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Suspect Cutaneous Anthrax from Goat Bone and Exposure to Baaad Goat Meat

Gabriela Calvi, MPH, CHW

Background

In February 2023 Dallas County Health & Human Services (DCHHS) fielded a hospital report of a patient with a blackened, involuted palmar hand wound suspected to be cutaneous anthrax after a penetrating injury was suffered by a food handler processing goat meat.

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Timeline of Events

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February 12, 2023

Patient cut her hand on a bone from goat meat she was cutting

February 21, 2023

Patient was seen at an Urgent Care due to a laceration. Prescribed Augmentin and Bactroban.

February 23, 2023

Patient admitted

February 24, 2023

Labs were collected & patient discharged

Timeline of Events

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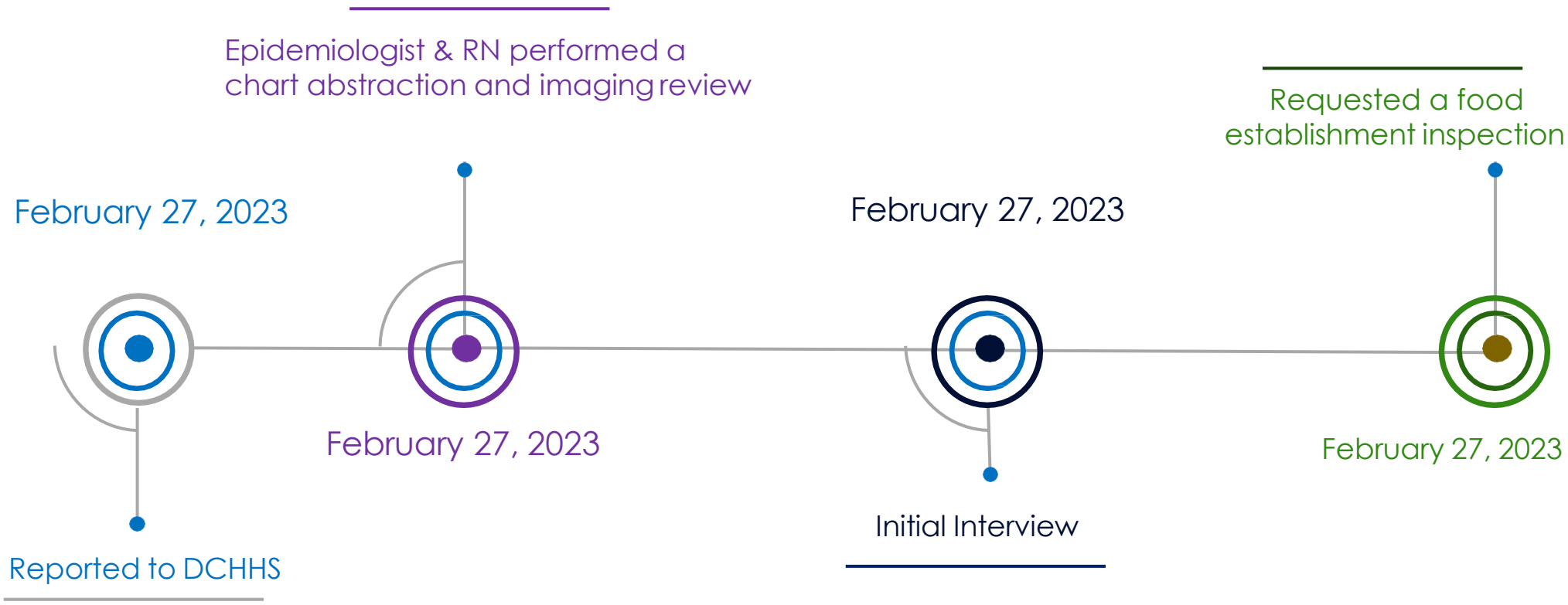

Meat Shop Inspection

- First Inspection on 02/28/23
  - Gaby Aguirre and Kathryn Johnson from City of Irving

    - Gary Balthrop from Texas Meat & Safety Unit (DSHS MSA)
    - Restaurant was open and fully stocked with cut/packaged meats.
    - Date of packaged meats 2/27/23.
    - The owner was the employee on site

Compliance Photographic

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The retailer freezer had 18 chickens, without marks of inspection. Photos taken by Gary Balthrop.

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Compliance Photographic

100 pounds of goat cuts & 20 whole chickens found in the retailer freezer, without marks of inspection.
Photos taken by Gary Balthrop.

5 pounds of goat lungs

Meat without marks of inspection. Photos taken by Gary Balthrop.

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Communication of Findings

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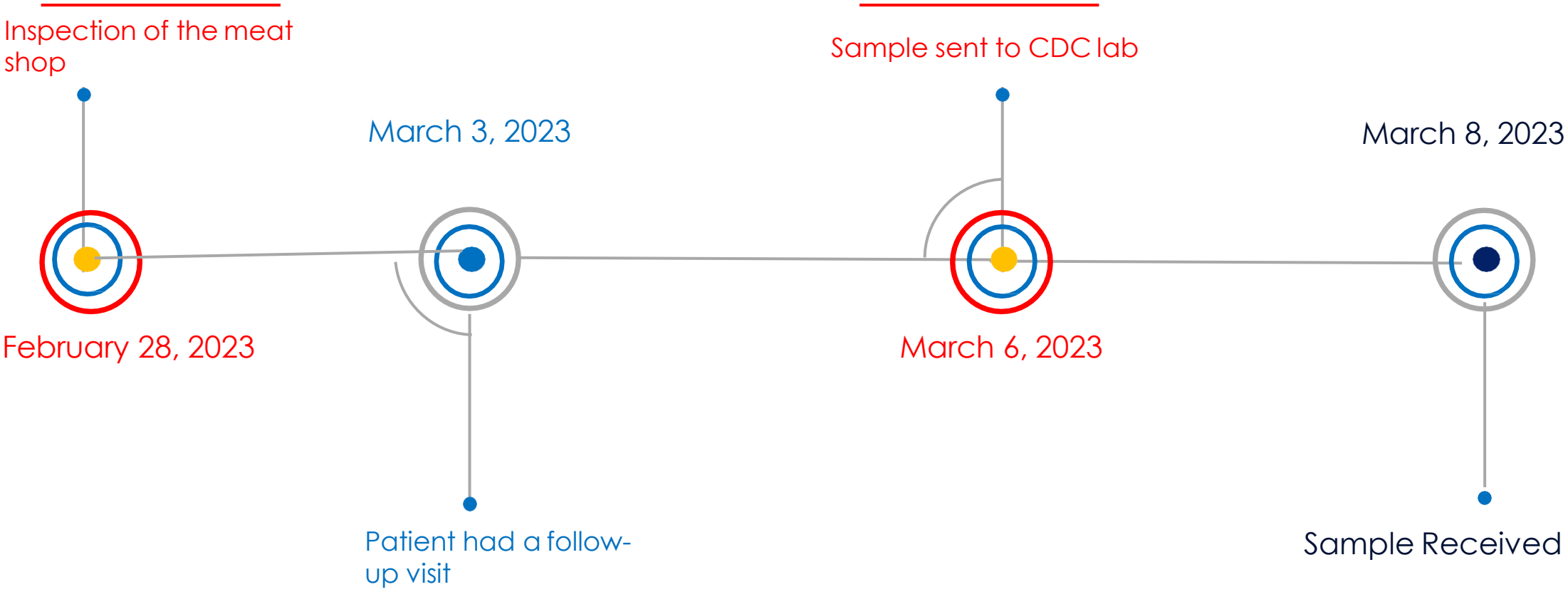
- Inspectors determined to seize meat
  - Failed to provide invoices
  - Suspended food permit
  - Closed restaurant and meat shop due to no certificate of occupancy (CO).

- Informed owner the city would not perform any CO inspection until complaint with the City of Irving, State Meat Inspection and DCHHS all have been resolved.

- Failed to provide evidence of invoices
  - State will have them voluntarily discard the meat
  - Issue citations – unapproved goat, chicken, operating without a CO and no hot water (no gas).

Timeline of Events



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Goat Farm Site Visit on 03/08/23

An Inspection of the farm was conducted in partnership with Texas Meat & Safety (DHSH MSA) team along with Dallas County Health & Human Services (DCHHS) Epidemiologist Gabriela Calvi.

MSA Compliance Photographic

Actively processing chicken & goat meat shop with a chicken plucker and a goat scalder.
Photos taken by Gary Balthrop.

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MSA Compliance Photographic

Actively processing chicken & goat meat shop with a chicken plucker and a goat scalder.
Photos taken by Gabriela Calvi

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MSA Compliance Photographic

Filthy sink without running hot water & black leathered apron.
Photo taken by Gabriela Calvi

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Live goats & chickens

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Farm Dog Drinking

Photo taken by Gabriela Calvi

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Roaming goats on the farm

Photo taken by Gabriela Calvi

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Close Observation of Free Roaming Goats

Photos taken by Gabriela Calvi

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Photo taken by Gabriela Calvi

Suspect Anthrax Conference Call

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- March 9th, 2023
  - Interdisciplinary meeting
  - Goat farm update & next steps

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Texas Meat Safety Unit Follow –up Inspection to the Meat Shop on 03/09/23

Destruction of Detained Meat

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Photos taken by Gary Balthrop

Voluntary Destruction

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Photo taken by Gary Balthrop

Anthrax vs. Other etiologies

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- *Bacillus anthracis* is reportable upon suspicion to the health department
  - Cultures that cannot be ruled out for *B. anthracis* should be forwarded to the closest laboratory reference network (LRN) facility for confirmatory testing.
  - Anthrax case criteria written to allow for classification of cases pending laboratory results (with out without epi linkage) to give health departments authority to investigate early upon notification.

Anthrax Epidemiological Case Criteria

Probable

A case that meets clinical criteria AND has a Gram stain demonstrating Gram-positive rods, square-ended, in pairs or short chains; OR a positive result on a test with established performance in a CLIA-accredited laboratory; **OR has epidemiologic linkage relating it to anthrax.**

Suspect

A case that meets the clinical criteria AND for whom an anthrax test was ordered, but with no epidemiologic linkage relating it to anthrax.

Epidemiologic linkage

Exposure to environment, food, animal, materials, or objects that is suspected or confirmed **to be contaminated with B. anthracis.**

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Detection Methods

DHSH & CDC Samples Request

- 1. Lesion swab – Parapoxvirus assay
- 2. Serum – rickettsial antibody panel testing
- 3. Biopsy – histopathologic evaluation (Anthrax / Orf Virus)

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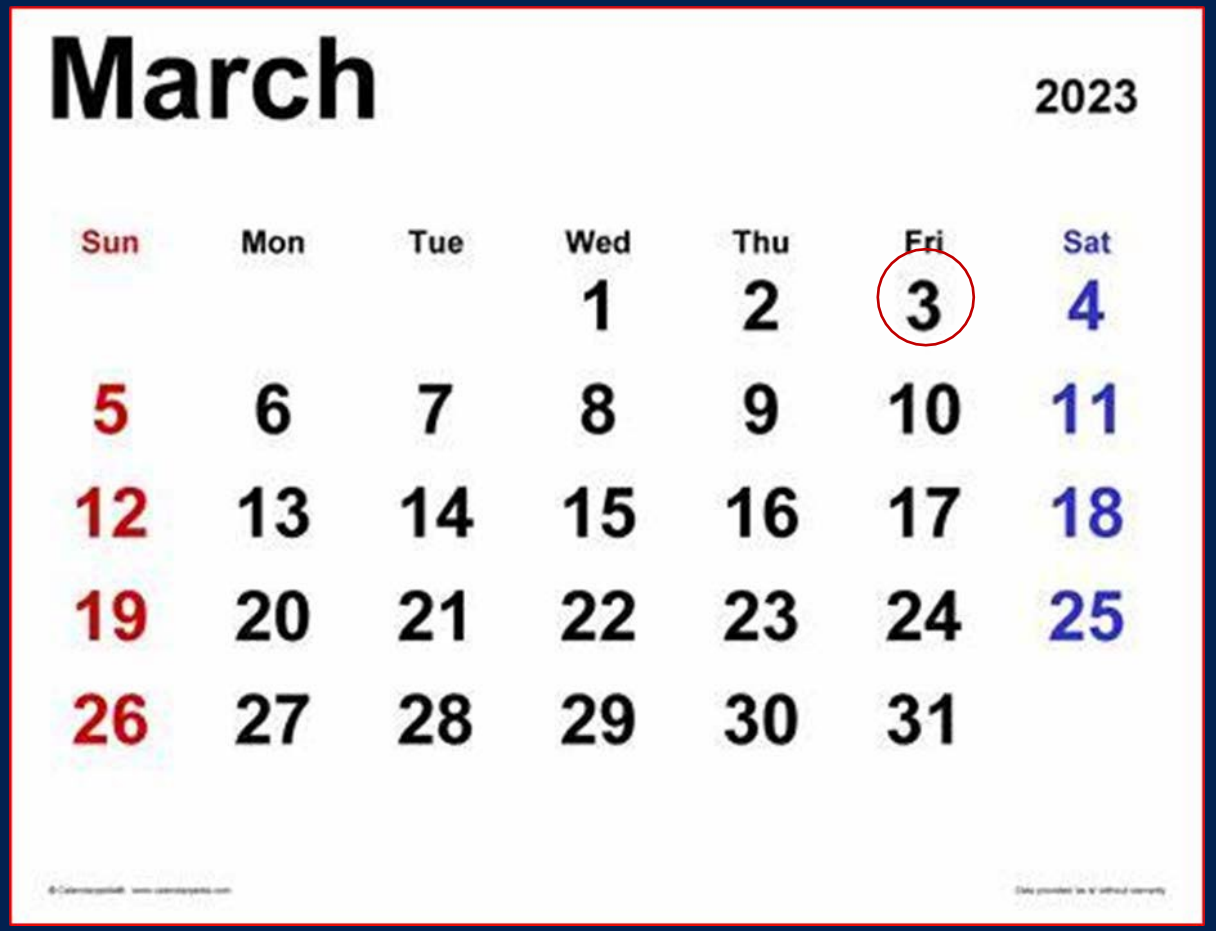
Test Performed



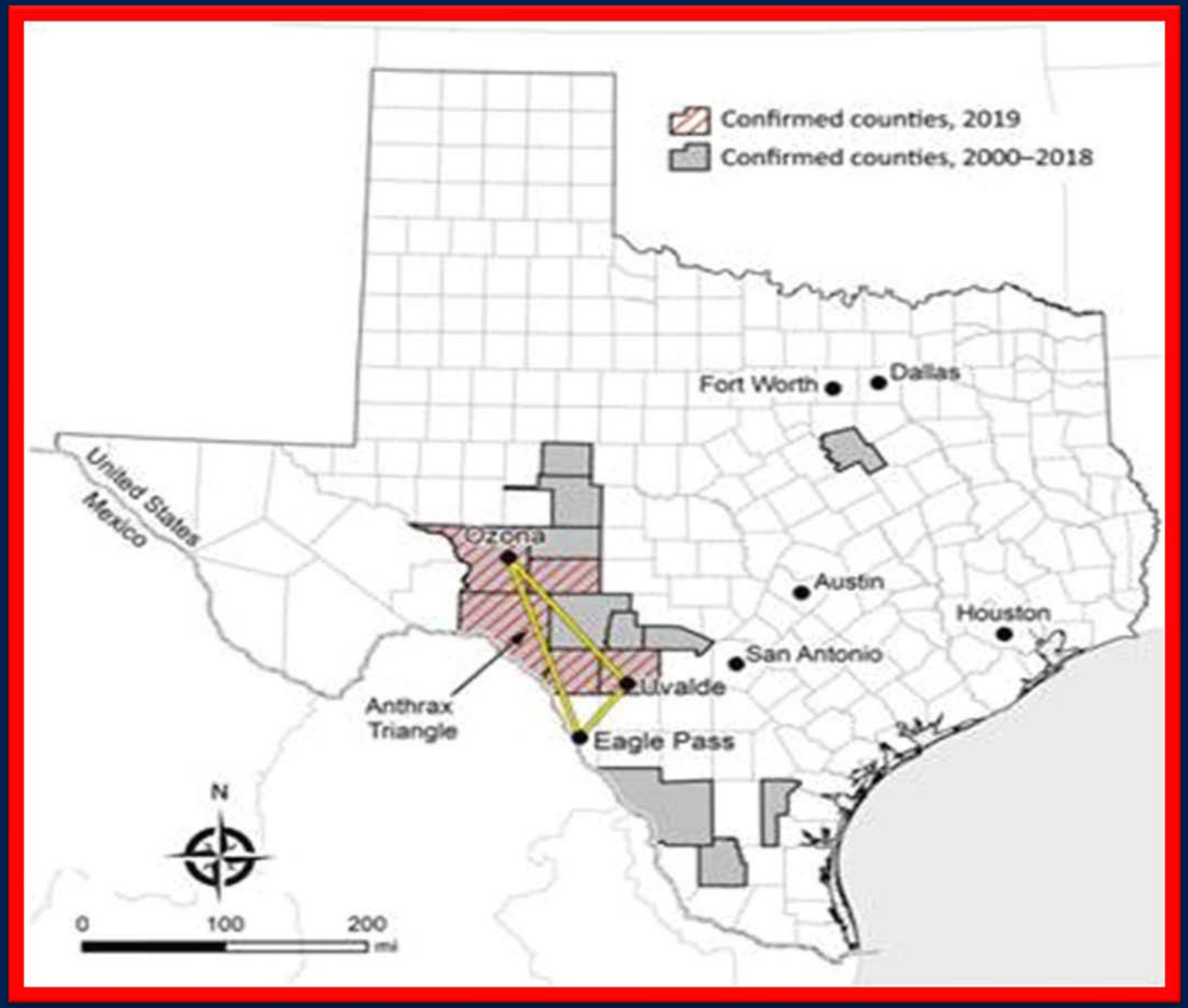
- Total lethal factor activity – a detection mechanism for B. anthracis virulence factor – from the suspected Anthrax lesion was analyzed using CLIA-approved MALDI-TOF mass spectrometry.

History of Orf Virus

- Orf described in animals
  - Sheep: 1787
  - Goats: 1879
- Orf described in humans
  - 1923

Center for Food Security and Public Health, Iowa State University, 2012

Animal Anthrax in Texas



Map from Sidwa et al 2020

Epidemiological Characteristics of Orf Virus

Zoonotic disease	Agent	Means of transmission to humans	Animal host	Nationally notifiable	Incubation Period	Cases confirmed by DCHHS in five years	Environment
Contagious pustular dermatitis (Orf or contagious ecthyma)	Parapoxvirus	Animal contact or tissue handling; not person to person	Mainly sheep and goats, but may affect other ungulates	No	3-7 days	1	Seen worldwide near animal husbandry sites

Center for Food Security and Public Health, Iowa State University, 2012

Comparison of Anthrax & Orf

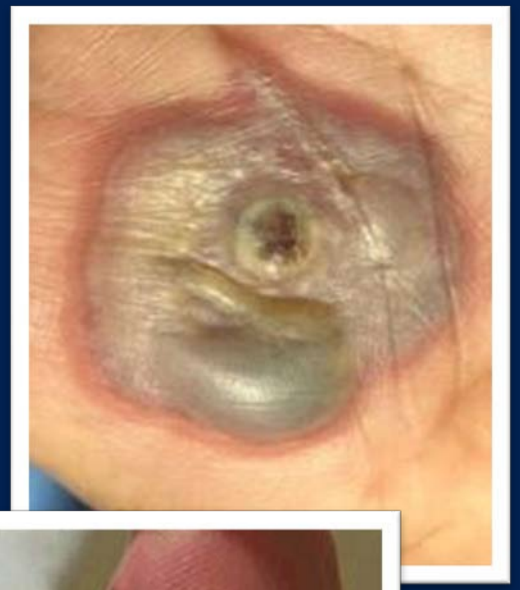
Clinical Signs

Usually single skin lesion

- Small, firm papule
- Fingers or hands
- Eventually lesion covered by crust

Often resolves spontaneously

- Immunosuppressed people at greater risk for complications



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Center for Food Security and Public Health, Iowa State University, 2012

Conclusion

- Food handlers and distributors were operating illegally under conditions that endanger the community, and coordination with regulatory authorities can both prevent contaminated livestock from entering the food supply and otherwise aid animal and human welfare.
- Increased familiarity with Orf could prevent unnecessary testing also reduce antibiotic misuse, as the infection is generally self-limiting.
- Differential diagnoses should consider the presentation of compatible skin lesions and risk factors such as occupational exposure to aid in identifying animal-borne illnesses.

Recommendations

- Infection Preventionists and Epidemiologists should consider negative results situationally, along with acquisition risks and antibiotic timing, when reviewing reports of anthrax-like wounds, as there is potential for misleading or alternate outcomes with public health implications.

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What Happened to the Farm?

- The owner of the farm hired a consultant to help them with getting the farm on the right track. The consultant had the livestock check out by a veterinarian and then sold the livestock to produce the funds to complete the processing plant. The plant now has a meat inspector and a grant to slaughter and sell meat products legally.

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Acknowledgements

DCHHS will like to give thanks to:

- Field investigator Gary Balthrop of Texas Department of State Health Services, Meat Safety Assurance (DSHS) (MSA)
- Sanitarian Gary Aguirre of City of Irving
- DSHS Region 2/3
- DSHS lab
- DSHS Zoonosis Control Branch
- CDC Poxvirus and Rabies Branch (PRB)
- DCHHS lab
- DCHHS Epidemiologist Michelle Carruthers and Epi nurse Marc Williamson

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Questions

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Communicating with Law Enforcement in Case Investigations:

A summary of three *Brucella* sp. positive samples collected on three consecutive days in PHR 4/5N

Brent Moore, DVM, MS, MPH, DACVPM
Regional Zoonosis Control Veterinarian
Texas Department of State Health Services
Public Health Region 4/5 North

Introduction

- Brucellosis is a zoonotic disease with both chronic and acute manifestations
  - Caused by infection with *Brucella* sp. bacteria
  - Different species often associated with specific exposures (e.g. *B. melitensis from unpasteurized dairy)*
- *Brucella melitensis, B. suis,* and *B. abortus* are categorized as select agents
  - Requires cultures be handled using special safety precautions
  - Samples should be sent to a laboratory reference network (LRN) facility for confirmation
  - All cultures must be destroyed by sentinel lab after identification is confirmed

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Brucellosis in Texas

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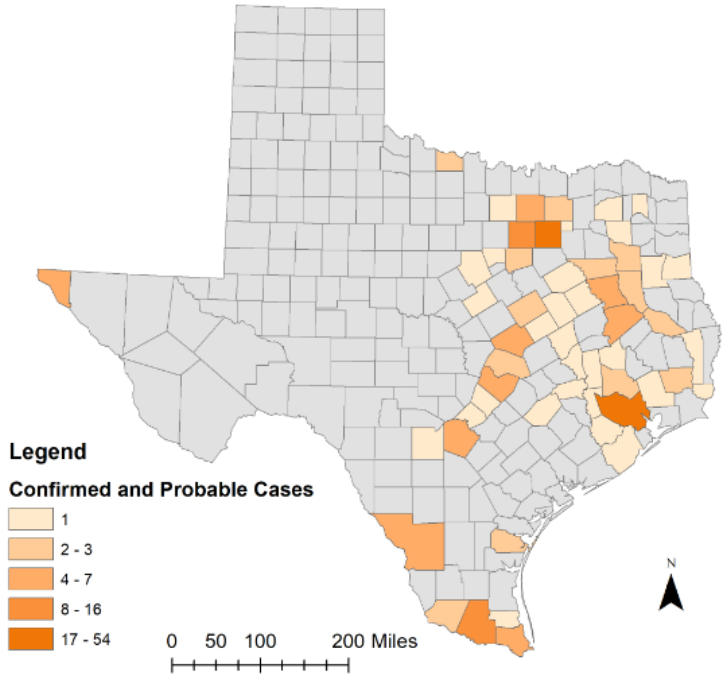
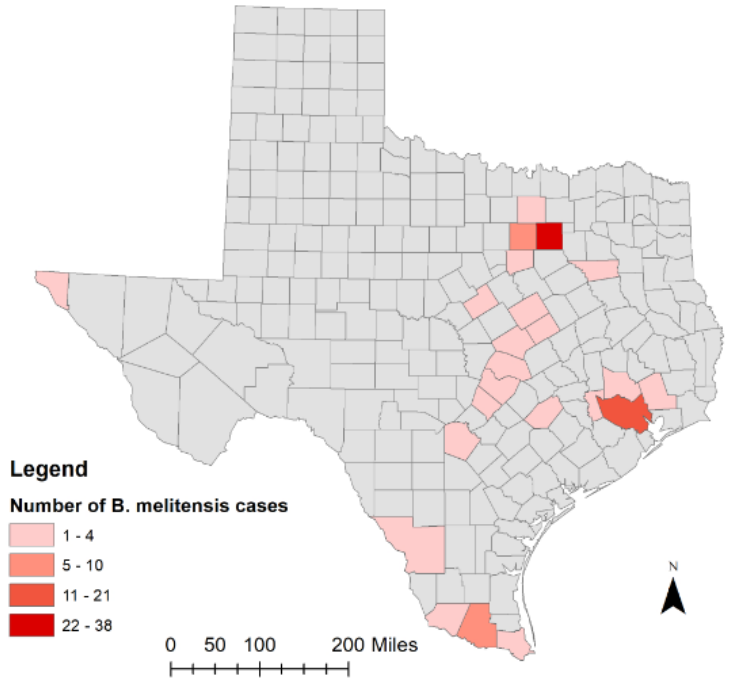
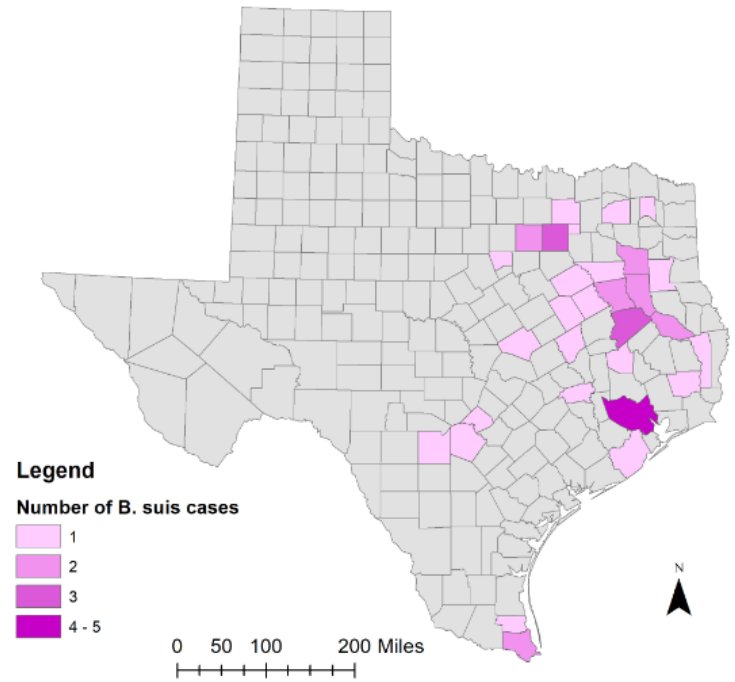
Confirmed and Probable Brucellosis Cases by County of Residence, Texas, 2013-2022



Brucella melitensis Cases by County of Residence, Texas, 2013-2022



Brucella suis Cases by County of Residence, Texas, 2013-2022



Brucellosis in PHR 4/5N

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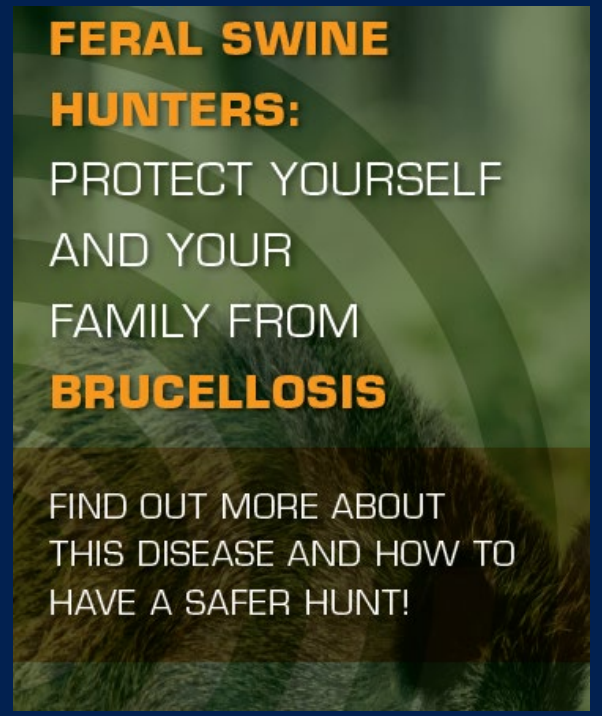
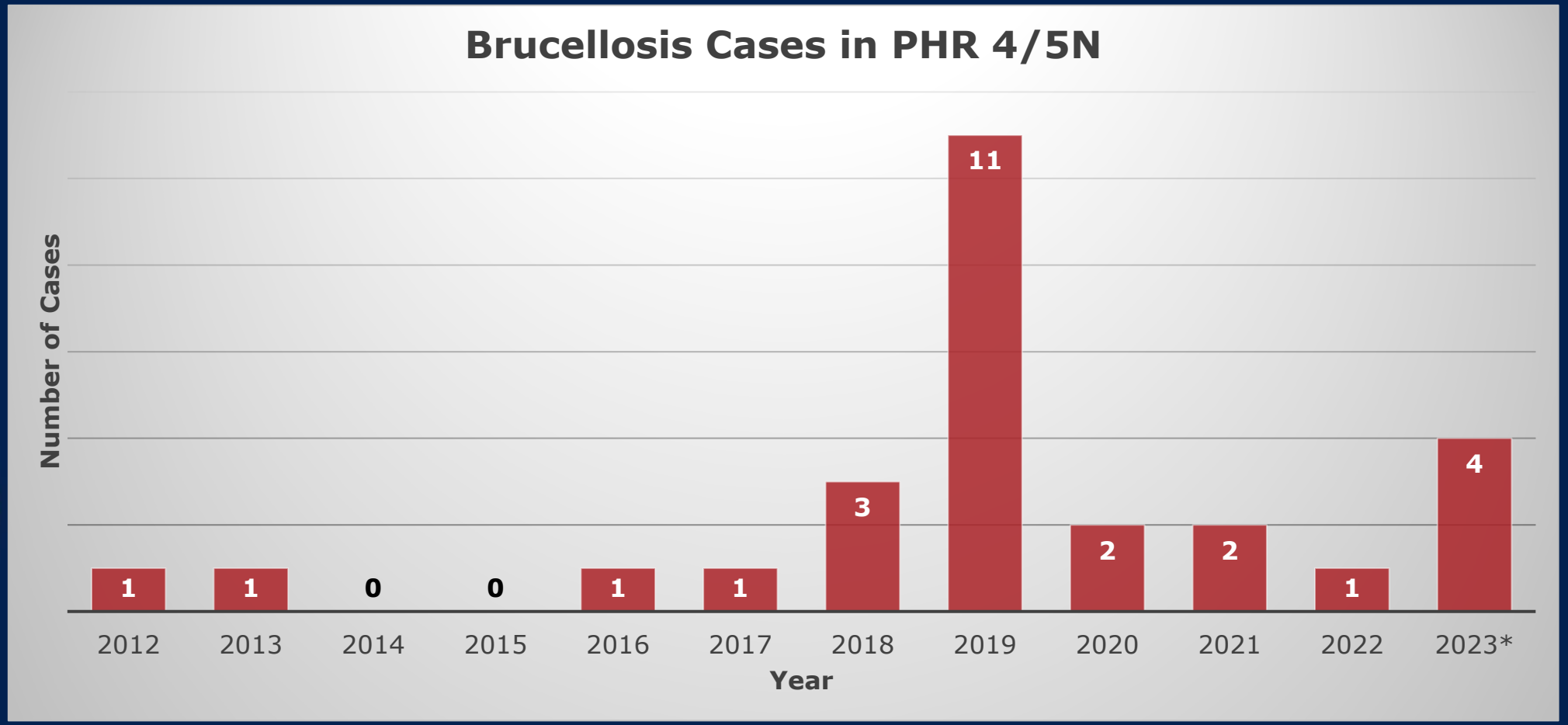
- *Brucella suis* likely ubiquitous in Northeast Texas in feral swine population
  - Likely more of an occupational threat (hunting and swine production) in this region
- Currently developing surveillance in feral swine population



PHR 4/5N Brucellosis Incidence (Confirmed and Probable)



*Data is preliminary

Case information

- Patient #1
  - Sample collected 3/24/2023
  - 48-year-old male
  - Fever, headache, fatigue, myalgia, chills
  - Would not return calls, but medical records indicated signs and symptoms also occurred "years ago"
- Patient #2
  - Sample collected 3/25/2023
  - 90-year-old male. Last feral hog exposure two months prior to symptom onset
  - Fever, fatigue, disequilibrium, weakness, icteric, malaise, sepsis
- Patient #3
  - Sample collected 3/26/2023
  - 47-year-old male
  - Fever, night sweats, fatigue, anorexia, weight loss, nausea/vomiting
  - Processes his own meats, including domestic and feral swine
  - Rarely uses PPE

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Brucellosis isolates confirmed and initial contacts

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April 17, 2023

- Regional office Contacted by Public Health Laboratory of East Texas (PHLET)
  - FBI contacted PHLET to ask about three identifications of *B. suis*
- Called FBI agent to discuss brucellosis history in this region
  - Had a previous working relationship on another situation
  - Due to previous working relationship, this issue was quick to resolve

PHLET Public Health Laboratory of East Texas

DEPARTMENT OF JUSTICE FEDERAL BUREAU OF INVESTIGATION FIDELITY BRAVERY INTEGRITY

CDC CENTERS FOR DISEASE CONTROL AND PREVENTION

Summary

- *Brucella suis* more common cause of brucellosis in NE Texas
  - Disease is likely underrecognized and underdiagnosed
  - Groups at greater risk include hunters and those that work in swine production
- Multi-agency investigations and interactions do not have to be painful
  - Importance of understanding population your health department serves
    - Exposures unique to population that might cause differences in disease trends from rest of state
    - Demographics of population
  - In this case, DSHS/FBI/CDC able to have seamless communication and closure
  - Each interaction can make future interactions easier or more difficult…

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Acknowledgments

- Public Health Laboratory of East Texas (PHLET)
- FBI – Dallas Branch
- CDC – Special Pathogens Branch
- USDA
- Texas Animal Health Commission
- Zoonosis Control Branch

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Questions?

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Cutaneous Anthrax Schleicher County 2023

Kelly Spencer, B.S., A.A.S

PHR 9/10 – Zoonosis Specialist III

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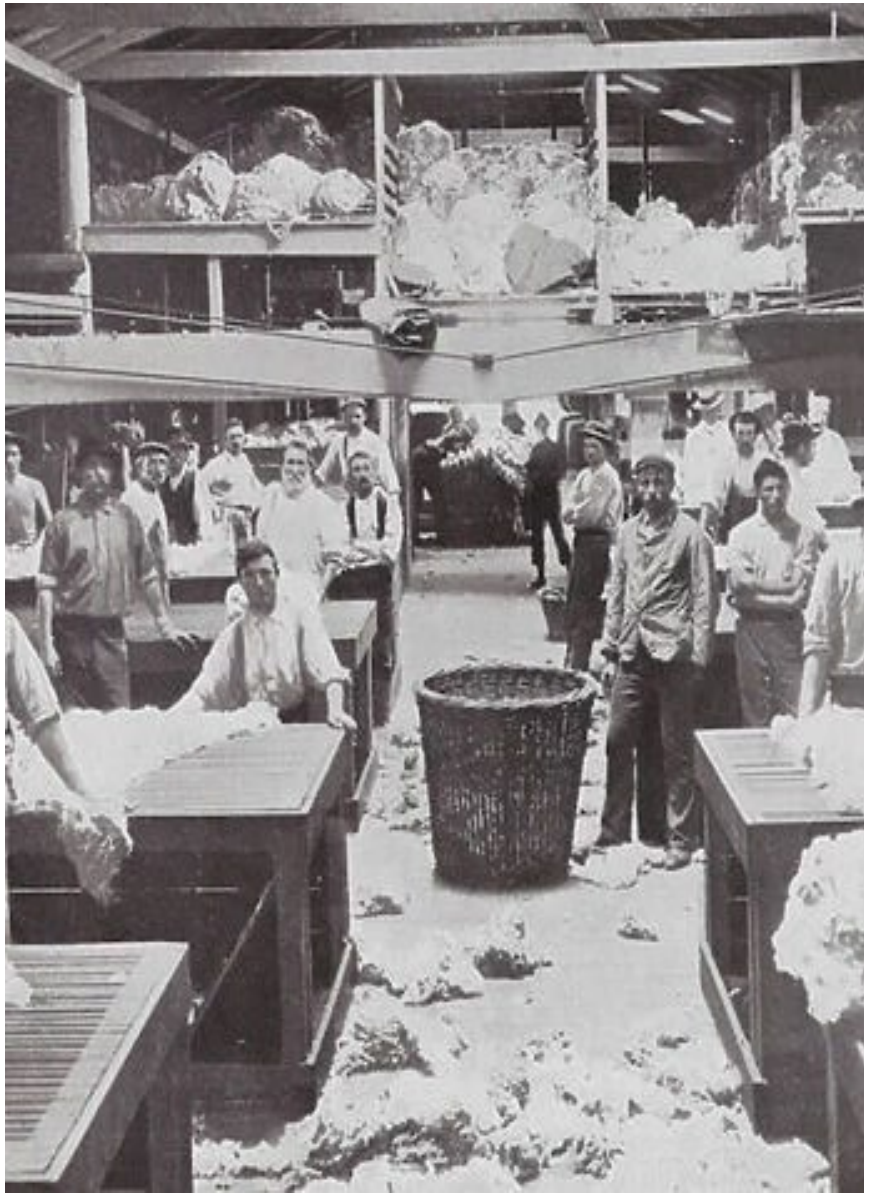
Introduction

- History of Anthrax
  - Reports of it may have been around since the 5th century
  - Became known as "wool sorters disease" in the 1800's.
  - Affects herbivores
    - Sheep, goats, cattle, horses and wild hoof stock



Anthrax: General Info

- Causative Agent *Bacillus anthracis* a gram-positive, rod-shaped bacteria
- Not contagious between people
- Spores of *B. anthracis* get into the body and produce toxins resulting in illness.
- Vaccinations (annually) for livestock is available and affordable
- Human vaccinations available for those who may have occupational exposure (e.g. military, diagnostic labs…)

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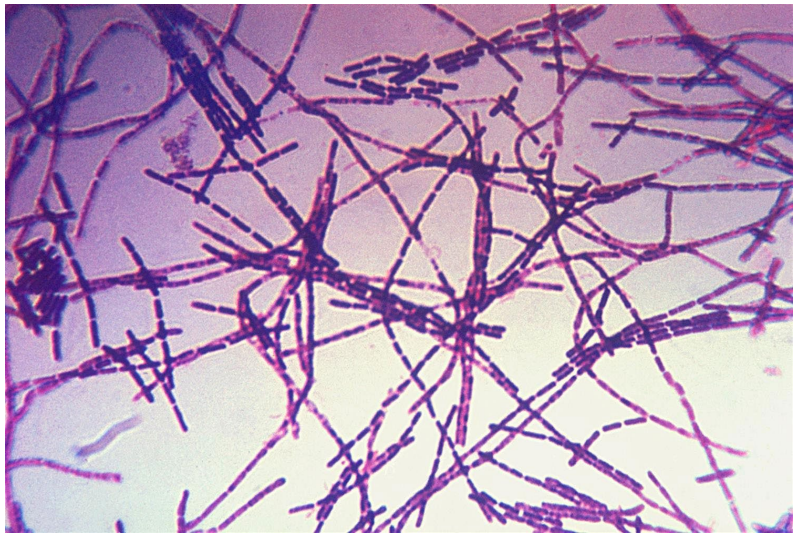
Microbiology

Bacillus anthracis 24-hour growth on sheep blood from a patient in Texas, USA, 2019. Typical ground glass colony morphology and lack of hemolysis are shown.



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Forms of Anthrax

Disease Type	Incubation	Exposure	Signs/Symptoms	Mortality
Cutaneous	1-7 days	Spores get into skin via cut/scrape	• Lesion that evolves from a papule, through a vesicular stage, to a black eschar. • Fever • Malaise • Lymphadenopathy	No treatment about 20% mortality Most survive with treatment
Gastrointestinal	1-7 days	Raw/under-cooked meat from animal with anthrax	• Severe abdominal pain • Nausea/vomiting • Hematemesis • Bloody diarrhea • Fever • Septicemia	W/O tx 50% mortality With treatment 60% survival

Inhalation	~7 days (up to 2 months)	Spores breathed in from infected animals or their byproducts.	• Hypoxia/dyspnea
			• ARDS
			• Cyanosis
			• Radiographic evidence of
			  • mediastinal widening or
			  • pleural effusion
				55% survival with aggressive treatment

Injection	0-4 days, though data is limited	Injection drug use with narcotics contaminated with anthrax spores	• Severe soft tissue infection with significant edema or bruising after injection. • No eschar is apparent and pain is not common.	33% mortality

Treatments

- Supportive therapy
- Antibiotic therapies (may have to take for up to 60 days post exposure)
  - Ciprofloxacin
  - Doxycycline
    - Can prevent disease if not showing signs/symptoms
- Antitoxin
  - Used in severe cases when anthrax toxins are produced

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Remember, antibiotic of choice….

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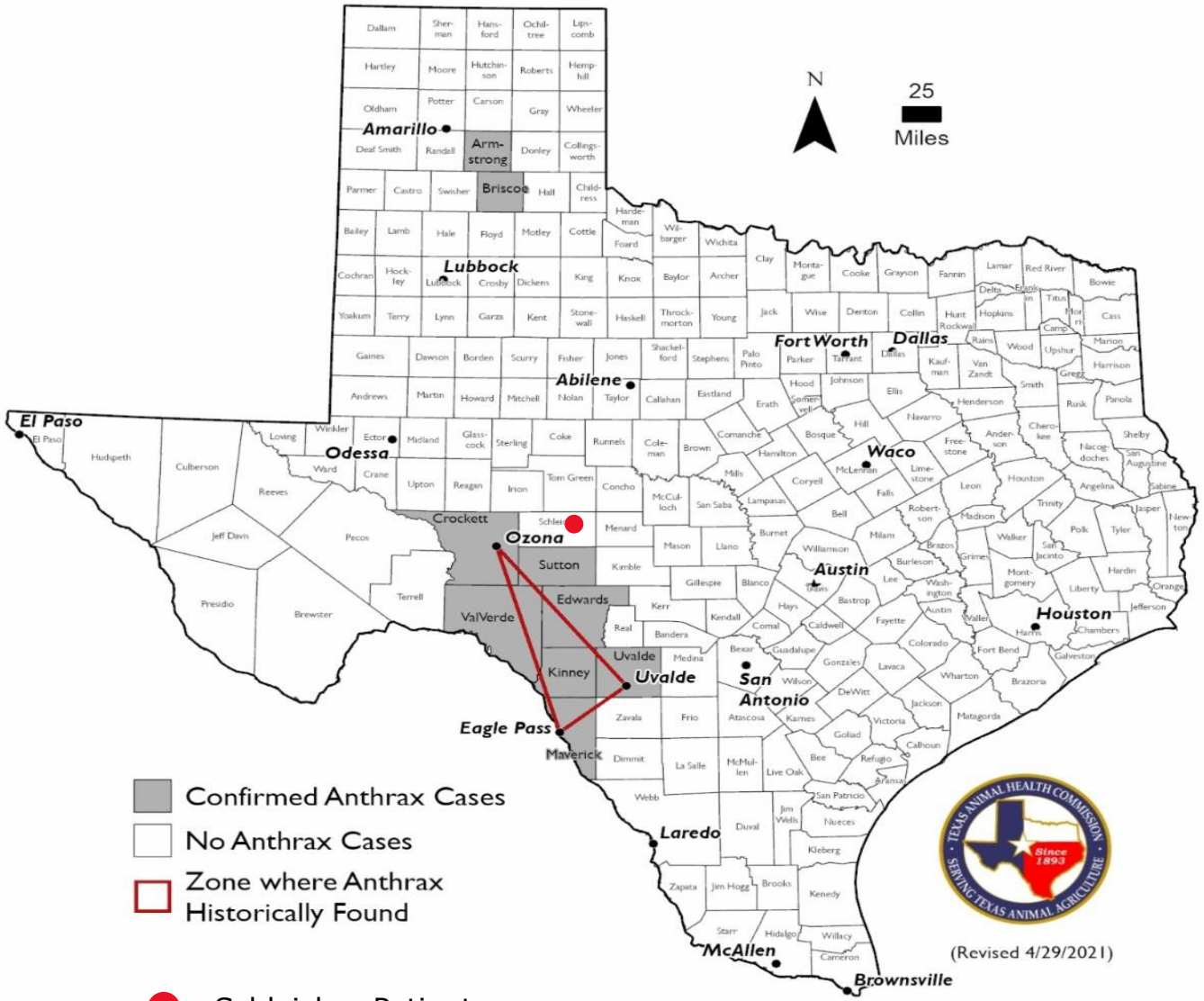
Confirmed Animal Anthrax Cases for 2019-2020



CASE HISTORY

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- >50 yo male from Schleicher Co
- Rancher with 1000+ head of Dorper sheep.
  - Wool/meat breed. Dorset & Blackhead Persian cross
- On 12/23/23 rancher found 8-10mo lamb had died.
  - COD-choking
- Patient butchered and grilled/smoked meat and was consumed on Christmas by family.
- No GI symptoms were reported

Dorper sheep

Anthrax evidence in livestock

- Livestock generally die quickly.
- Fever
- Off feed
- Dyspnea, staggering, trembling then collapse
- Rigor mortis is absent
- Uncoagulated blood seen from body opening
- Necropsy discouraged

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Case History

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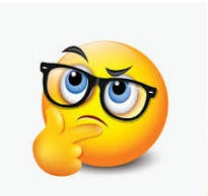
- 1/1/24 Pt seen by his provider
  - Pt thought it was insect bite or wound infection
  - RX'd Steroids & Keflex (cephalexin) no improvement
- 1/5/24 went to SCMC ED
  - Blisters on plantar surface of right forearm
  - Eschar developing
  - Fever
  - Elevated WBC
- Family questioned if it might be anthrax



Case History

Lamb – note appearance

Early blisters and eschar developing

Case History

- Blood, serum and wound samples were collected at SCMC
- Patient was transferred to Austin hospital
- Patient's blisters, swelling and eschar increased in size
- Started on oral & IV doxycycline and ciprofloxacin

Case History

- Patient continued to have increased swelling
- Spreading of blisters
- Concern that blisters might be Orf disease
  - Contagious Ecthyma, aka Sore Mouth disease.
  - A parapoxvirus.

Orf or Contagious Ecthyma

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Case History

Case History

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- Patient taken to OR on 1/6/24 for forearm fasciotomy
- "dishwater" type fluid was drained off
- Culture sent- no organisms grown
- Pt vitals normal
- Med staff not convinced its anthrax.

Case History

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- Patient was discharged on 1/12/24 from Austin
- Bandage changes Q3d UTH at SCMC
- Pt reports still painful but improving

Animal Anthrax & Disposal

- 1st ewe dies 1/6/24 after lambing
- 1/11/24 2nd ewe found dead
- Both ewes found with blood coming from nose/eyes
- Samples taken sent to TVMDL – NEG
  - Time from death to collection >3days
- Disposal – burn

Turkey and Black Vulture

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Case History

- Bandage change on 1/18/24.
- Hand and arm still has some swelling
- Wounds healing as expected
- Patient continues antibiotics

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1/22/24 – Reduced swelling

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1/22/24 –area slow to heal. Note eschar reduction

Samples & CDC

- CDC tested remaining cooked meat for anthrax
  - As of 2/3/24 PCR POSITIVE for Anthrax DNA
  - Cultures Negative
- No long bones to DNA test
- No Orf testing to be done by CDC given the anthrax positive results.

CDC Results

- Pre & Post serum patient samples
  - 1/4/24 Anti-PA IgG = 0 ug/mL
  - 1/15/24 Anti-PA IgG = 31.4 ug/mL
    - ≥ Four-fold rise in anti-PA(Protective Agent) IgG between paired acute and convalescent sera is indicative of a seroconversion.

- 1/29/2024
  - Serum Lethal factor by MALDI-TOF mass spectrometry
  - 1/4/24 serum LF 11.9 ng/mL
  - 1/15/24 serum LF <LOD (limit of Detection is 0.0027ng/mL)

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Things to consider if you have a case

- Notify PHR Zoonosis dept – DSHS website has contact list.
- Collect samples ASAP
  - Patient samples prior to antibiotics and convalescing 15+ days out
  - Livestock samples within 24 hours
    - Swabs of any bleeding orifice
    - Meat or long bones (rib, femur, humerus)
- Generate a good contact list of providers/RN's
- Share info as it becomes available
- Keep patient informed, they are not just data.

TEAM WORK!

- This entire case was the work of multiple PHR and staff.
- Special thanks for ALL their hard work
  - Briana O'Sullivan, MPH – Epidemiologist Austin
  - Melissa Maass, LVT PHR 7 Zoonosis Specialist
  - Dr. David Smonko, DVM PHR 7
  - Dr. Ken Waldrup, DVM PHR 9/10
  - DSHS BT Lab – Erin Swaney and Staff
  - CDC - Bacterial & Special Pathogens Branch
  - Our patient…He was generous with time and information.

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- https://www.dshs.texas.gov/anthrax/anthrax-faqs
- CDC Guidelines for the Prevention and Treatment of Anthrax, 2023 - PMC (nih.gov)
- Anthrax Infection - PMC (nih.gov)

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Questions??