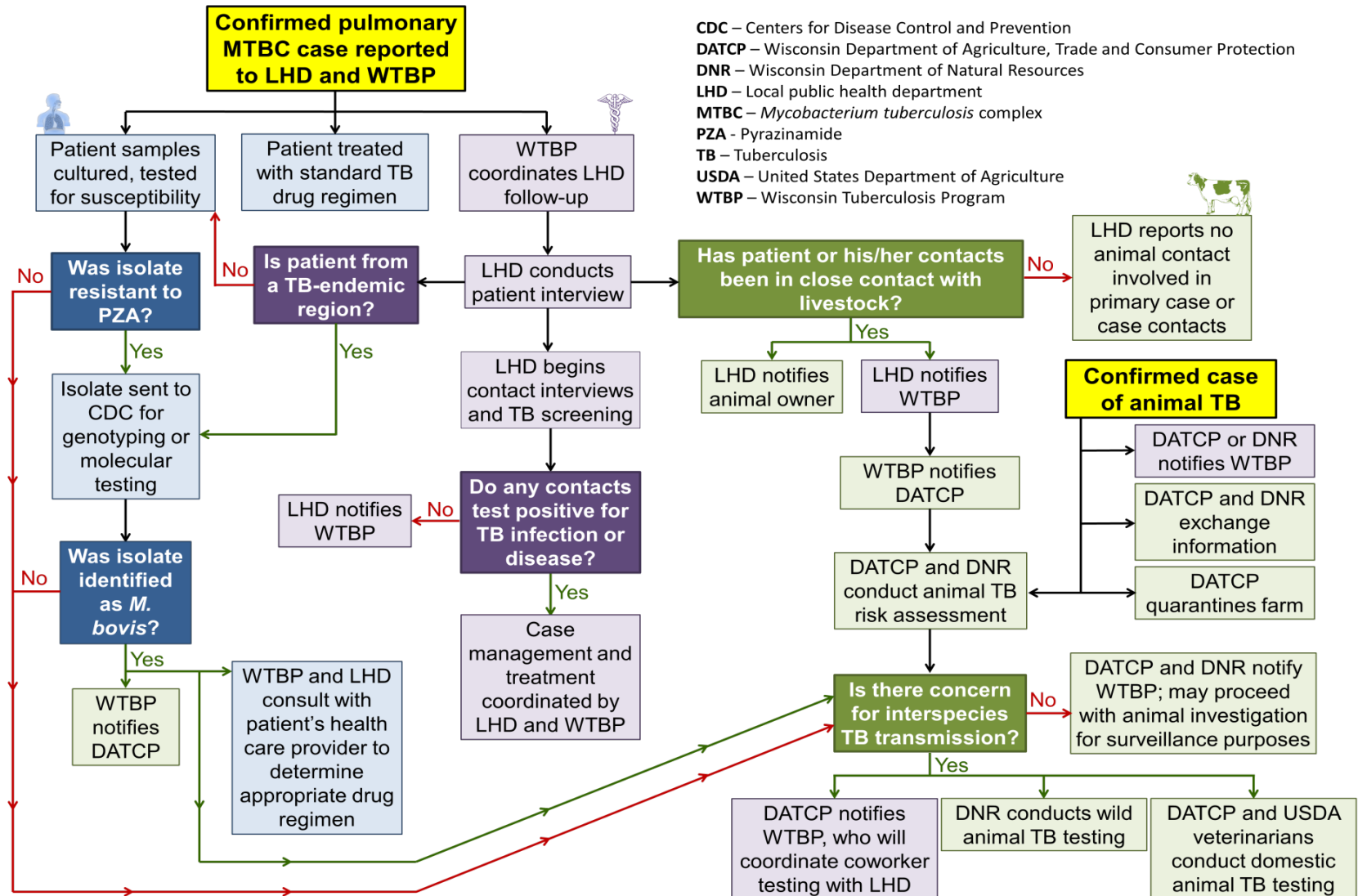


# Human to Animal Aerosol Transmission of *M. bovis*

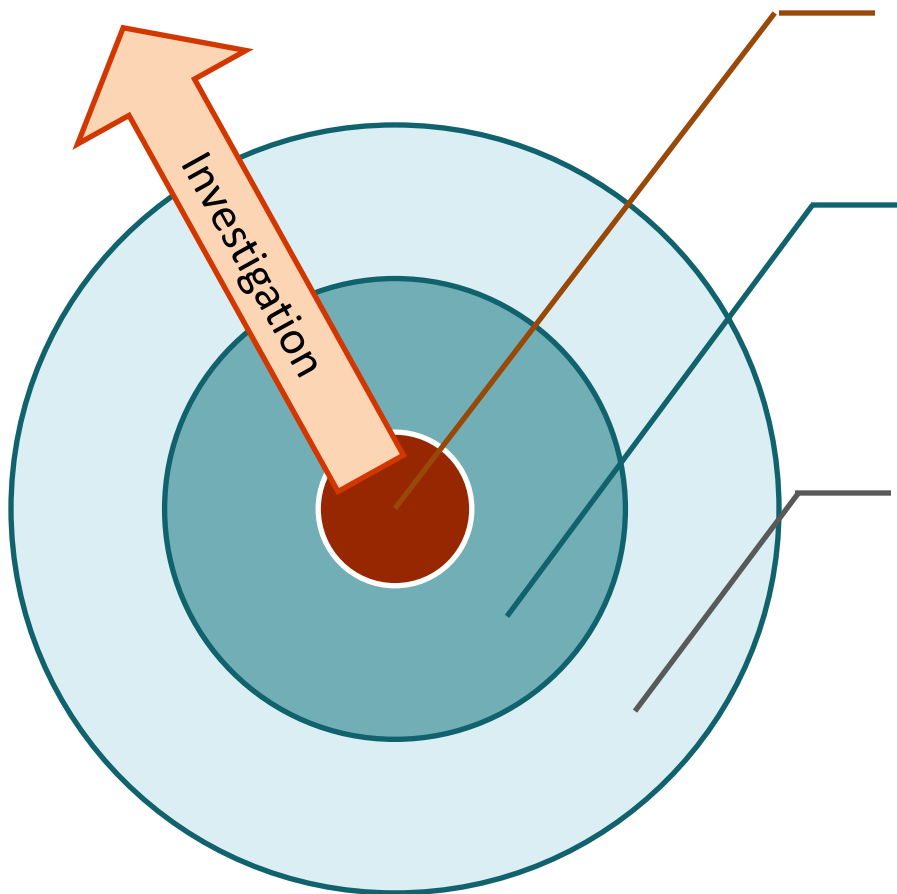
Worker with pulmonary TB disease can generate droplet nuclei that can infect any age cattle in ideal conditions.



# Wisconsin TB Response Plan



# Public Health Contact Investigations



**Contagious Human or Animal**  
(Index Patient)

## High Priority Contacts

- Persons with elevated risk to exposures and transmission
- Persons with risk factors for progression to TB disease

## Low Priority Contacts

- Persons with low risk exposures
- Persons without elevated disease vulnerability





# TB Screening

- Recent TB symptoms**
- Born, traveled, or resided** in a country with high TB prevalence
- Close contact** to someone with infectious TB disease
- Human immunodeficiency virus (HIV) Infection**
- Current** or planned immunosuppression



# TB Screening

- Current or former employee or resident of a high-risk congregate setting in a state with an elevated TB rate**

No longer a TB risk-assessment question



# Additional Screening for *M. bovis* Exposure Risk

- Consumed** unpasteurized milk or dairy products made outside U.S.
- Close contact** to an animal known or suspected to have TB disease
- Handled carcass** of an animal suspected to have TB infection
- Performed** an invasive procedure on an animal suspected to have TB infection

If yes

- Sustained a cut or puncture** during animal or carcass contact
- Did not use** sufficient personal protective equipment (PPE)





# Testing to Find TB Infection



If positive



If positive



Caudal fold tuberculin test (CFT)

Comparative cervical tuberculin test (CTT)



An iceberg floating in the ocean. The tip of the iceberg is above the water surface, while the much larger, jagged base is submerged underwater. Two white arrows with black outlines point from text boxes on the right towards the visible tip and the submerged part of the iceberg respectively. The sky is blue with some clouds, and the water is a deep blue.

**TB Disease may  
be contagious**

**TB Infection  
without disease is  
not contagious**



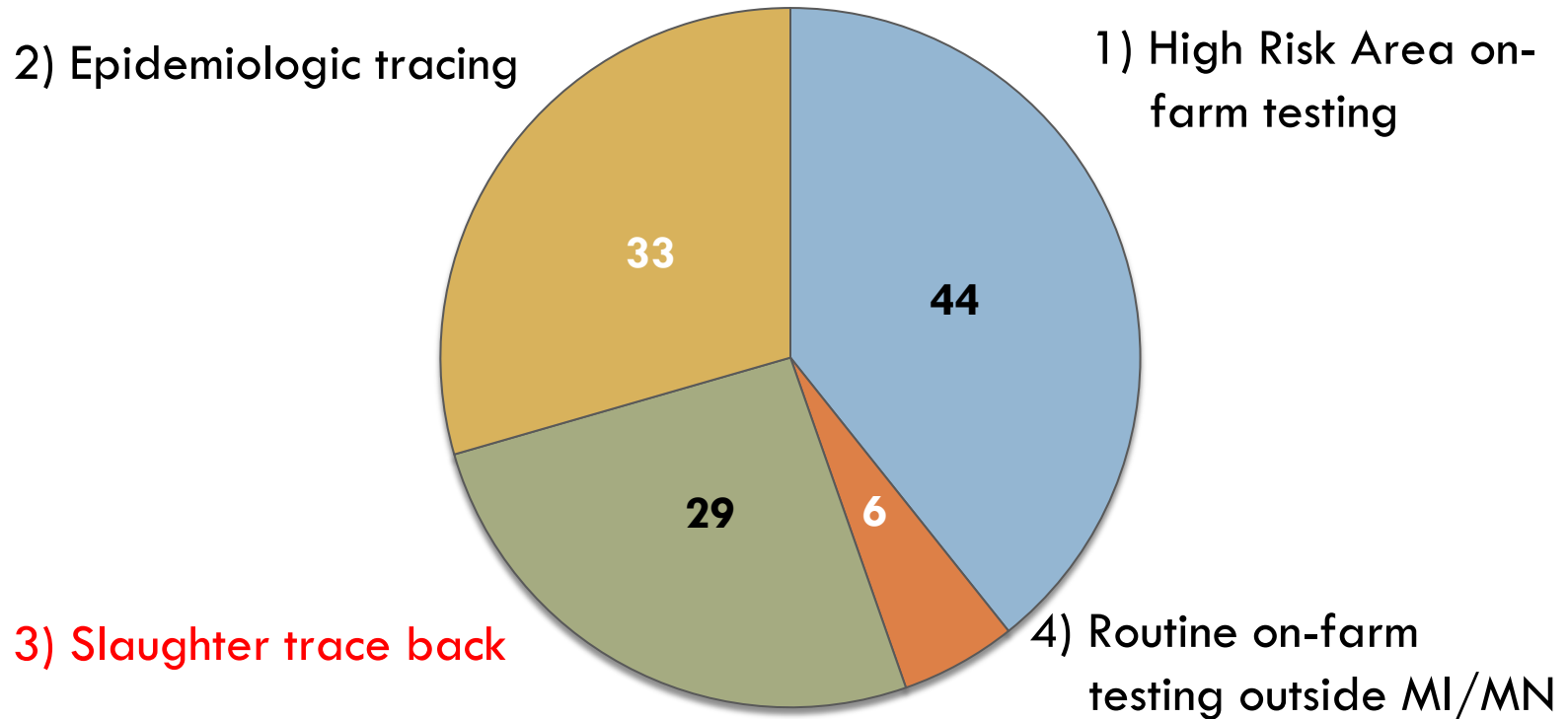
# Bovine Tuberculosis Update

Wisconsin Department of Agriculture, Trade and Consumer Protection  
Division of Animal Health



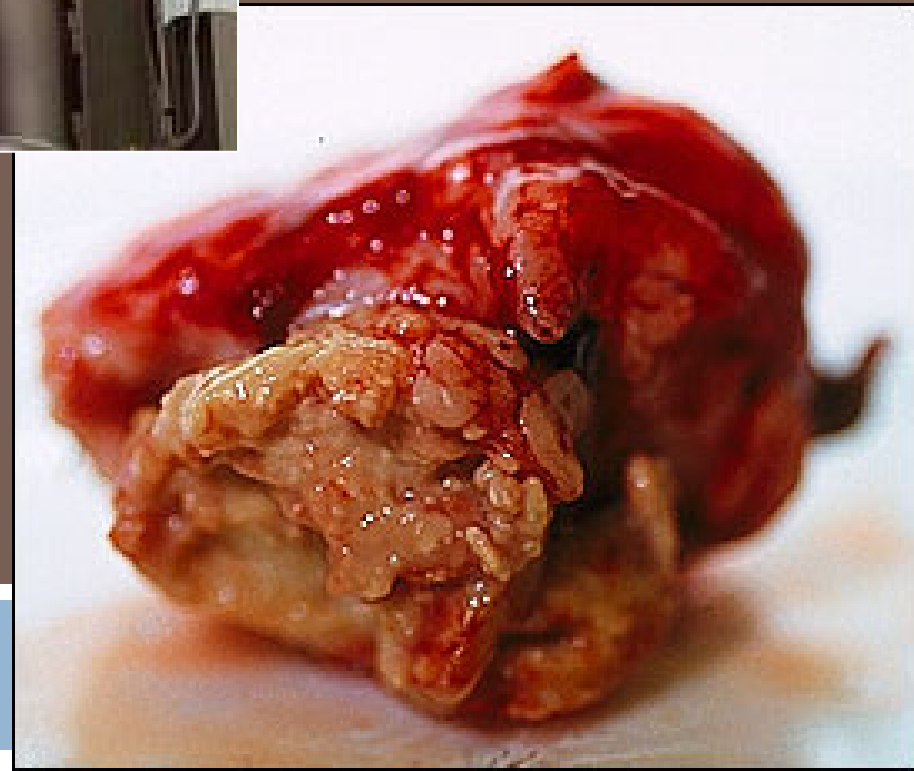
# How do we find bTB-affected herds? (FY 2003 to 2017)

## Case findings (112 Total)





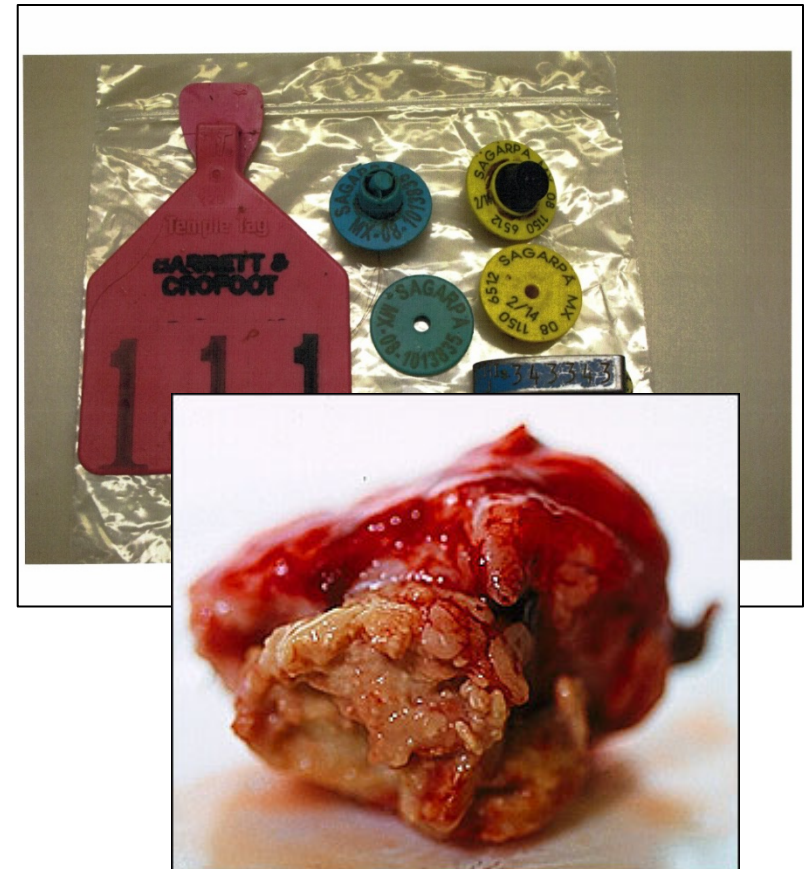
# SLAUGHTER TRACE INVESTIGATION





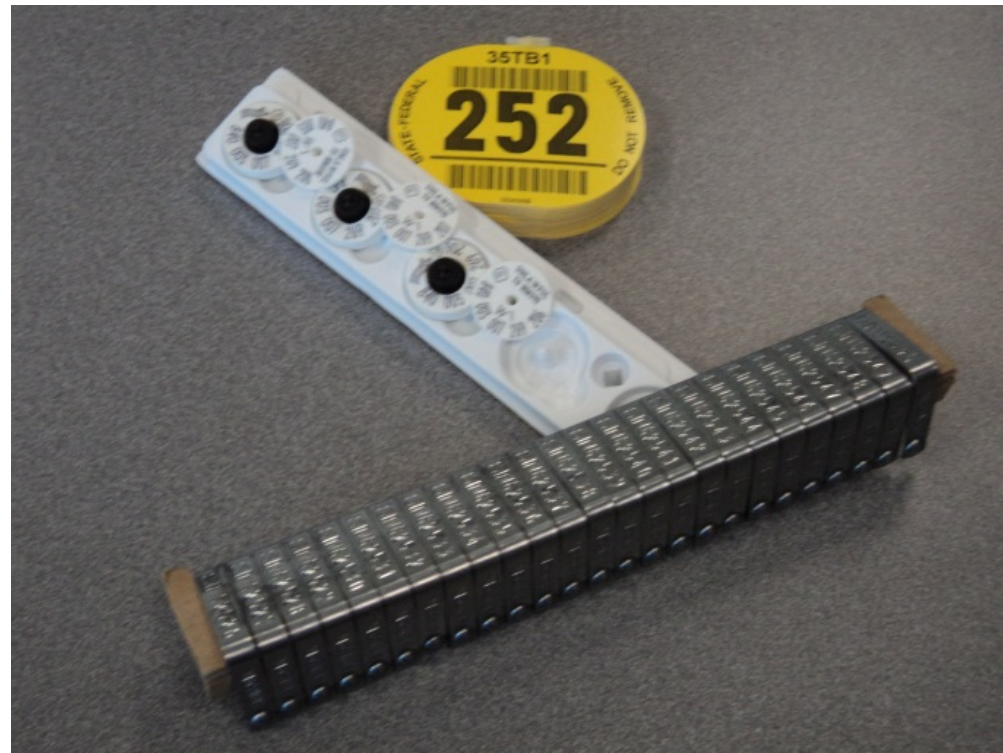
# Samples submitted to NVSL

- Histology
- PCR
- Culture
- If compatible
  - ▣ Check for match of DNA
    - Tissue on tags
    - Tissue from lesion



# Trace to source herd

- Slaughter records
  - ▣ Animal Owner
  - ▣ Animal location
- Tag allocation
- Determine state/farm location



# Quarantine Source Herd

AH-IC-52 (3/2016)



**Wisconsin Department of Agriculture,  
Trade and Consumer Protection**

Division of Animal Health  
PO Box 8911, Madison, WI 53708-8911  
Telephone: 608-224-4872 Fax: 608-224-4871

## ORDER OF QUARANTINE

Issued under sections 93.07 (10), 95.20 and 95.23, Wis. Stats. and chapter ATCP 10, Wis. Admin.Code.

<b>DATE ISSUED:</b>		<b>QUARANTINE NUMBER:</b>
Quarantine Property Address:		Legal Name of Owner:
Quarantine Property City / State / Zip		Business Name (if other than above):
Quarantine Property County / Town / Section		Mailing Address / City / State / Zip (if different than property address)
Premises Registration Number:	Latitude / Longitude	Legal Name of Custodian (if applicable):
<b><u>BREED/SPECIES/FAMILY:</u></b>		<b><u>REASON FOR QUARANTINE:</u></b>

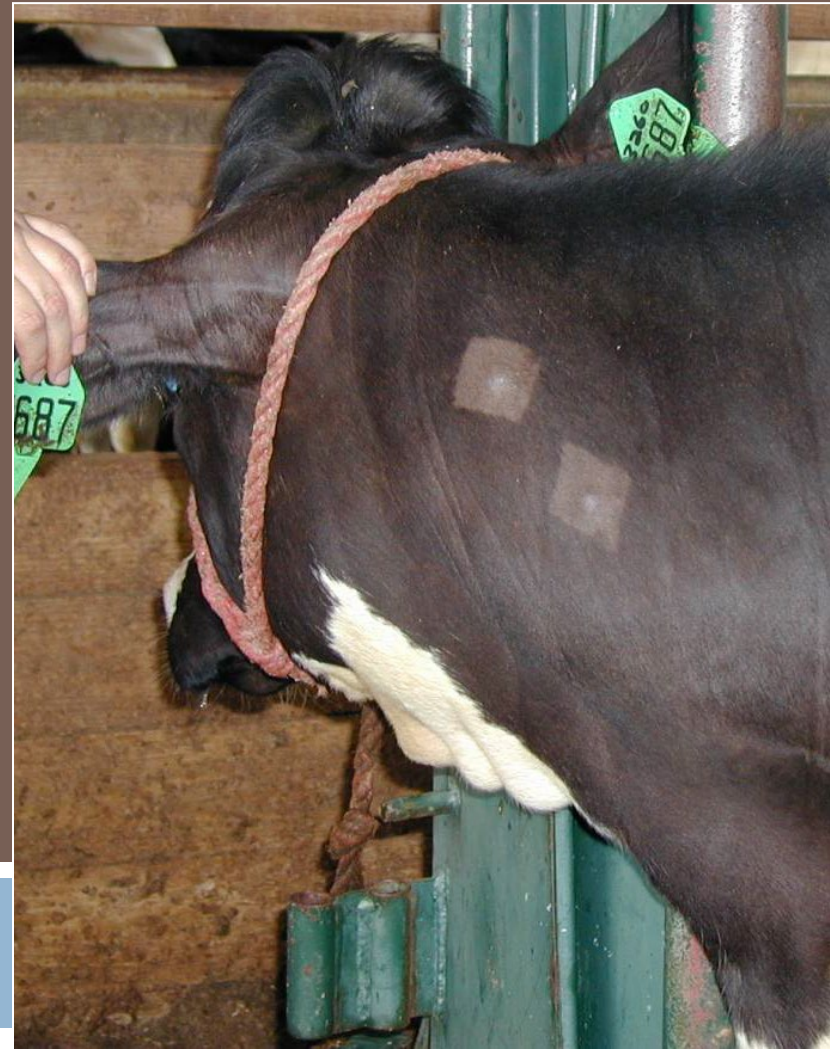
You are hereby notified that the following described animals or products are quarantined and may not be removed from the premises where now located without written permission of the State Department of Agriculture, Trade and Consumer Protection.

**Identification of Animal(s) or Products:**





# TB HERD TESTING IN SLAUGHTER TRACE



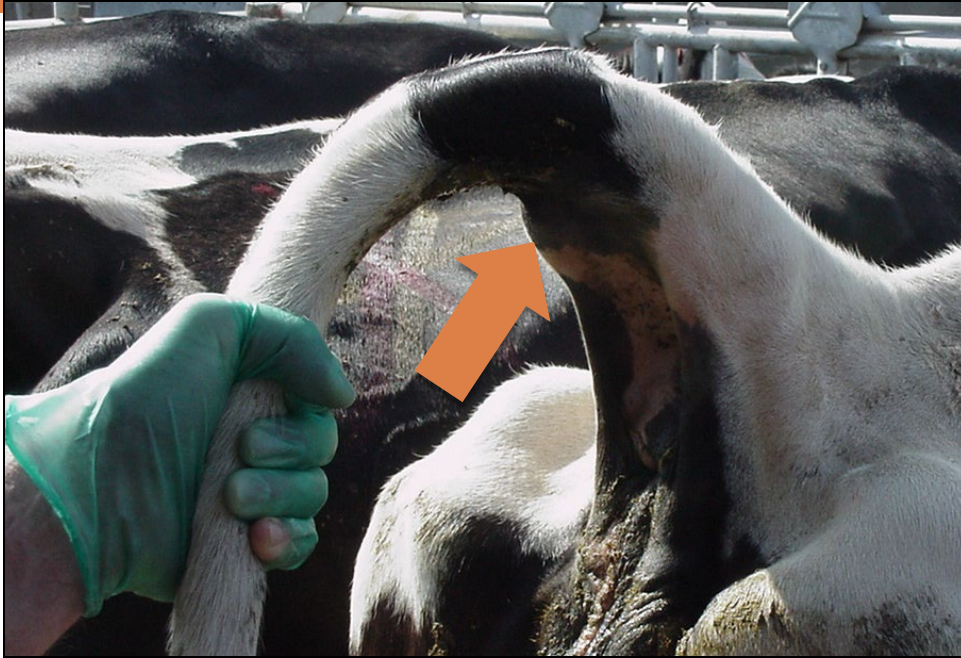


# TB Herd Test in Slaughter Trace

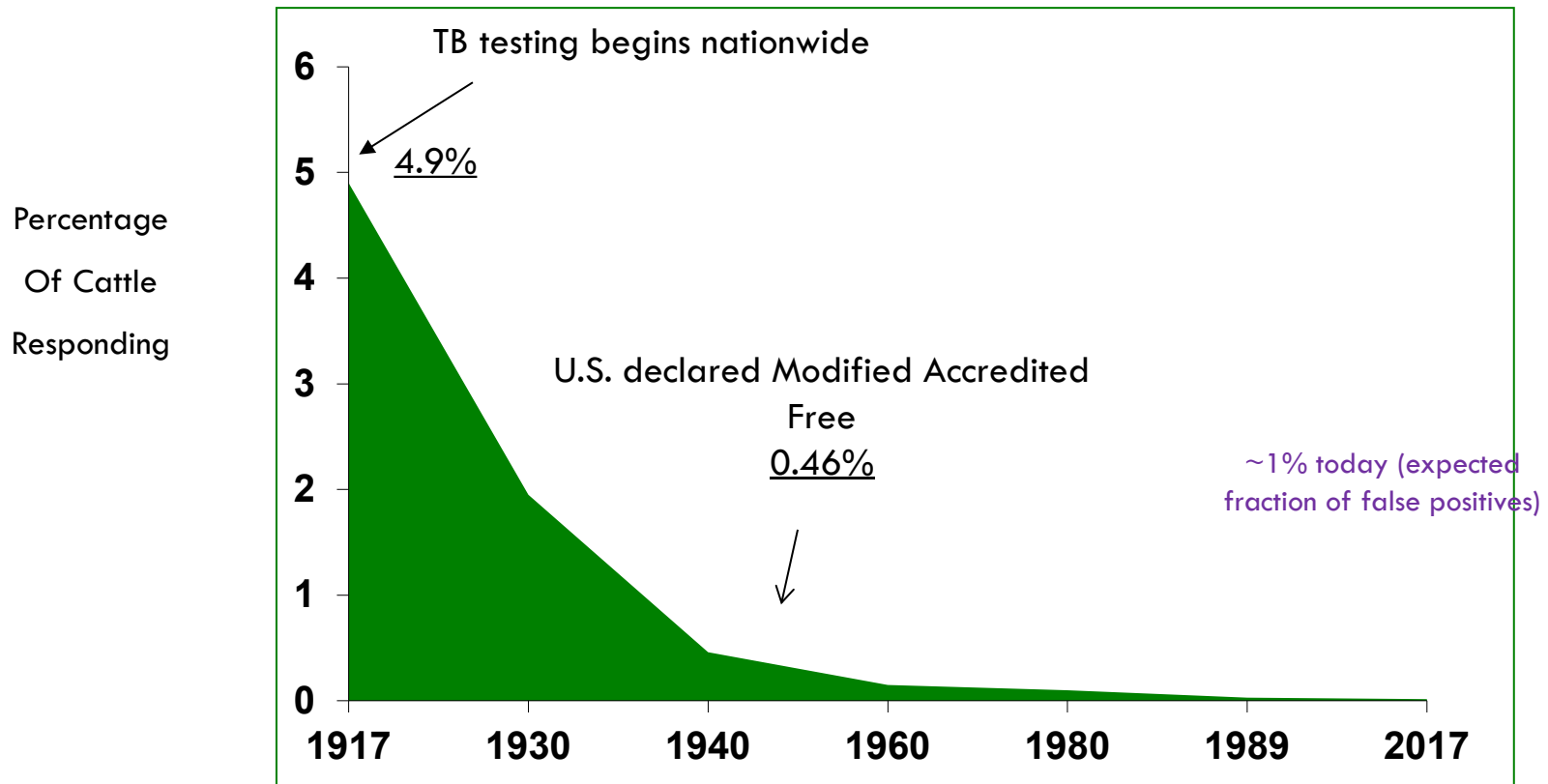
- Herd quarantined
- Apply caudal fold tuberculosis test (CFT)
  - ▣ Read 72 hours



# CFT Responders



# Percentage of U.S. Cattle Responding to the Skin Test, 1917 - 2017



Source: Palmer & Waters, Establishment of Bovine TB Eradication Program, Veterinary Medicine International, 2011



# Secondary TB Tests

- Comparative Cervical tuberculosis test (CCT)/Interferon Gamma Assay
  - CFT responders
  - Prioritize animal removal





# CCT Test

HERD OWNER - LAST NAME      FIRST NAME

DUTCHER, MICHAEL / USDA, A

ROUTE - STREET - ROAD

1111 DEMING WAY / SUITE 10

POST OFFICE      ST.

MADISON      WI

COUNTY      TOWNSHIP

Dane

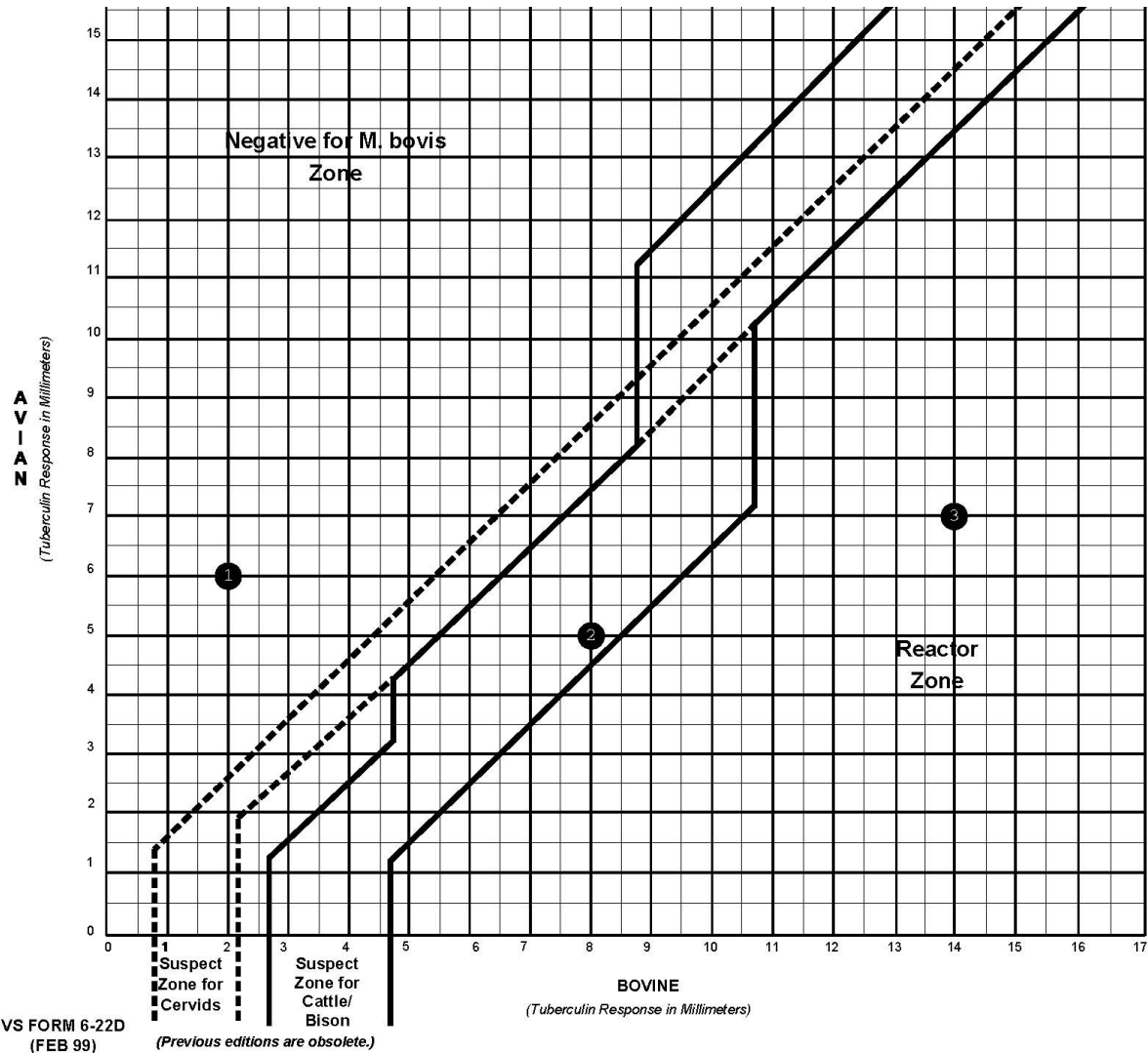
ANIMAL NUMBER	OFFICIAL IDENTIFICATION NUMBER	OTHER IDENTIFICATION
1	31AAA1230	Y-1559 8.40003E+14
2	31AAA1231	Y-1671 8.40003E+14
3	31AAA1232	Y-1674 8.40003E+14
4		
5		



[https://www.michigan.gov/documents/emergingdiseases/Web-bovinetuberculosislivestocktesting-sara\\_137663\\_7\\_421100\\_7.pdf](https://www.michigan.gov/documents/emergingdiseases/Web-bovinetuberculosislivestocktesting-sara_137663_7_421100_7.pdf)

ANIMAL NUMBER	OFFICIAL IDENTIFICATION NUMBER	OTHER IDENTIFICATION	AGE	SEX	WEIGHT	HEIGHT	WIDTH	DEPTH	LENGTH	THICKNESS	...	...	...	...
2	31AAA1231	Y-1671 8.40003E+14	6Y 2M	HO	F	10.0	15.0	5.0	12.0	20.0	8.0			S
3	31AAA1232	Y-1674 8.40003E+14	5Y 10M	HO	F	10.0	17.0	7.0	12.0	26.0	14.0			R
4														
5														

# CCT Scatter Gram



# Confirmed Infection in the Herd

- Infection confirmed in herd
  - ▣ Necropsy or slaughter CFT+
  - ▣ Samples submitted to National Veterinary Services Laboratory
    - Histopathology
    - PCR
    - Culture
    - Whole Genome Sequencing



# Infection Confirmed in a Herd

- TB Affected Herd
- Herd Remains Quarantined
- Disease Eradication
  - ▣ Depopulate
  - ▣ Test and remove
- Deciding factors
  - USDA modeling system
  - Number of Herd Tests
  - Time to clear disease
  - Cost
  - Other risk factors



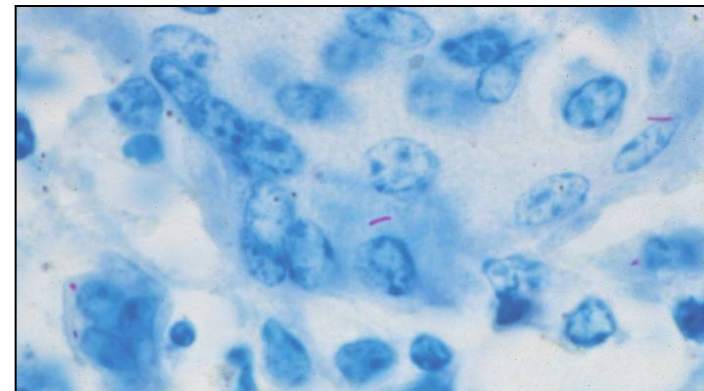


# WI Bovine TB Current Situation

- September 28, 2018: NVSL notifies DATCP of bovine TB positive cow at slaughter
  - ▣ Histocompatible & PCR positive
- 840 tag traced back to a Dane Co dairy
- Dane Co dairy quarantined, whole herd TB test of all animals over 2 months of age performed
- CFT, CCT and gamma interferon testing used to prioritize animals for further testing

# WI Bovine TB Current Situation

- October 29, 2018: NVSL confirms 2 positive animals (histocompatible and PCR positive), confirmation of TB affected herd status for Dane Co dairy herd
- 48 animals classified as reactors (CFT responders) from the initial whole herd tests
- Initial necropsy five animals sampled histo/culture +

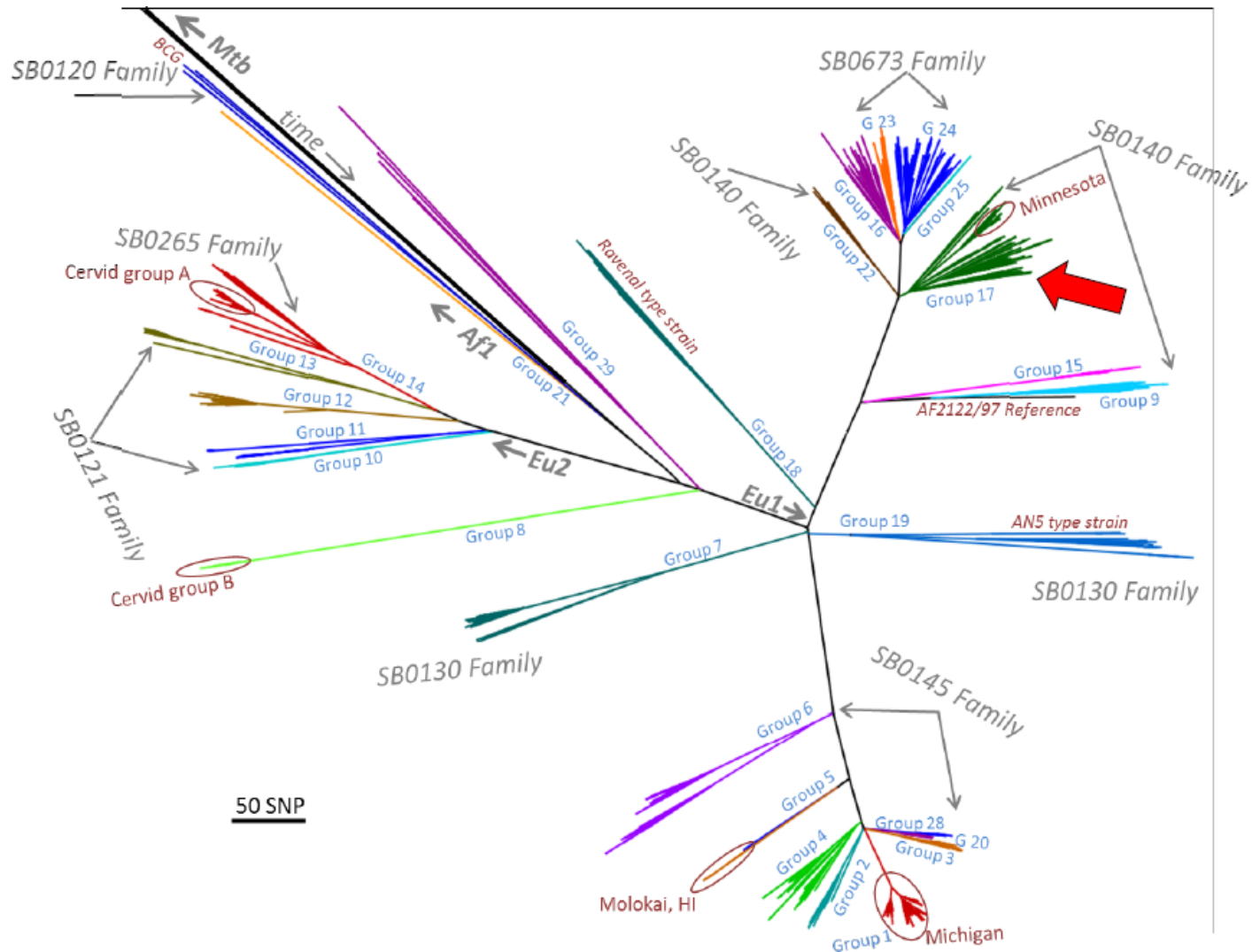


# WI Bovine TB positive herd

- Strain of bovine TB isolated from the cow at slaughter matches the strain isolated from a human patient in WI in 2015
- WI Public Health contacted DATCP in 2015 regarding possible herd exposure
  - ▣ 2 Whole herd tests were negative for TB in 2015
- Genetic sequencing results for the positive animals removed directly from the herd also match this strain



# M. bovis Phylogentic Tree



# Take Home

- TB is re-emerging disease- present in the US
  - ▣ Changing demographics of the industry
  - ▣ New opportunities for disease transmission
  - ▣ Could occur in any herd
- A State's free status does not prevent diseases from entering

# TB Awareness in Agriculture

WisCONTEXT

Series: [The Dairy State Economy](#)  
Series: [Wisconsin's Diverse Waves Of Immigration](#)

## Non-Profit Looks To Build Connections Between Midwestern Dairy Farms And Immigrant Workers

Puentes/Bridges Hosts Farmer Visits In Mexico, Provides Healthcare In Wisconsin

Madeline Heim, Wisconsin Center for Investigative Journalism  
Oct. 16, 2018 | 3 p.m.

## 5m The Cattle Site

- Home
- News & Analysis
- Features
- Markets & Reports
- Sustainability

### Featured Articles

#### Tuberculosis: Concerns And The Future

04 July 2010

Steve Maddox, a dairy farmer from California, tells an audience at the 2010 Annual Meeting of the National Institute for Animal Agriculture, how tuberculosis (TB) has affected his business and the changes he has made to prevent future disturbances.

### Bovine Tuberculosis in Animals and Humans



Division of Animal Health  
Wisconsin Department of Agriculture, Trade and Consumer Protection  
Wisconsin Department of Health Services

Questions?





# Resources and Contacts

- Wisconsin TB Program:  
[www.dhs.wisconsin.gov/tb/index.htm](http://www.dhs.wisconsin.gov/tb/index.htm)
- CDC bovine TB:  
[www.cdc.gov/tb/publications/factsheets/general/mbovis.htm](http://www.cdc.gov/tb/publications/factsheets/general/mbovis.htm)
- Wisconsin Department of Agriculture, Trade and Consumer Protection; Tuberculosis:  
[https://datcp.wi.gov/Pages/Programs\\_Services/Tuberculosis.aspx](https://datcp.wi.gov/Pages/Programs_Services/Tuberculosis.aspx)

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