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| Title:  **Safe conduct of work in areas with the potential for exposure to C*oxiella burnetii***  **(Q fever)** | |
| Revision #  **C – 03.06.18** | Prepared By: Date Prepared:  **Neil Bowles**  **James Stubbs 03.06.18**  **Derek Hedquist** |
| Effective Date: | Reviewed By: Date Reviewed:  **Roger VanAndel** |
| Standard: | Approved By: Date Approved:  **Roger VanAndel**  **Neil Bowles**  **James Stubbs** |

Procedure

# **1. Purpose**

To minimize the potential for exposure to *Coxiella burnetii* during the care and use of ungulates, specifically sheep and goats, in university research operations. While other animals, such as cattle, may carry this pathogen currently these animals are not housed at the University of Utah.

# **2. Rule**

## **A. Roles and Responsibilities:**

All personnel working with sheep or goats must participate in the animal care occupational medicine program and undergo an initial health and risk assessment to evaluate and address any health concerns. Note: employees identified as having a high risk for infection with *Coxiella burnetii* may be excluded from working with sheep and goats. This includes, but is not limited to, individuals with the following conditions: heart defects (valvulopathy, prosthetic heart valve, aneurysm, etc.), liver disease, and compromised immune function.

Pregnant women infected with *Coxiella burnetii* are at high risk for developing chronic Q fever. However, limited data are available for the treatment of Q fever during pregnancy, and the earlier the infection occurs during pregnancy the greater the risk for development of chronic disease. Therefore, the recommendation is that women working with sheep and goats who are pregnant or are considering becoming pregnant should discuss the risks with their health care provider. Also recommended is that the risks be discussed with a healthcare provider that is an expert in infectious diseases.

### Principal Investigators:

* + - 1. PIs must register the use of pregnant sheep or goats, as well as newborn lambs and kids (<72 hours of age) with the Institutional Biosafety Committee (IBC). All work with sheep and goats must be registered with the Institutional Animal Care and Use Committee (IACUC).
      2. Ensure that all staff members are trained in and follow the procedures established in this document, as well as other appropriate training opportunities, such as BSL2 and ABSL2 training offered through the research Administration Training Series (RATS).
      3. Provide training records to the IBC and/or IACUC. No personnel may come into contact with sheep or goats until they have been trained and have been added to IBC and/or IACUC protocols.
      4. Provide necessary minimum PPE, as identified in this document (section B and Appendix B) or via a risk assessment of the procedure, for all people, as needed.
      5. Ensure that all staff members are trained in the proper application and use of the identified PPE, the signs and symptoms of *Coxiella burnetii* exposure, and the procedures for reporting any exposure events.
      6. Ensure that all staff are participating in required medical surveillance and occupational medicine programs as determined by an Occupational Medicine Professional.

### Research and Animal Husbandry Staff:

* + - 1. Follow the procedures as prescribed in this document at all times when working with sheep or goats.
      2. Wear all personal protective equipment as prescribed in this document.
      3. Discuss all concerns regarding care and use of sheep or goats with the PI or their designee
      4. Participate in all scheduled trainings
      5. Participate in the medical surveillance and occupational medicine program as instructed.

### Laboratory Compliance Inspectors:

* + - 1. Follow the procedures as established in this document at all times when observing with sheep or goats.
      2. Wear all personal protective equipment as prescribed in this document.
      3. Discuss all concerns regarding the potential for exposure when working with sheep or goats with the Biosafety Officer.

### Occupational and Environmental Health and Safety:

* + - 1. Provide periodic review of this procedure and its application as needed.
      2. Provide guidance in assessment of risk and the appropriateness of personal protective equipment when necessary.
      3. Provide technical consultation for respiratory protection needs, including: written plan assistance and fit-testing services

## **B. Exposure Control Procedures**

All rooms in the vivarium housing sheep or goats shall be negative pressured relative to vivarium corridor(s). All rooms will be posted with a biohazard sign describing the minimal PPE and warnings to at risk-populations.

1. **PPE requirements when in the presence of or working with pregnant sheep or goats, when in the presence of or working with newborn (<72 hours old) lambs or kids, or working with tissues where the probability of exposure to *Coxiella* is high (e.g., removing placentas from postpartum sheep or goats, collecting and handling placenta for analysis or disposal).**
   * + 1. Street clothes are not allowed in these areas unless the person is wearing full Tyvek coveralls over the clothes.
       2. Access to the area(s) shall be restricted to authorized personnel only, who are wearing the required PPE as identified below for the duration of the procedure and all cleanup activities.
       3. Appropriate signage (see appendix A), indicating that a procedure is in process and entry is restricted, should be posted on entry doors to the area in that the procedure is taking place prior to initiation of the procedure. Signage shall not be removed until the cleaning procedure indicated below is complete.
       4. Handwashing should be scrupulously practiced after contact with animals or working in animal housing/holding areas. Soap and warm water are preferred over hand sanitizer, but persons should carry and use hand sanitizer when working with animals at a distance from handwashing facilities. Hands should be washed with soap and water at the first opportunity.
       5. Personal Protective Equipment shall consist of:
          1. Nitrile or Latex gloves (surgeons performing sterile procedures must wear sterile gloves)
          2. Disposable or on-site launderable scrubs or gowns, caps, coveralls, or other appropriate protective clothing that covers arms and legs (surgeons performing sterile procedures should wear sterile gowns). Note: clothing must not leave the site after use and must be disposed or laundered on site after use.
          3. Safety goggles. In situations where a surgeon is required to utilize specialized equipment, such as a magnifying optical loupes, and goggles are not practical then a face shield or other protective devices, such as side shields or splash guards, should be used.
          4. N95 respirator (medical surveillance and fit testing must be conducted prior to an employee wearing a respirator)
          5. Surgical cap or bonnet
          6. Appropriate dedicated footwear or shoe covers (booties) that protect the shoes against fluid contamination

Note: Birth products and all other organic materials should be removed and disposed of immediately via incineration or burial. Appropriate PPE (gloves, full body protective clothing, eye protection and N95 respirator) should be used during removal and disposal, and training in safe handling and disposal of birth products should be provided. Collection should be in hard-sided containers with lids that are lined with biohazard bags. Collection should be done using mechanical implements (scoops, shovels). All disposable PPE must be disposed as biohazard waste. Durable (non-disposable) PPE must be cleaned and decontaminated prior to laundering. Surgical scrubs, gowns, and caps should be rinsed in Micro-Chem Plus (for the manufacturer’s recommended contact time) prior to laundering.

Standard microbiological and chemical practices described in the University of Utah [Biosafety Manual](https://oehs.utah.edu/resources/university-of-utah-biosafety-manual) and [Chemical Hygiene Plan](https://oehs.utah.edu/topics/chemical-safety), respectively, must be followed.

**2. PPE requirements when conducting or observing sheep or goat surgeries or necropsies, or procedures with the potential to generate aerosols not described in B.1 above.**

1. Access to the area(s) shall be restricted to authorized personnel only, who are wearing the required PPE as identified below for the duration of the procedure and all cleanup activities.
2. Appropriate signage (see appendix A), indicating that a procedure is in process and entry is restricted, should be posted on entry doors to the area in that the procedure is taking place prior to initiation of the procedure. Signage shall not be removed until the cleaning procedure indicated below is complete.
3. Handwashing should be scrupulously practiced after contact with animals or working in animal housing/holding areas. Soap and warm water are preferred over hand sanitizer, but persons should carry and use hand sanitizer when working with animals at a distance from handwashing facilities. Hands should be washed with soap and water at the first opportunity.
4. Personal Protective Equipment shall consist of:
5. Nitrile or Latex gloves (surgeons performing sterile procedures must wear sterile gloves)
6. Disposable or on-site launderable scrubs or gowns, caps, coveralls, or other appropriate protective clothing that covers arms and legs (surgeons performing sterile procedures should wear sterile gowns) Note: clothing must not leave the site after use and must be disposed or laundered on site after use.
7. Safety goggles. In situations where a surgeon is required to utilize specialized equipment, such as a magnifying optical loupes, and goggles are not practical then a face shield or other protective devices, such as side shields or splash guards, should be used.
8. Disposable surgical mask or HEPA-filtered/N95 respirator (recommended).
9. Surgical cap or bonnet
10. Appropriate dedicated footwear or shoe covers (booties) that protect the shoes against fluid contamination

Note: all disposable PPE must be disposed as biohazard waste. Durable (non-disposable) PPE must be cleaned and decontaminated prior to laundering. Surgical scrubs, gowns, and caps should be rinsed in Micro-Chem Plus (for the manufacturer’s recommended contact time) prior to laundering.

Standard microbiological and chemical practices described in the University of Utah [Biosafety Manual](https://oehs.utah.edu/resources/university-of-utah-biosafety-manual) and [Chemical Hygiene Plan](https://oehs.utah.edu/topics/chemical-safety), respectively, must be followed.

**3. Facility cleaning following surgical or other procedures with the potential to generate aerosols**

Due to the durable nature of the *Coxiella burnetii* the organism is resistant to disinfection by some chemical disinfectants, and can be difficult to destroy without thorough autoclaving and/or use of appropriate disinfectants. The surgical suite must be thoroughly and completely cleaned immediately following all surgical procedures

1. While still wearing required PPE (described in (1) above), clean all surfaces of gross contamination. Collect all cleaning supplies for disposal as biohazard waste.
2. After gross cleaning, disinfection must be accomplished using an appropriate disinfectant cleaning agent that has proven effectiveness against *Coxiella burnetii,* such as 1:10 dilution of hydrogen peroxide, Micro-Chem Plus, or a 1% solution of Virkon S. Follow all manufacturers’ recommendations including contact times. Seventy-percent ethanol also completely deactivates the organism, although rapid evaporation makes this a less feasible treatment.

**4. Minimum PPE requirements for entry into indoor housing, laundry facilities, autoclave facilities, and research areas when no surgical procedures are being conducted and no pregnant ewes/does or newborn lambs/kids are present**

1. Scrubs or gowns, caps, coveralls, or other appropriate protective clothing that covers arms and legs.
2. Safety glasses (not goggles)
3. Long pants
4. Appropriate dedicated footwear or shoe covers (booties) that protect the shoes against contamination
5. Disposable surgical mask (recommended).

**5. Medical surveillance and occupational medicine requirements**

1. All individuals that will be performing surgeries or conducting procedures with the potential for aerosol production must be enrolled in the occupational medicine program.
2. All individuals required to wear respiratory protection must undergo a respirator medical evaluation and be fit-tested for the exact model of respirator that they will use.
3. Workers should receive a pre-employment medical screening, prior to working with sheep or goats, to document any risk factors for chronic illness if infected. Individuals must inform the Occupational Medicine Physician (OMP) of all conditions that may affect the risk associated with infection as well as the work activities that are to be performed. For individuals identified as having increased risk for developing Q fever; the OMP may impose work restrictions, up to and including reassignment to a unit that does not utilize these animals, to manage the risk of contracting Q fever or of developing severe complications.
4. For employees conducting, or observing, surgeries or procedures with the potential for aerosol formation - A baseline serum sample should be drawn within 30 days of beginning work and tested for evidence of previous exposure to *C. burnetii* infection. Sera should then be tested for IgG antibodies against phase I and phase II *C. burnetii* annually to determine whether seroconversion has occurred and whenever an employee develops symptoms consistent with Q fever. Serum collection is NOT required for individuals that do not conduct surgeries or procedures with the potential for aerosol formation.

**Note: A positive Q fever IgG titer suggests prior infection and present immunity from Q fever. Individuals with a positive serum titer are not required to undergo annual serum testing.**

1. Should an event occur that calls into question an individual’s ability to fight infection (i.e. use of a drug that suppresses immune function) the individual should discuss the risks of continued work with sheep and goats with the OMP or their personal physician.

**5. Exposure events**

1. In the event of an eye, or other mucus membrane, exposure to material with the potential to contain *Coxiella burnetii*; flush the affected eye for a minimum of 15 minutes in an eyewash. Report the exposure immediately to your supervisor and proceed to the Occupational Medicine Clinic for assessment and/or treatment.

Inform clinic personnel that you have potentially been exposed to *Coxiella burnetii*

1. In the event of exposure to material with the potential to contain *Coxiella burnetii* via needlestick, contact with non-intact skin, etc. flush the affected area with water for 15 minutes. Treat the affected area with a 10% povidine iodine solution (aka Betadine™). Report the exposure immediately to your supervisor and proceed to the Occupational Medicine Clinic for assessment and/or treatment. Inform clinic personnel that you have potentially been exposed to *Coxiella burnetii.*
2. In the event that an employee working in an area with the potential for exposure to *Coxiella burnetii* develops any of the following symptoms they should report the onset of symptoms to the Biosafety Officer by calling 801-581-6590 and seek medical attention at the occupational medicine clinic. They should inform the attending provider of their work with sheep and/or goats and the potential for *Coxiella burnetii* (Q fever) exposure.

Fever

Pleural pain or difficulty breathing

Severe headache

Jaundice

Severe fatigue

Muscle aches

Chills

1. Additional measures may be necessary, at the discretion of the biosafety officer, should a positive case of Q fever be noted in the facility.

**6. Handling and disposal of waste material and/or contaminated materials**

1. Absorbent pads, paper towels, and other lab “trash” must be double bagged. Liner bags must be closed and sealed immediately following use. Exterior of bags should be cleaned using MicroChem-Plus, autoclaved, and placed into a designated, biohazard labeled, hard-sided, leak proof, securely closed, container prior to leaving the ungulate facility..
2. Birth products, aborted fetuses, animal carcasses, discarded body parts, and all other organic material must be double bagged or placed in a biohazard bag and then put into a designated, biohazard labeled, hard-sided, leak proof, securely closed, container prior to leaving the ungulate facility. Each container must be surface decontaminated with MicroChem-Plus prior to leaving the facility.

7. References:

These guidelines are based on recommendations from the Center for Disease Control and Prevention (CDC) that can be reviewed here: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr6203a1.htm>

1. University of Utah Contacts:

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Biosafety Officer Director of Comparative Medicine Institutional Veterinarian

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Associate Director of Occupational

and Environmental Health and Safety Assistant Biosafety Officer

## **Appendix A**





**Procedure in Process**

**Entry Restricted to Authorized Personnel Only Special Personal Protective Equipment (PPE) Requirements**

**Apply for Entry**

**For more information contact:**

**Appendix B**

**PROTECTIVE CLOTHING REQUIREMENTS FOR PERSONNEL IN UNGULATE FACILITIES**

**Considerations:** In ungulate facilities PPE functions to reduce staff exposure to allergens and to protect staff from infectious agents. ***Lab coats (coveralls, scrubs that provide skin protection),*** ***shoe covers or facility dedicated footwear, and eye protection are required to enter an ungulate facility***. Thorough washing of hands is recommended when exiting any animal facility. Safety shoes should be worn when working with large ungulates. The following provides a frame work for the establishment of Best Practices for PPE:

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| **Activity Risk Level** | **Description** |
| Low Risk | Entering area with no anticipation of physical exposure to animals or soiled caging |
| Moderate Risk | Exposure to animals, animal allergens, or soiled non-biohazardous soiled caging |
| High Risk | Potential exposure to biohazardous material or zoonotic agents, such as animals harboring *Coxiella burnetti* |

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| **Risk Code** | **Suggested PPE** | **Protection Of** | **From** |
| G | Moisture Impermeable Gloves | Personnel | Scratch |
| M | Mucous Membrane Protection [Safety Goggles + Surgical Face Mask or Face Shield] | Personnel | Splash & Droplets |
| R | Respiratory Protection [Respirator, N-95, PAPR (Note: Most PAPRs provide concurrent eye protection)] | Personnel | Aerosols |

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| **Example Activity** | **Shoe Cover, Lab Coat and Eye Protection plus Code(s)** |
| Entry into indoor animal holding areas | None additional |
| Direct contact with animals | G |
| Cleaning animal holding areas (no pregnant ewes/does or newborn animals) | G, M |
| Cleaning animal holding areas (with pregnant ewes/does or newborn animals) | G, M, R |
| Contact with pregnant sheep or goats; during parturition, their birth products, bedding and other wastes | G, M, R |
| Contact with animals (surgeries, necropsy, etc), potentially harboring biohazardous agent, such as *Coxiella burnetti* | G, M, R |

**Adapted from the NIH document “Guidelines for Personnel Protection in Animal Facilities**