

## Supplementary Appendix S2

# Livestock abortion-associated zoonoses

Please complete the survey below.

Thank you!

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Form Approved  
OMB No. 0920-1251  
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Dear Veterinarian,

The Centers for Disease Control and Prevention (CDC) is conducting a survey of large animal veterinary practitioners across the United States. The goal of this survey is to better understand the circumstances and challenges large animal veterinarians experience when working up an abortion event in livestock. Information gathered will assist the CDC with future interventions in veterinary education to decrease occupational exposures to zoonotic infectious disease, specifically those diseases associated with obstetric spread. In addition to aiding the development and improvement of educational materials, the data will be aggregated and published to aid in further dissemination of these findings.

Your participation in this survey is strictly voluntary; you can decide to stop at any time. All information collected will remain anonymous; we will not collect any personally identifiable information, such as your name or contact information. There are no negative consequences to you should you decline to participate or not complete the survey in its entirety.

This survey should take you approximately 15 minutes to complete.

The CDC thanks you for your time and involvement.

Public reporting burden of this collection of information is estimated to average 15 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB Control Number. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to CDC/ATSDR Reports Clearance Officer, 1600 Clifton Road NE, MS D-74, Atlanta, Georgia 30333; ATTN: PRA 0920-1251.

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Are you currently a licensed clinical veterinarian  
that works with livestock?

Yes  
 No

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What is your age ?

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(years)

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Sex

Male  Female  Prefer not to answer

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What year did you graduate from veterinary school?

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(4 digit year)

**Please answer the following questions based on your current veterinary practice.**

Which state do you primarily practice in?

- Alabama
- Alaska
- Arizona
- Arkansas
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Idaho
- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nevada
- Nebraska
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Ohio
- Oklahoma
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina
- South Dakota
- Tennessee
- Texas
- Utah
- Vermont
- Virginia
- Washington
- West Virginia
- Wisconsin
- Wyoming
- American Samoa
- Guam
- Northern Mariana Islands
- Puerto Rico
- U.S. Virgin Islands

What is your position in the veterinary practice?

- Owner/Partner
- Associate
- Relief vet
- Consultant
- Other

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Please specify your "other" position in veterinary practice.

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How many other veterinarians work at this practice?

(#)

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How many hours per week do you generally work in practice?

0-19    20-39    40+  
(hours per week)

During an average workweek, what percentage of time do you spend in contact with livestock?

25%  
 50%  
 75%  
 >75%

How would you classify your veterinary practice?

Mixed    Food/Large Animal  
 Specialty/Referral    Industry  
 Other

Please specify your "other" type of veterinary practice.

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Please indicate your practice type.

Non mobile (e.g. haul in clinic)  
 Mixed mobile/clinic    Mobile only  
 Stationed at farm

What species of animal do you primarily treat?

Beef Cattle    Dairy Cattle  
 Small Ruminant    Swine  
 Poultry    Equine    Companion  
Animal    Other  
(select only one)

Please specify "other" species of animal you primarily treat.

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**Please indicate how the following diseases are transmitted to humans (select all that apply):**

	Direct Contact	Fomite	Aerosol	Food/water -borne	Vectorborne	Other	Not Sure
Brucellosis	<input type="checkbox"/>						
Q fever (Coxiella burnetti)	<input type="checkbox"/>						
Salmonellosis	<input type="checkbox"/>						
Leptospirosis	<input type="checkbox"/>						
Campylobacteriosis	<input type="checkbox"/>						

Specify other brucellosis transmission route.

\_\_\_\_\_

Specify other Q fever transmission route.

\_\_\_\_\_

Specify other salmonellosis transmission route.

\_\_\_\_\_

Specify other leptospirosis transmission route.

\_\_\_\_\_

Specify other campylobacteriosis transmission route.

\_\_\_\_\_

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In the past 12 months, how often were you contacted by clients to consult or examine livestock that had aborted?

- 0  
 1-5  
 6-15  
 16-30  
 >30  
(number of times contacted)

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In the past 12 months, did you examine any livestock or consult with a client for the following reasons?

- One uncomplicated abortion  
 Large-scale abortion event  
 Reproductive failure (e.g. too many open females)  
 More abortions than expected  
 Aborted fetuses were abnormal in appearance  
 Weak offspring were produced  
 Female livestock required reproductive diagnostic work up or treatment  
 Provide recommendations to prevent additional abortions  
(Select all that apply)

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In the past 12 months, what percentage of abortions did you submit for diagnostic work up?

- 0%  
 1-5%  
 6-10%  
 11-20%  
 21-30%  
 >30%

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In the past 12 months, what events served as a trigger to submit specimens for diagnostic work up for an abortion?

- Abortion storm (acute)  
 Increased incidence of abortions over a longer time period  
 Introduction of new animals  
 Zoonotic concern  
 Other

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Please specify "other" event served to trigger specimen submission.

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**If you were to submit samples for the diagnosis of the following diseases, which samples would you collect and submit? Select all that apply.**

	Blood/ serum	Milk	Placenta	Vaginal secretions	Aborted Fetus	Feces	Other
Brucellosis	<input type="checkbox"/>						
Q fever (Coxiella burnetii)	<input type="checkbox"/>						
Salmonellosis	<input type="checkbox"/>						
Leptospirosis	<input type="checkbox"/>						
Campylobacteriosis	<input type="checkbox"/>						

Please specify other sample collected for brucellosis testing.

\_\_\_\_\_

Please specify other sample collected for Q fever testing.

\_\_\_\_\_

Please specify other sample collected for salmonellosis testing.

\_\_\_\_\_

Please specify other sample collected for leptospirosis testing.

\_\_\_\_\_

Please specify other sample collected for campylobacteriosis testing.

\_\_\_\_\_

Have you diagnosed (via laboratory confirmation) any of the following diseases in livestock in the past 5 years?

- Brucellosis  
 Q fever (Coxiella burnetii)  
 Salmonellosis  
 Leptospirosis  
 Campylobacteriosis  
 (Select all that apply.)

**Select the reporting status for each animal disease in your primary state of practice. Select all that apply.**

	Nationally notifiable	State reportable	Not reportable	Not sure
Brucella abortus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Brucella suis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Q fever (Coxiella burnetii)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Salmonellosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Leptospirosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Campylobacteriosis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Select the option that best describes your perceived occupational risk of acquiring the following zoonotic diseases in your primary work environment.**

	No risk	Slight risk	Moderate risk	High risk
Brucella abortus	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Brucella suis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Q fever (Coxiella burnetii)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Salmonellosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leptospirosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Campylobacteriosis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Select the option that best indicates how often you advise clients on the following topics.**

	Never	Rarely	Sometimes	Frequently	Always
Personal Protective Equipment (PPE) use while assisting during parturition	<input type="radio"/>				
PPE use while handling aborted materials	<input type="radio"/>				
Proper disposal of aborted tissues and contaminated materials	<input type="radio"/>				
Personal hygiene practices following exposure to obstetric materials (e.g. hand washing)	<input type="radio"/>				
Purchase of disease free replacement stock	<input type="radio"/>				
Breeding to disease free animals to avoid spread to herd	<input type="radio"/>				
Quarantine of newly purchased animals	<input type="radio"/>				
Farm management practices to prevent disease and disease spread (i.e. general biosecurity practices)	<input type="radio"/>				
Disinfection of contaminated equipment or facilities	<input type="radio"/>				
Zoonotic diseases of concern, specifically brucellosis, Q fever ( <i>C. burnetii</i> ), salmonellosis, leptospirosis, or campylobacteriosis	<input type="radio"/>				

**During a routine veterinary examination, which personal protective equipment (PPE) do you wear when you perform the following activities? Please select all that apply:**

	Gloves	Rubber Boots	OB Sleeves	Protective clothing (e.g. coveralls)	Surgical Mask	Respirator (e.g. N95)	Goggles or face shield	Do not wear PPE
Handling a neonate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling an adult animal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducting a rectal exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducting a vaginal exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assisting with parturition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performing a cesarean section	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling an animal with hemorrhage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling birth products or aborted tissues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performing a necropsy on an animal or fetus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**During a veterinary examination where a zoonotic disease is suspected, which PPE do you wear when you perform the following activities? Please select all that apply:**

	Gloves	Rubber Boots	OB Sleeves	Protective clothing (e.g. coveralls)	Surgical Mask	Respirator (e.g. N95)	Goggles or face shield	Do not wear PPE
Handling a neonate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling an adult animal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducting a rectal exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducting a vaginal exam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Assisting with parturition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performing a cesarean section	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling an animal with hemorrhage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handling birth products or aborted tissues	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Performing a necropsy on an animal or fetus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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At any time in your career, has a medical care provider diagnosed you with acute brucellosis (non-vaccine strain), Q fever (*C. burnetii*), salmonellosis, leptospirosis, or campylobacteriosis due to suspected animal contact?

- Yes  
 No

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Which disease(s) were you diagnosed with?

- Brucellosis  
 Q fever (*C. burnetii*)  
 Salmonellosis  
 Leptospirosis  
 Campylobacteriosis  
(Select all that apply. )

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Was brucellosis confirmed by a diagnostic laboratory?

- Yes  No  Not sure

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Was Q fever confirmed by a diagnostic laboratory?

- Yes  No  Not sure

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Was salmonellosis confirmed by a diagnostic laboratory?

- Yes  No  Not sure

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Was leptospirosis confirmed by a diagnostic laboratory?

- Yes  No  Not sure

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Was campylobacteriosis confirmed by a diagnostic laboratory?

- Yes  No  Not sure

Indicate your level of awareness with the Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel.

- Not aware  
 Slightly aware  
 Somewhat aware  
 Moderately aware  
 Extremely aware

Which personal protective equipment (PPE) do you have access to at your practice?

- gloves  
 OB sleeves  
 rubber boots  
 disposable shoe covers  
 reusable protective clothing (e.g. coveralls, lab coat)  
 disposable protective clothing (e.g. Tyvex or similar coveralls, lab gown)  
 surgical mask  
 respirator (e.g. N95)  
 goggles  
 faceshield  
 none  
 (Select all that apply.)

How often is PPE readily available and accessible to you?

- Never  
 Sometimes  
 Often  
 Always

Does your practice provide training on when and how to use, care for, and maintain your PPE?

- Yes    No    Not sure

Do you wear a respirator as part of your personal protective equipment?

- Yes    No

What type of respirator do you primarily use?

- Filtering Facepiece (e.g. N95 or P100)  
 Elastomeric half-mask  
 Elastomeric full-face  
 Powered Air-Purifying Respirator (PAPR)  
 Other

Please specify what type of other respirator you wear.

\_\_\_\_\_

Is there a written respirator program available at your practice?

- Yes    No    Not sure

Is there an identified staff member who is responsible for the respirator program?

- Yes    No    Not sure

Have you been medically cleared by your physician to wear a respirator?

- Yes    No    Not sure

Have you received respiratory fit-testing to identify what model of respirator to wear?

- Yes    No    Not sure

Please indicate where you were last fit tested for the respirator:

- Public health department  
 Occupational health department  
 At your practice  
 Other

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Please specify the other location of your last  
respirator fit test.

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Have you been trained on when to use the respirator,  
limitations, care and maintenance, and conducting  
user seal checks?

- Yes
- No
- Not sure

**Indicate the level of importance the following motivators have for your decision to use PPE.**

	Not important	Of little importance	Moderately important	Important	Very Important
Concern for personal safety	<input type="radio"/>				
Concern for spreading disease to other humans	<input type="radio"/>				
Concern for spreading disease to other animals	<input type="radio"/>				
Concern for liability	<input type="radio"/>				
Adherence to workplace policy	<input type="radio"/>				
Concern about pregnancy/ability to conceive	<input type="radio"/>				

Please indicate other motivators to PPE use not listed above, if applicable.

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**Indicate the level of concern you have towards each potential barrier to PPE use.**

	Not concerned	Slightly concerned	Moderately concerned	Very concerned
Cost of equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negative perceptions of others to PPE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inconvenience of taking the gear with you in the field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inconvenience of disposal or disinfection after use in the field	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inconvenience of wearing PPE	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Belief that it is unnecessary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unsure how to use PPE properly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Unsure what PPE to use for a specific situation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decreased safety due to mobility or visibility while in use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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What resource(s) do you consult for information on zoonotic diseases?

- Textbooks
  - Journal articles
  - CE/conferences
  - Webinars
  - Organization website (e.g. AVMA)
  - CDC website
  - USDA website
  - Colleagues
  - Veterinary professional websites (e.g. VIN, DVM360)
  - Veterinary school websites
  - Other
- (Select all that apply. )

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Please specify what other resources you consult for information on zoonotic diseases.

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What topics would you like to receive more continuing education opportunities?

- PPE use
  - Zoonotic diseases
  - Regulatory reporting requirements
  - Infection control
  - Other
- (Select all that apply. )

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Please specify what other topics you would like to receive more CE opportunities.

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Through which resources would you like to receive educational materials?

- Textbooks
  - Journal articles
  - CE/conferences
  - Webinars
  - Organization website (e.g. AVMA)
  - CDC website
  - USDA website
  - Veterinary professional websites (e.g. VIN, DVM360)
  - Veterinary school websites
  - Other
- (Select all that apply. )

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Please specify what other resources you would like to receive educational materials.

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Please visit the following websites to learn more about specific zoonotic diseases and occupational health recommendations.

Q fever  
Leptospirosis  
Veterinary Safety and Health  
Veterinary Standard Precautions