

WVU IACUC Policy:

Q Fever

Objective

To protect West Virginia University (WVU) faculty, staff, students, volunteers, and visitors (WVU community) from exposure to the Q fever agent (*Coxiella burnetii*) and other zoonotic diseases. The goal of this Policy is to reduce the potential for transmission of Q Fever to susceptible individuals. Although written specifically with sheep in mind, all aspects of this program also apply to goats.

Authority

Authority is delegated from the University Vice President for Research through the WVU Institutional Biosafety Committee (IBC) and Institutional Animal Care and Use Committee (IACUC); both are duly constituted standing committees of the University responsible for biological safety and the safe use of animals at all University facilities. Under this authority, all University programs that use animals are developed to provide a safe teaching, research, service, housing, and recreational environment. Occupational Medicine (OM) is authorized to make a health risk assessment relating to the use and care of animals by the WVU community, and recommend procedures based on this assessment for the purpose of protecting members of the WVU community and the public.

Background

Q fever is an infectious disease caused by the *Coxiella burnetii*, a bacterium with two forms, including a durable small cell variant (cyst-like) form. The cyst form is very environmentally resistant (e.g. to ultra-violet light, osmotic, high temperature, etc.) and can be distributed readily for years by aerosol or by the wind for some distance from livestock sources. Goats, sheep and cattle are the species most often infected, with sheep being the most common source for human disease. The primary mode of transmission to humans is inhalation of pathogen-contaminated dust or aerosols. About 50% of human infections are asymptomatic, and many others have flu-like symptoms. This infection can be severe or even life-threatening to persons who are pregnant, immune compromised, or have valvular heart disease. Therefore, this program's goal is to protect all workers, students, and other persons visiting University facilities from exposure to animals carrying the Q fever pathogen.

Risk Mitigation

WVU takes steps to mitigate and reduce risk associated with potential exposure to Q fever through working with livestock on campus. With these steps risks will be reduced but not eliminated. All individuals engaging in work with these animals ***especially during the birthing process*** should be aware of these risks. Steps that are taken include:

- A. Purchasing animals from local farms or states with low Q fever incidence.
- B. PCR testing (blood) of all new arrival animals that are post-pubertal or if intended for breeding use.
- C. PCR testing of birth/fetal tissues from spontaneous abortions or stillbirths.
- D. No lambing in indoor facilities unless reviewed by IBC and IACUC and additional PPE (personal protective equipment) worn.

An individual's health status may change their individual risk assessment and additional PPE requirements may become necessary to ensure their safety.

Responsibilities

A. Environmental Health & Safety (EH&S)

1. Educational Program (in collaboration with the Office of Laboratory Animal Resources-OLAR)
2. Routine Inspections/Audits
3. Respirator user training for those requesting it (in collaboration with WVU Occupational Medicine)

B. WVU Occupational Medicine

1. Medical Monitoring Program provide surveillance services based on EHS recommendations
2. Health Risk assessments for all WVU personnel via occupational health questionnaire (OHQ)
3. Health screens for all WVU personnel and paid students with animal contact. Unpaid students who are identified through the OHQ as having health concerns are contacted by Occupational Medicine and advised to go to student health or their personal physician
4. Respirator Fit Tests **as required** by job duties
5. Support Respirator user training

C. Davis College of Agriculture and WVU Farm Management

1. May assist with coordinating animal procurement for PIs. Veterinary staff approve procurement sources
2. May assist with routine animal care
3. May assist with animal certification, testing risk assessment and quarantine
4. Provide PPE for their animal care workers

D. OLAR

1. Approve sources and coordinate animal procurement.
2. Ensure appropriate PPE is available to staff working with biomedical sheep.
3. Oversee husbandry and care of sheep used in biomedical research.

E. IACUC

1. Overseeing animal use
2. Identifying protocol and animal care staff personnel, students, and faculty with likely contact with University livestock potentially carrying Q fever (especially sheep and goats)
3. Ensuring completion of the annual occupational health questionnaire by all personnel, students and faculty

F. WVU Student Health

1. Health Assessments for non-employee students (in collaboration with WVU Occupational Medicine)

G. Principal Investigator or Similar Activity Leader

1. Ensures that all persons with sheep or goat contact have been trained and are using personal protective equipment when expected, and that they complete the annual occupational health questionnaire.
2. OLAR will provide PPE for all activities in the FARF (Food Animal Research Facility)

Reducing Exposure Risk – Animal Management

A. Preventive Management Measures

1. Proper Sanitation and good hygiene when working with pregnant animals.
2. Segregation of lambing areas to limit potential contamination.
3. Removal of birth products/fluids, contaminated bedding and manure.
4. Restriction of moving peri-parturient animals.

B. Disinfectants Appropriate for Sheep and Goat Work

1. Surfaces in surgical and laboratory areas and indoor housing facilities
 - a. Fresh-made 10% solution of household bleach
 - b. 10% solution of H₂O₂ (Hydrogen Peroxide)
 - c. 5-10% solution of Lysol concentrate (phenol-based)
2. Outdoor Pastures and Sheds
 - a. Lime

C. Any PCR positive animal will be euthanized for appropriate burial, 3 ft down in a compost manure pile, or incineration or disposal as biohazardous material. PCR (-) animals will be retained for teaching or research purposes.

D. If abortion or stillbirth occurs in any animal, the placenta of the aborted fetus will be tested for *C. burnetii* via PCR.

Animal Importation (new arrivals)

A. All new sheep and goats that are post-pubertal or intended to be used for breeding purposes coming to WVU **must** be PCR (polymerase chain reaction) tested using blood samples collected approximately 1 week after arrival and found negative to be retained for ANY use.

B. All newly arriving animals will be quarantined from established university flocks until the test results come back. ***This location must be at a separate (non-nose to nose) quarantine site.***

C. If any sheep aborts a fetus or gives birth before test results are obtained, the biosafety officer should be contacted and full PPE, including respiratory protection and Tyvek coveralls, **must** be used.

D. Even if an animal arrives with documentation of a negative test, they will still be **required** to have a Q fever negative PCR test before use. Animals euthanized or dying before testing is complete will be treated as infected for disposal and clean-up purposes.

E. Animals testing PCR positive will be immediately euthanized and the original group segregated for retesting

1. These animals will be provided care last (after all other animals).
2. Contact for handling or shipping is limited to personnel cleared to work by OM.
3. PPE Required
 - a. Disposable or onsite-laundered coveralls, jumpsuits, or scrubs
 - b. Boots/boot covers or shoe covers (indoors)
 - c. Gloves
 - d. Eye Protection/Safety glasses
 - e. N-95 mask or PAPR (powered air-purifying respirator)

WVU Flock Scenarios

- A. **Flock A** - Farm Flock for teaching and research (Agricultural Setting)– All active breeding flock members are PCR tested for *C. burnetii*.
 - 1. ONLY this flock shall be used for undergraduate/graduate teaching and activities involving public contact.
 - 2. Lambs born to ewes in flock A will be considered coxiellosis free and will be tested for *C. burnetii* prior to first parity.
- B. **Flock B** – Quarantine Flock (Agricultural Setting)– Sheep with unknown status, including new arrivals (pregnant or non-pregnant):
 - 1. Sheep will be quarantined separated from other sheep until PCR test results are available.
 - 2. All post-pubertal sheep will be sampled for PCR testing, approximately 1 week after arrival.
 - 3. PCR-negative animals will be transferred to Flocks A or C unless an animal in this groups is PCR positive. In that case, they will be retested after the PCR-positive animal is euthanized.
- C. **Flock C** – Biomedical Research Flock – Sheep with unknown status (flocks with no previous testing history), **biomedical sheep are not pregnant or used for breeding:**
 - 1. Sheep used for biomedical testing will be PCR tested for Q-fever within 1 week of arrival if they are post-pubertal at the time of arrival.
 - 2. Sheep will be separated (no nose-to-nose contact) based on source until Q fever results are received.

Independent Testing Sites – See information below under references.

FARF and Other Indoor Facilities Housing Sheep at WVU Operated Facilities

- A. Indoor housing is defined as a space with 4 solid outside walls and a ceiling/roof with no un-assisted movement of outside air through the space. All indoor housing, research, and/or procedure areas at the FARF or elsewhere for sheep and goats will be confined to areas having no recirculation of air to other rooms (e.g. surgery area and connecting corridor).
- B. All air supply to surgery or procedure rooms or rooms in the FARF housing sheep or goats shall be HEPA (high efficiency particulate air) filtered and if recirculated, will recirculate only to the place of origin.
- C. Because of the significantly increased risk of transmitting *C. burnetii* during lambing, lambing is ***not permitted*** in the FARF or indoor housing unless the PI receives approval from IACUC and IBC and all animals in that group have received a negative PCR test. This applies to all university operated facilities.
- D. EH&S (Environmental Health & Safety) personnel will perform semi-annual inspections of all sheep and goat facilities and practices. They will audit work practices, PPE, and engineering controls. These inspections will be coordinated with the efforts of the University Biosafety Officer.

Reducing Risk – Employees

- A. WVU takes active steps to conduct active herd surveillance and testing of incoming animals in order to prevent exposure to infected sheep. However, the testing methods alone do not guarantee a negative flock and practicing standard precautions when working with small ruminants, especially during the birthing process, is essential.
- B. Initial biosafety training is **required** for all individuals that will work with, and around, sheep and goats. The training will cover information about Q fever and methods to reduce exposure, the Occupational Health Program, and needed PPE. The training will be given by the Biosafety Officer or a Veterinarian.
- C. Human health changes that would necessitate contacting Occupational Medicine such as the development of Q fever, pregnancy, heart valve surgery, and the use of immunosuppressive drugs will be reviewed via annual OHQ. WVU Occupational Medicine will be involved in personnel monitoring and will assist with recommending appropriate PPE for all personnel who work with sheep at the WVU farms.
- D. Participation in the Medical Monitoring Program is **required** for all individuals working with, or in close proximity to, sheep and goats or for those entering indoor housing, research, and/or procedure areas used for sheep or goats. See program details below.
- E. Members of the WVU community who develop a febrile illness while working with sheep and goats (or their feces, urine, tissues, or bodily fluids), will be directed to seek immediate medical care.
- F. Personal Protective Equipment (PPE)
 - 1. Appropriate PPE will be available to the WVU community interacting with sheep.
 - 2. PPE for personnel working with sheep who have tested Q fever negative in indoor housing, procedure, and research areas (non-pregnant/non-birthing animals):
 - a. Required
 - i. Boots, booties, or dedicated footwear
 - ii. Gloves
 - b. Suggested
 - i. Disposable or onsite-laundered coveralls, jumpsuits, or scrubs
 - ii. Eye protection / Safety glasses
 - iii. Surgical Mask or N-95 respirator*
 - iv. Hair cover

** Surgical Masks may be used by most persons for work with flock A or C animals. All individuals may choose to voluntarily wear an N-95 respirator. Individuals with increased risk may be **required** to use an N-95 or N-100 respirator to work with these animals.*
 - 3. PPE for personnel conducting obstetrical procedures (lambing or kidding) or surgery/necropsy of pregnant sheep who have tested Q fever negative (not indoors):
 - a. Required
 - i. Disposable or onsite-laundered coveralls, jumpsuits, or scrubs
 - ii. Boots, booties, or dedicated footwear
 - iii. Gloves
 - b. Suggested
 - i. N-95 or N-100 respirator (filtering facepiece, elastomeric or PAPR)

- ii. Hair cover
 - iii. Eye protection/Safety glasses
4. PPE **required** for all personnel contacting placental tissue or amniotic fluid (e.g. at parturition or abortion) from animals of unknown Q fever status that are post-pubertal (Quarantine Flock). Personnel handling birth/fetal tissues secondary to spontaneous abortion or stillbirth regardless of animal testing status:
- a. Disposable or onsite-launched coveralls, jumpsuits, or scrubs
 - b. Boots, booties, or dedicated footwear
 - c. Gloves
 - d. Eye protection / safety glasses
 - e. N-95 or N-100 respirator (filtering facepiece, elastomeric, or PAPR)
 - f. Hair cover
5. PPE **required** for all personnel contacting feces/urine exposure from animals of unknown Q fever status that are post-pubertal (Quarantine Flock).
- a. Disposable or onsite-launched coveralls, jumpsuits, or scrubs
 - b. Boots, booties, or dedicated footwear
 - c. Gloves
 - d. Eye protection / safety glasses if splashing or spraying is a risk
6. **NOTES FOR PERSONAL PROTECTIVE EQUIPMENT:**
- a. All persons using a respirator require respirator safety education (from EH&S) plus respirator medical assessment and annual fit testing provided by WVU Occupational Medicine. Failure to keep the certifications up to date will lead to protocol suspensions or removal from an active protocol.
 - b. All disposable PPE shall be left onsite in biohazard bags. All reusable PPE shall be appropriately disinfected. Surgical scrubs and gowns shall be autoclaved prior to laundering. All animal contact clothing should be laundered on site.

Students

Students working with animals as part of their coursework **must** complete an Occupational Health Questionnaire through WVU Occupational Medicine. Students working with pregnant animals or participating in lambing/kidding activities **must** be educated about zoonotic disease risks related to these activities during their coursework. It is important for the instructor to document this training and ensure all students understand the zoonotic risk, signs and symptoms, precautions/SOPs, high risk groups, and steps to take if health concerns arise (including contact information). Students participating in high-risk activities should follow all the same safety precautions as expected of staff.

Medical Monitoring Program for Q Fever- WVU employees

A. Requirements

- 1. All those who work with, or in close proximity to, sheep and goats, or those entering sheep and goat indoor housing, or procedure areas, **must** be enrolled in the medical monitoring program.
- 2. These individuals are **required** complete respirator user medical assessment and have annual fit testing completed by WVU Occupational Medicine based on the PPE recommendations described above.

3. Generally, risk assessments for protocol activities are part of the protocol approval process. Risk assessment for non-protocol contact with animals (i.e. the animal care activities) will be done based upon the activities of the individual and the location, frequency, and type of work done with sheep and goats.
4. The Animal Contact Medical Monitoring Risk Assessment includes:
 - a. Completion of an on-line medical history questionnaire
 - b. If the answers on the annual questionnaire suggest increased risk or need for medical restrictions, those persons shall be evaluated in the Occupational Medicine clinic.
 - c. Clinic evaluation for all persons whose activities require use of a respirator.
5. This information is evaluated by WVU Occupational Medicine Physicians to determine potential health risks to employees and whether further clinical interaction or preventive steps may be necessary to protect their health. The above animal contact medical monitoring risk assessments are to be done prior to exposure or following a change of job status or change in the nature of animal contact, and annually.
6. Individuals identified as being at an increased risk for developing Q fever (see below) shall be scheduled for a medical consultation/assessment at WVU Occupational Medicine to discuss their risk of getting Q fever and of developing severe complications. Restrictions to manage that risk may be recommended and may include reassignment to another unit which does not require animal contact, as determined by Occupational Medicine, the Davis College and WVU Human Resources. The reasons for this will be thoroughly explained during the health consultation.
7. Conditions with an increased risk for developing Q fever or complications from Q fever:
 - a. Heart Valve Disease
 - b. Pregnancy
 - c. Prosthetic heart valves
 - d. Liver disease
 - e. Altered immune system
8. Respirator users **must** obtain medical clearance from WVU Occupational Medicine. Occupational Medicine will then provide a fit test for an appropriate respirator. Note that respirator user medical clearance and respirator fit testing is **required** on an annual basis.
9. If a Q fever positive animal is identified at the University, all potentially exposed individuals shall undergo further medical evaluation through WVU Occupational Medicine, which may include Q fever titer testing.

Non-Compliance

Compliance with this program is the responsibility of the employee's supervisor, faculty instructor, and veterinary oversight. Failure to comply with program requirements may result in the IACUC rescinding an investigator's animal use or Institutional biosafety protocol approval and the ability to procure or have any contact with animals.

Education for those working with Sheep and Goats

The handout "Information about Q fever" following this policy consists of a succinct overview of the key health risks related to working with sheep and goats.

References

1. Centers for Disease Control and Prevention (CDC) webpage on Q fever: <http://www.cdc.gov/qfever/>
2. CDC Morbidity and Mortality Weekly Report (MMWR) from March 2013:
<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6203a1.htm>

Independent Testing Sites

CSUVDL, Colorado State University
200 West Lake Street - 1644 Campus Delivery
Fort Collins, CO 80523-1644
970-297-1281 phone 970-297-0320 fax

CAHFS – Davis Laboratory, University of California
620 West Health Sciences Drive
Davis, CA 95616 cahfsdavis@cahfs.ucdavis.edu
530-752-8700 phone 530-752-6253 fax

USDA – APHIS – NVSL, Attn: Sample Processing Department
1920 Dayton Ave.
Ames, IA 50010
Ph: (515) 337-7514 Fax: (515) 337-7568

Information about Q fever

What is Q fever?

Q fever is an infectious disease caused by the *Coxiella burnetii* bacteria for which sheep and goats are carriers and humans can be infected. Although about 50% of human infections are asymptomatic, this infection can be severe or even life threatening in persons who are pregnant, immune compromised, or have heart valve disease. About 75% of people diagnosed with Q fever are sick enough to be hospitalized, and less than 2% of persons of who get acute Q fever die.

How can I get Q fever?

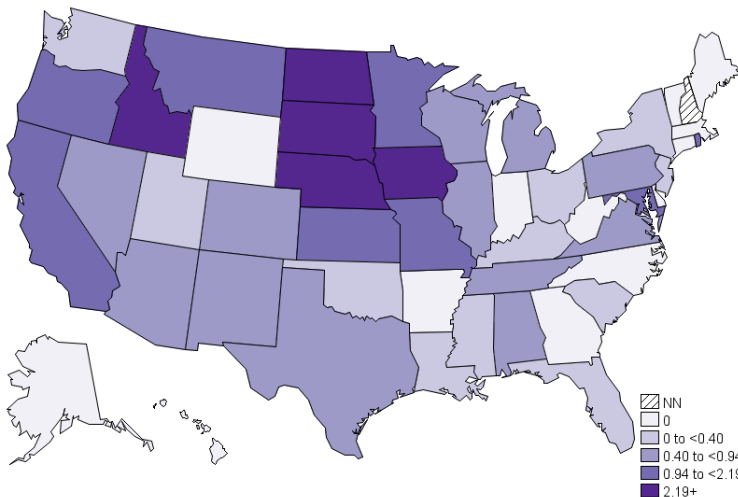
Almost any contact with an infected sheep or goat can pass the bacteria to you. The highest risk is during lambing since the bacteria can grow especially well in the amniotic fluid. However even non-pregnant animals can cause infections.

Is there anything I can do to decrease my risk?

- Be certain that animals have completed testing before you have any contact.
- Use personal protective equipment when working with sheep or goats, as outlined in the program. Check with your supervisor, the veterinarian, or WVU Occupational Medicine if you are uncertain what protective equipment is **required** for a specific activity.
- If your personal health changes (especially pregnancy, heart valve disease, or immune status changes), contact WVU Occupational Medicine at 304-293-3693 to discuss your risk of acquiring the disease.

What is the prevalence of Q fever in West Virginia?

Epidemiological data collected by the CDC in 2019 lists West Virginia as a low prevalence state for Q fever cases.



Annual Reported Incidence (per million persons) for Q fever – United States for 2019

How will West Virginia University help protect me from this risk?

The University tests animals born at the University farms prior to their first parity. Other animals are tested upon arrival at the farm before they are used for research/teaching activities. Any animals that test positive are removed from the farm.

All persons working with animals are **required** to have completed the Occupational Health Questionnaire through WVU Occupational Medicine. If you report any health conditions that could increase your risk, you will be evaluated in the WVU Occupational Medicine clinic, and additional personal protection equipment may be **required** to continue animal contact.

In the unlikely event that an animal is identified with Q fever after WVU personnel had been working with it, testing and any needed medications will be provided by WVU Occupational Medicine.

What are the symptoms of Q fever?

After an incubation period of 2–3 weeks, acute Q fever causes a nonspecific febrile illness, perhaps accompanied by pneumonia or hepatitis. The most frequently reported symptoms include fever, fatigue, chills, and muscle aches. Severe, debilitating headaches are common, with pain behind the eyes and increased by light. It is common for these symptoms to be mistaken initially for other diseases.

Pneumonia can occur, ranging from mild to severe, and patients may have accompanying severe headache, muscle aches, and joint pain. An unproductive cough is often present in 50% of patients. Sore throat is uncommon. Fever usually lasts approximately 10 days in untreated patients (fever may range from 5 - 57 days), and may last longer in immune compromised or older patients.

Is there any treatment for Q fever?

Coxiella burnetii is a bacterium that is responsive to several antibiotics. The majority of cases improve within 72 hours of starting antibiotics. About 70% of those who get acute Q fever are hospitalized, but outpatient treatment with oral antibiotics is quite effective once the diagnosis is made.

Are there any health conditions that could put me at increased risk of getting Q fever or having severe consequences from Q fever?

There are several medical conditions that will put you at increased risk for developing Q fever or having the severe consequences of the disease. These include:

- Heart Valve Disease
- Pregnancy
- Prosthetic (Artificial) Heart Valves
- Liver Disease
- Altered Immune System (HIV, Use of Steroids, Chemotherapy, and Immune Modulator Drugs used for Rheumatologic and Gastrointestinal diseases)

What should I do if I have symptoms that could be caused by Q fever?

If you develop symptoms that could be related to Q fever exposure, contact WVU Occupational Medicine (304-293-3693) or go to the WVU Medicine Emergency Room. Make sure to explain to any healthcare professional evaluating you that you work with sheep or goats and Q fever could be a possibility. Tell them that WVU Occupational Medicine is available to assist them.

Are there any other diseases I could get from sheep or goats?

Orf: This viral disease causes papules and pustules (small blisters) in the animals, mostly often on or near the hairline or on the lips and muzzle. This virus can also infect people, causing blisters on infected body parts. It does not usually cause systemic disease, and lesions usually resolves without treatment. However, people with impaired immune function can get a progressive and even life-threatening infection. Serious damage to the eye can occur if the eye is infected by Orf, even in healthy individuals. Prevention is through monitoring animals for disease and using gloves during animal contact.

Anthrax: This bacterial infection comes from exposure to wool or skin of infected animals. Animals are generally vaccinated, which decreases the frequency of disease. Infected animals typically live only a few hours from the onset of symptoms. Humans may be infected through skin or respiratory exposure to infected animals. Prevention is through the use of protective equipment including respirators when handling dead animals of unknown cause.