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Health and Human Services

Texas Department of State Health Services

Human Infection with *Brucella abortus* Strain RB51 Associated with Raw Milk Consumption (Texas)

NASPHV/CSTE Webinar

February 21, 2018

Objectives

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- Describe the history and epidemiology of brucellosis
- Describe the history and unique aspects of *Brucella abortus* RB51
- Describe investigation of the first reported case of human brucellosis from RB51 in the US linked to consumption of unpasteurized milk
- Describe prevention and control measures employed

Brucellosis History

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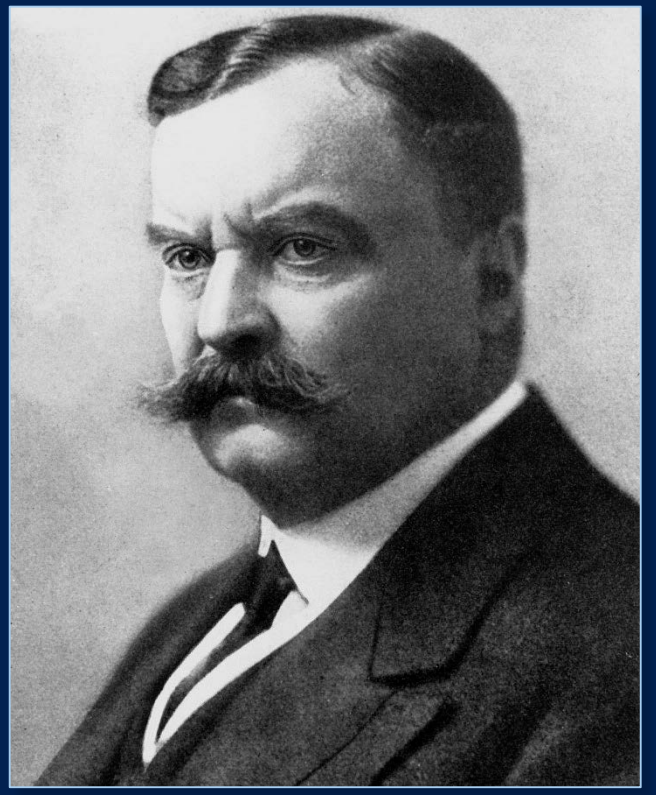
Recognized since antiquity in the Mediterranean Region

- Sir David Bruce, 1887
  - Coined the term “Malta fever”
  - Gram negative bacterium…*Micrococcus melitensis*
- Themistokles Zammit, 1905
  - Demonstrated organism in Maltese goats
- Bernard Bang, 1897
  - Disease of cattle in Denmark referred to as “contagious abortion”
  - Isolated and named *Bacillus abortus*.



https://en.wikipedia.org/wiki/David_Bruce_(microbiologist)

Brucellosis History

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Alice Evans, 1918

- Undulant fever correlation with Bang's
- Cultured organism from raw milk
  - Noted similarity to Bruce's organism

In about 1920, genus renamed *Brucella* in honor of Bruce

- Species recognized at the time
  - *B. melitensis, B. abortus, B. suis*

https://en.wikipedia.org/wiki/Alice_Catherine_Evans

Human Disease

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- Incubation period highly variable: 5 days–6 months
  - Average 2-4 weeks
- Protean manifestations (sub-clinical infections are common)
  - Acute
    - Non-specific: fever, chills, sweats, headache, myalgia, arthralgia, anorexia, fatigue, weight loss
    - Lymphadenopathy (10–20%)
    - Splenomegaly (20–30%)

Human Disease

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- Chronic
  - Recurrent (“undulant”) fever
  - Arthritis and spondylitis
  - Possible focal organ involvement
    - Central nervous system, uveitis, epididymo-orchitis

Animal Disease

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Livestock disease impact

- Decreased milk production
- Weight loss
- Abortion
- Infertility
- Lameness

Transmission

- Vertical
- Exposure to birthing products

Pathology

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Intracellular bacteria
- *B. melitensis, B. abortus*, *B. suis*, *B. canis*
  - Pathogenicity varies by species
- Gram negative coccobacillus
- Fastidious in culture

Tissue tropism
- Lymphatics
- Genital tract
- Placenta

www.google.com/search?rlz=1C1GGRV_enUS762US762&tbm=isch&q=photos+of+Brucella&chips=q:photos+of+brucella,online_chips:brucella+melitensis&sa=X&ved=0ahUKEwijgZHRlJ_ZAhVCZawKHXrPAIQQ4lYIKCgC&biw=1536&bih=759&dpr=1.25#imgrc=lsynffEMH2je1M:

Transmission to Humans

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Consumption of
- Raw milk
- Raw milk products
  - Soft cheese
  - Kefir

Contact with mucous membranes or non-intact skin
- Abattoir workers
- Hunters
- Veterinarians (also needle stick)

Inhalation of aerosolized materials
- During parturition of infected animals
- Surgical procedures
- Laboratory workers

B. abortus, *melitensis* and *suis* are “Select Agents”

http://www.idimages.org/atlas/organism/?atlasentryID=15&organism=Brucella

Disease Interventions

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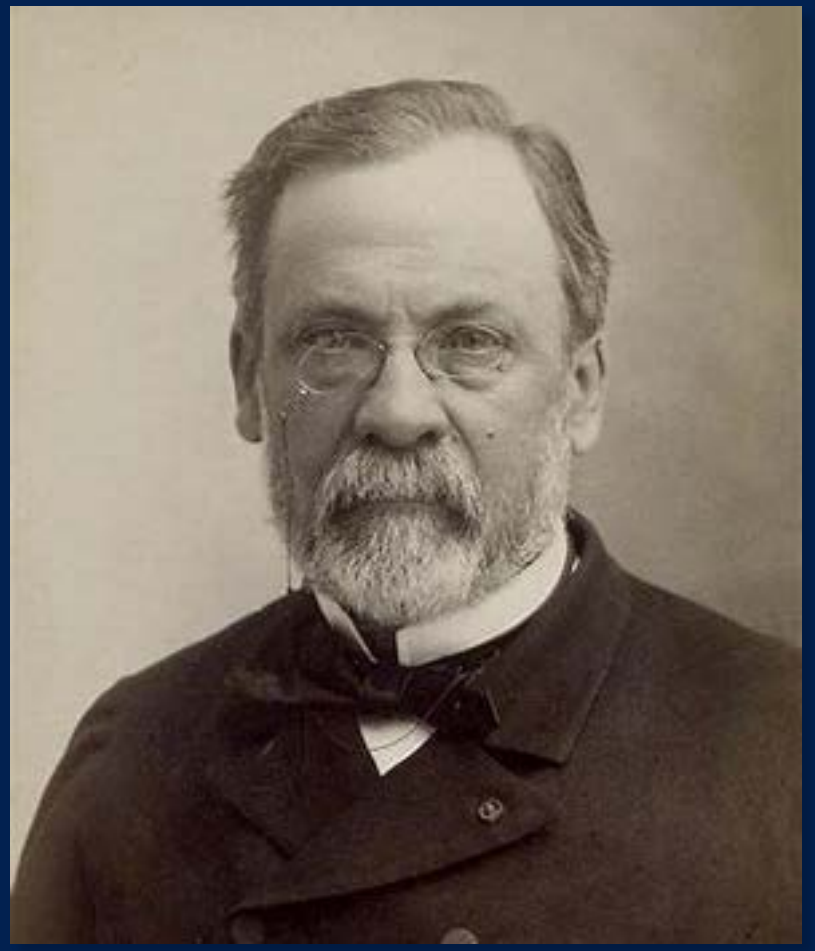
Pasteurization (Louis Pasteur, 1864)

- Applied to dairy products
  - Franz von Soxhlet, 1886
  - Milton Joseph Rosenau, 1912

Required by law in US

- First states passed, 1947
- For interstate dairy sales, 1975



Disease Interventions

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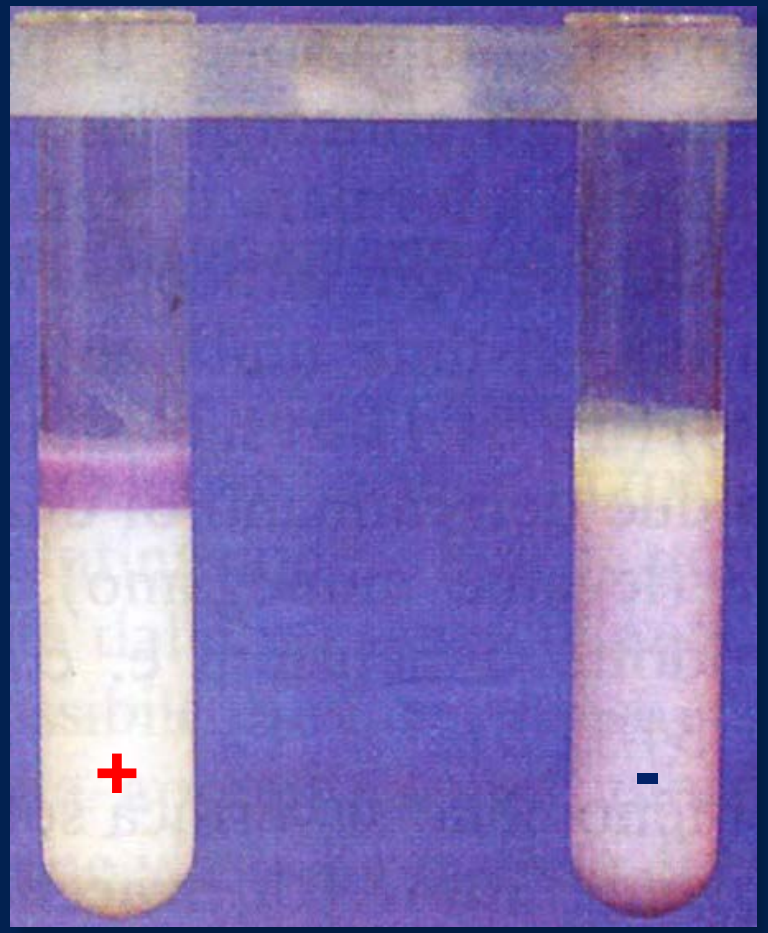
State-Federal Brucellosis Eradication Program, 1934

- State agriculture departments cooperative
- Cattle herds tested
- Infected cattle slaughtered
- Vaccination (strain 19)

Cattle surveillance

- Dairies: bulk tank milk testing
- Non-dairy: blood test (market, slaughter)



Vaccine: RB51

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Laboratory strain *B. abortus* RB51

- Lacks surface polysaccharide O side chain
- Not identifiable by serology
- Resistant to rifampin, penicillin

Live vaccine approved for cattle, 1996

- Effective, less abortigenic than strain 19
- Differentiates natural infection, vaccination
- No vaccine approved for humans

RB51 in Humans

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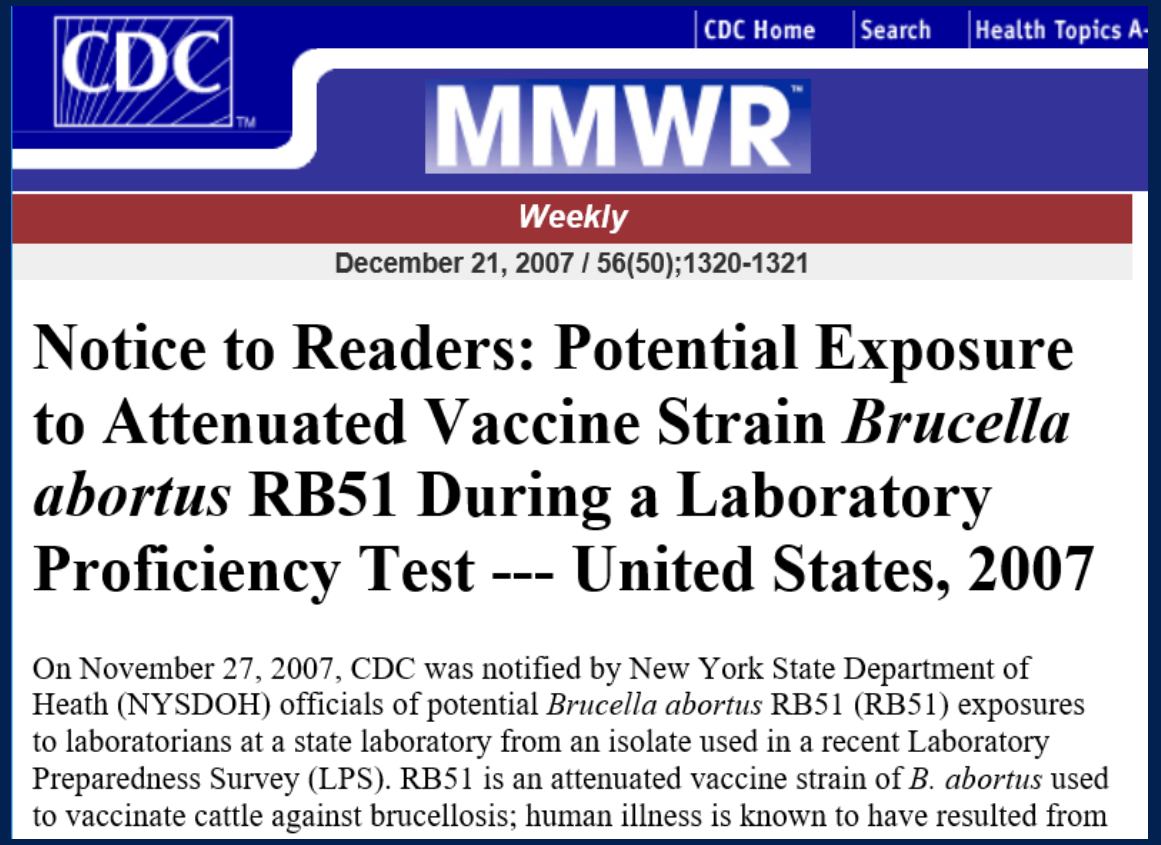
Human exposure to RB51

- Laboratorians
- Veterinarians

After exposure

- Determine high-risk/low-risk
- Post-exposure prophylaxis (PEP)
- Serologic monitoring not helpful
- 6 months symptom watch



CDC Home | Search | Health Topics A-

CDC

MMWR

Weekly

December 21, 2007 / 56(50);1320-1321

Notice to Readers: Potential Exposure to Attenuated Vaccine Strain *Brucella abortus* RB51 During a Laboratory Proficiency Test --- United States, 2007

On November 27, 2007, CDC was notified by New York State Department of Heath (NYSDOH) officials of potential *Brucella abortus* RB51 (RB51) exposures to laboratorians at a state laboratory from an isolate used in a recent Laboratory Preparedness Survey (LPS). RB51 is an attenuated vaccine strain of *B. abortus* used to vaccinate cattle against brucellosis; human illness is known to have resulted from

Outbreak Timeline

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PATIENT

July 3 , 2017
Index case symptomatic and subsequently hospitalized

Jul 17
- Hospital lab blood culture consistent with *Brucella*
- Isolate *Brucella* spp. by PCR at LRN

July 21
- DSHS notified of *Brucella* case

Jul 28
CDC received isolate from LRN for speciation

August 3
Preliminary positive RB51 isolate identified by CDC

Aug 7
CDC confirmed isolate from human specimen as *Brucella abortus* RB51

July **August**

Outbreak Timeline

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PRODUCT

August 1
Bulk milk tank samples collected from dairy

Aug 3
Bulk milk tank samples preliminary positive for *Brucella* spp. at DSHS

Aug 8
- Milk detained and destroyed at dairy
- Products as of Aug. 1 recalled

Aug 11
Bulk milk tank samples confirmed by CDC as *Brucella abortus* RB 51 from August 1 collection

August

Outbreak Timeline

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NOTIFICATIONS

August 14
DSHS issued press release and clinician health alert

Aug 17
Consumer notification began

September 1
CDC-assisted notification

Sept 13
CDC health alert released

Sept 15
National press release issued

Sept 21
Laboratory health alert

August → **September**

Public Health Challenges

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Disease confirmation

Source verification

Exposure time frame and transmission estimate

Future Health threat determination for the dairy

Mitigation Strategies

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Exposure prevention
- Detention Notice
- “Do not sell” emergency order
- Product recall order

Public and customer notification

Provider education

Herd Assessment

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Requirement to return dairy to production:
Testing bulk milk and individual cows for RB51

- Bulk milk testing
  - DSHS and CDC
- Animal testing
  - Texas Animal Health Commission (TAHC)
  - National Veterinary Services Laboratory (NVSL)
- Multiple specimen collections and tests
  - 2 cows tested positive and were culled
  - All subsequent testing of cows and bulk milk has been negative
  - Dairy resumed production on October 11, 2017 with ongoing testing of bulk milk by DSHS

www.google.com/search?q=pictures+of+dairy+herds&rlz=1C1GGRV_enUS762US762&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwiFy92b5qDZAhVO6wKHeeYDmcQ7AkIQA&biw=1536&bih=759#imgrc=nCtiPzwwqr1pmM:

Media Release

DSHS release

Dallas Morning News

Star Telegram

FORT WORTH

CDC issues raw milk warning about Paradise dairy, at least one person sick

BY MITCH MITCHELL
mitchmitchell@star-telegram.com

September 15, 2017 05:39 PM

PARADISE — People who consumed raw milk or milk products between June 1 and Aug. 7 from the K-Bar Dairy in Wise County should get antibiotic treatment to avoid the risk of lifelong, chronic infections, Centers for Disease Control and Prevention officials warned.

Customer Notification

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Consumer contact information obtained

- Household line list created
- Notified of potential RB51 exposure

Ensure accurate case finding

- Exposure period: June 1–August 7
- Line list expanded with additional households

Notification Efforts

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Multistate Exposure

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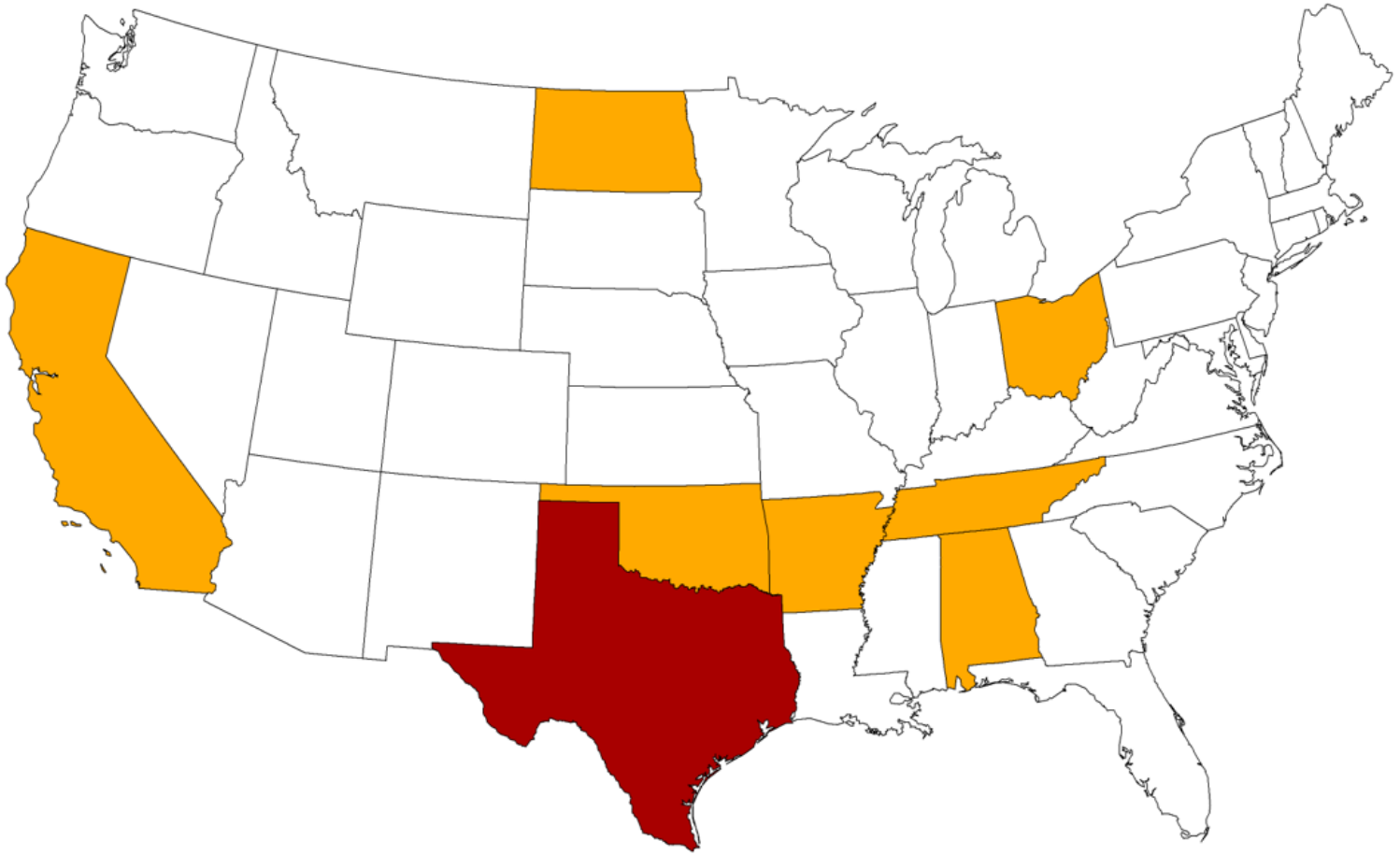
Consumers from

- Texas
- Alabama
- Arkansas
- California
- Ohio
- Oklahoma
- North Dakota
- Tennessee



Health Alert Network

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This is an official

CDC HEALTH ADVISORY

TEXAS Health and H
Services

Distributed via the CDC Health Alert Network
September 13, 2017, 1230 ET (12:30 PM ET)
CDCHAN-00407

Rifampin/Penicillin-Resistant Strain of RB51 *Brucella* Contracted from Consumption of Raw Milk

Summary:
The Texas Department of State Health Services, with assistance from CDC, is investigating *Brucella* RB51 exposures and illnesses that may be connected to the purchase and consumption of raw (unpasteurized) milk from K-Bar Dairy in Paradise, Texas. Symptoms of brucellosis can include: fever, sweats, malaise, anorexia, headache, fatigue, muscle & joint pain, and potentially more serious complications (e.g., swelling of heart, liver, or spleen, neurologic symptoms).

Brucello

Background

Raw milk is milk f
to kill harmful bac
bacteria such as *E*
which are respons
outbreaks.

The Texas Depart
people drink and
ice cream, and yo

- Pasteurizati
  temperature
- This is espe

Background
A person who drank raw milk from K-Bar Dairy in Paradise, Texas, has been hospitalized with brucellosis. Milk samples from the dairy have tested positive for a *Brucella* strain called RB51. People who consumed milk or milk products from this dairy from June 1, 2017, to August 7, 2017 are at an increased risk for brucellosis and should receive appropriate post-exposure prophylaxis (PEP). They are advised to consult with their health care providers regarding PEP care and possible diagnostic testing. Please note: the incubation period for brucellosis can range from five days to six months.

Recommendations
Brucella strain RB51 is resistant to rifampin and penicillin. A combination of doxycycline and trimethoprim/sulfamethoxazole for 21 days is the recommended first-line PEP regimen for RB51 exposure. There is no serological test available to detect RB51 infection. Blood culture is the recommended diagnostic test for exposed symptomatic individuals. When ordering

Federal Guidance

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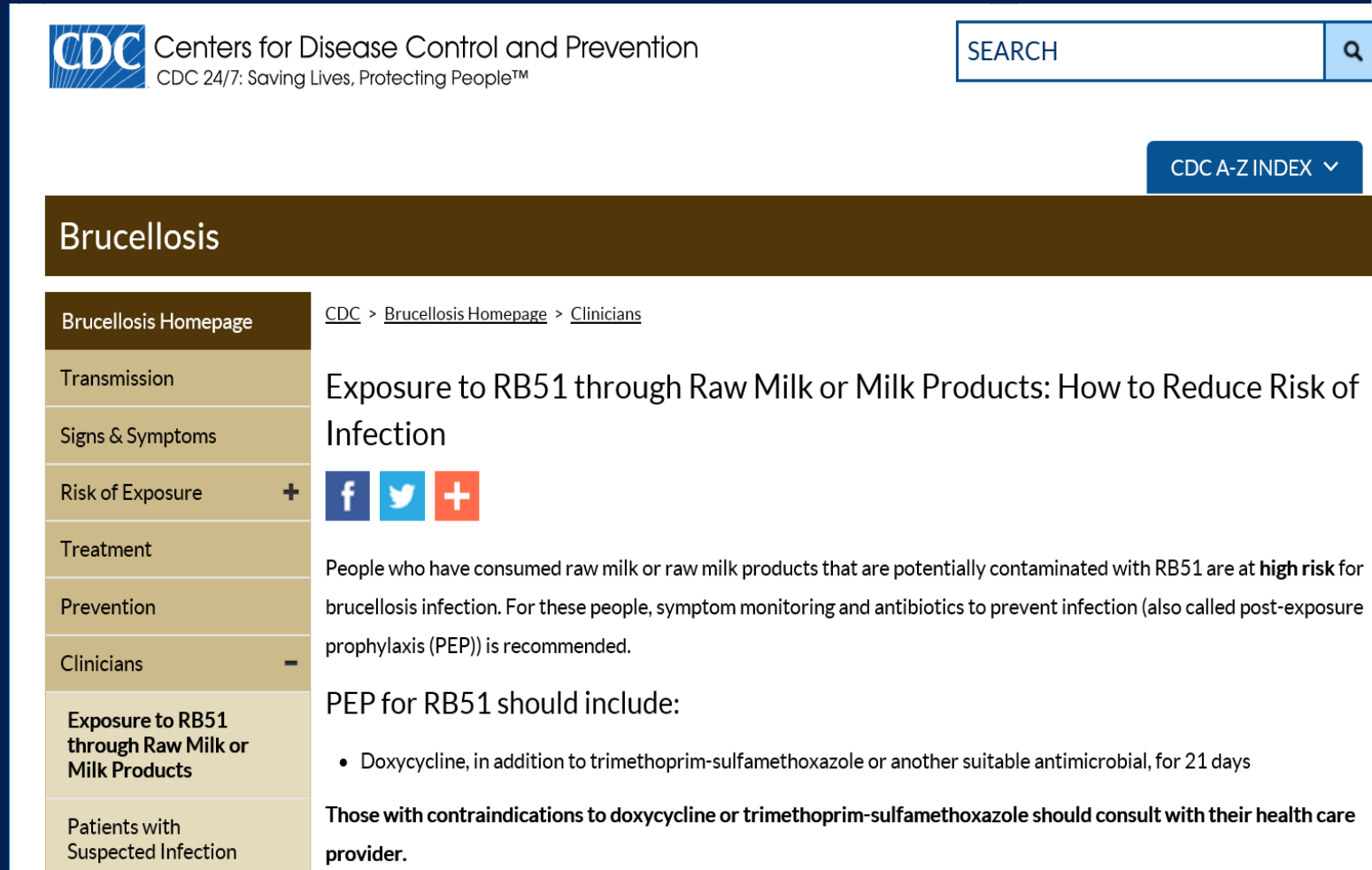
DSHS collaboration

Updated website
- Clinician instructions
- Laboratory guidance



Clinician Education

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Jennifer Shuford, MD, MPH
Infectious Disease Medical Officer
Department of State Health Services

Target audience

- Emergency & urgent care facilities
- Primary care providers
- Obstetricians
- Infectious disease specialists

Communication network challenges

- Local/regional health departments
- Clinician contact information

Consultation Service

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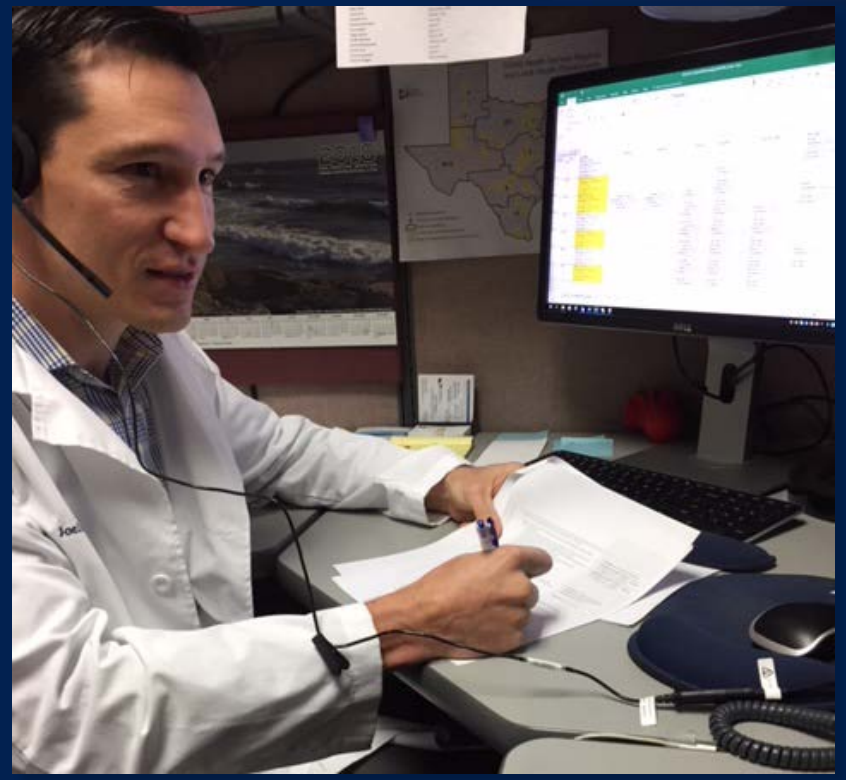

Joel Massey, MD
Preventive Medicine Resident
Texas Department of State Health Services

August 16–September 25

47 Consultations

- 39 Primary care providers
- 2 Emergency/urgent care
- 2 Laboratories
- 2 Infection preventionists

Public Education

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Risk communication

Avoid alienation
- Raw dairy industry
- Consumers and patrons
- Clinicians

Message dissemination channels

https://keepkidshealthycom.files.wordpress.com/2017/02/raw-milk.jpeg?w=1108

Contact Investigation

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RB51 Exposure—June 1–August 7, 2017	
Households responded to questionnaire	199
Individuals identified as exposed	517
Individuals reported seeking care, PEP	202 (39%)
Individuals reported receiving antibiotics	110 (21%)
Cases confirmed	1 (0.2%)

Findings are preliminary and subject to change.

Summary

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Brucella RB51 outbreak linked to raw milk

Mitigation interventions

- Exposure prevention
- Public and consumer notification
- Clinician education

DSHS provides rare disease education and control services

Acknowledgements

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- Chris Van Deusen

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- Dr. Susan Rollo
- Dr. Jody Hall
- Dr. Max Dow

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- Dr. Suzanne Tomasi
- Rebekah Tiller
- Karen Wu
- Dr. Henry Walke

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Thank you

Tom J. Sidwa, D.V.M., M.P.H.
State Public Health Veterinarian
Zoonosis Control Branch Manager
Texas Department of State Health Services
Austin, Texas