Q Fever in Washington, 2011

WASHINGTON STATE DEPARTMENTS OF AGRICULTURE AND HEALTH
TOPICS FOR TODAY

- Introduction to Q fever
- Q Fever in humans
  + Clinical signs, testing and treatment
- Q fever in animals
  + Clinical signs, diagnostic methods and test results
- Historical Q fever
- Washington outbreak
- Prevention and control
Q fever is a disease caused by the bacteria *Coxiella burnetii*. *C. burnetii* is a highly infective bacteria:

- A single bacterium can cause disease

Can be found throughout most of the world, including the U.S.

Can cause disease in animals and people:

- Cattle, sheep, and goats are the main animal sources in nature
- Many other animals also carry the bacteria

Can be passed from infected animals into the environment:

- Animals shed bacteria in their feces, milk, urine, vaginal secretions, and semen
- The bacteria can contaminate the environment, such as animal bedding and soil
- Survives well in the environment (e.g., dried barnyard dust); can be carried in the wind (miles)
HOW DO PEOPLE GET SICK?

- Infected animals shed *C. burnetii* in milk, urine, feces and vaginal fluids
  - During birthing the bacteria are shed in high numbers
  - Shedding can contaminate the farm environment
- People can become sick by:
  - Breathing in contaminated barnyard dust
  - Helping infected animals during birthing
  - Contact with contaminated clothing or linens
  - Consuming raw (unpasteurized) milk products from infected animals
  - Tick bites (from infected ticks)
- Q fever doesn’t usually spread from person to person
Q FEVER IN HUMANS

- Time from exposure to illness is usually 2-3 weeks
- About half of people who are infected do not get sick
- Symptoms of Q fever
  + People that do get sick usually have a flu-like illness, with symptoms such as: fever, chills, severe sweats, headache, chest pain, cough, muscle aches
  + Some people will get more severe illness, such as pneumonia (lung infection), hepatitis (liver infection), or other serious complications
  + Most people recover within a few weeks
  + Long-lasting fatigue may occur in 15-20% of people
  + Pregnant women are at risk for pre-term delivery or miscarriage or spontaneous abortions
**CHRONIC Q FEVER**

- Rarely occurs (1-5% of people infected)
- Certain people are at high risk for developing chronic Q fever:
  + Pregnant women
  + People with weak immune systems
  + People with pre-existing heart valve conditions
- Chronic symptoms can develop weeks to years later
  + Endocarditis (inflammation of lining of heart) is the most common chronic symptom
  + Other rare complications of bone, liver, and reproductive system are also possible
LABORATORY DIAGNOSIS

- **Serology (blood test)**
  - Used to detect antibodies in the blood
  - May require two separate blood tests a few weeks apart
  - Can detect current or past Q fever infection

- **Isolation (bacterial growth) or “PCR”**
  - Growing the bacteria in the lab is rarely done
    - Risk to laboratory personnel
    - Usually limited to heart valve tissue following surgeries for chronic Q fever cases
  - “PCR” = polymerase chain reaction
    - Detects the bacteria
    - PCR not commonly done unless either in first week of illness (blood) or on chronic Q fever cases (heart tissue)
TREATMENT FOR PEOPLE WITH Q FEVER

- The earlier treatment is started, the more effective it will be
  - If you are sick, see your doctor for a medical evaluation
- Antibiotics can be prescribed by your doctor
  - Usually requires a short course (a few weeks)
  - Chronic disease requires a long course of antibiotics (1.5 to 4 years)
- Immunity
  - People who recover from Q fever are thought to develop long-lasting antibodies that should protect them from re-infection
Q FEVER IN ANIMALS
ANIMAL DISEASE

- Sheep, cattle, goats and other animals
  - Usually don’t appear sick
  - Most obvious signs include reproductive problems such as:
    - Abortions, stillbirths
    - Retained placenta
    - Infertility
    - Weak newborns
    - Low birth weights
    - Mastitis in dairy cattle
ANIMAL SHEDDING

- C. burnetii can localize in:
  - mammary glands
  - supramammary lymph nodes
  - amniotic fluid
  - placenta
  - uterus

- Shedding is usually highest during 1st & 2nd pregnancies
  - Can continue after birthing for several weeks or possibly months

- While animals are shedding bacteria, there is a potential for people and animals to be exposed

- In 2008, WSDA began requiring testing on all raw (unpasteurized) milk being sold for human use because of concern about shedding
Veterinarians and lab personnel look for:

- Abnormal placental findings (placentitis)
  - Leathery and thickened appearance of placenta
  - Abnormal amniotic birth fluid
    - Creamy, white-yellow pus
    - Edges of placental-fetal attachments (cotyledons) abnormal
- Aborted fetus
  - Non-specific lesions
LABORATORY DIAGNOSIS (ANIMALS)

- Testing for Q fever in animals may include:
  - If you experience an abortion outbreak in your herd, your veterinarian may need to examine or test the placentas following births/abortion
  - PCR = polymerase chain reaction
    - Detects the DNA from bacteria
    - Determines whether an animal was actively shedding
    - Can be done on whole blood, vaginal swabs, fecal swabs and milk samples or placenta
  - Serology as described above for human disease
Treatment (questionable as to how well this works)

- Antibiotics, such as Tetracycline, prior to parturition
  - Always consult your veterinarian
- No vaccine available in this country at this time
HISTORICAL AND RECENT EXAMPLES OF Q FEVER
HISTORICAL ASPECTS OF Q FEVER

- Historically Q fever has been an occupational disease
  + Mostly farmers and veterinarians got sick with Q fever
- Q fever is rare in the United States
  + Usually <200 people get Q fever each year
  + Many do not have direct animal contact or occupational exposure
- Recent large outbreak in the Netherlands (2007)
  + 2,300 people diagnosed with Q fever
  + Timed breedings lead to large numbers of infected goat birthings and abortions which caused large amounts of C. burnetii to be shed
  + Involved many dairy goat and sheep farms
  + People living near farms were more likely to get Q fever; likely wind dispersal of bacteria in contaminated dust
  + Drastic measures initiated to control this unprecedented outbreak in both animals and humans
- Sporadic cases and outbreaks do occur around the world
CASE EXAMPLE # 1

- Male dairy farmer
  - Sudden onset
    - Fever, chills, cough, weight loss
  - Thought it was influenza
  - Symptoms persisted for 2 weeks

- Visited emergency room
  - Referred to infectious disease specialist doctor
  - Tested positive for Q fever
  - Antibiotics given and patient recovered in 2 weeks

- Investigation
  - No recent calvings on his farm
  - Two beef cattle herds across the road
    - 2 out of 14 tested positive for Q fever
CASE EXAMPLE # 2

- Nova Scotia, Canada (1985)
- Q fever associated with exposure to a cat
  - Cat had 2 stillborn kittens followed by vaginal bleeding/discharge
- 33 people got sick with Q fever
  - Included neighbors in other apartment buildings near the apartment building where the cat lived
    - Most did not have exposure to cattle, sheep or goats
  - 17 people developed cough
  - 14 people developed pneumonia
- Cat tested positive for *C. burnetii*
Q FEVER IN WASHINGTON STATE
Q FEVER IN WASHINGTON STATE

- On average, 0-3 people are diagnosed with Q fever each year in Washington State
  - Usually no common source of exposure
  - Normally geographically separate locations
  - Typically diagnosed at different times of the year

- In 2011, an outbreak associated with goats was identified in Washington and Montana
HOW DOES PUBLIC HEALTH WORK TO PREVENT DISEASE?

- Monitor diseases
- Investigate illnesses to determine the source
- Educate the public about risk and prevention via local news or posted warnings in known risk areas
In April, a goat from a farm in Washington tested positive for *C. burnetii* (the bacteria that causes Q fever)

No people with Q fever were identified at the time

The county health department sent an alert to doctors to be aware of this in case they saw human patients with symptoms of Q fever
2011 INVESTIGATION IN WASHINGTON

- Roughly 1 month after the goat tested positive, people with Q fever were identified
  - These people lived in both Washington and Montana
  - All of them had contact with goats

- A public health investigation was launched to figure out why there were so many people sick with Q fever
  - Was this a more severe strain of the Q fever bacteria?
  - Were farmers using different animal husbandry practices?
  - Were there more sick people than we knew about?
    - Important to identify and inform exposed people
INVESTIGATION – METHODS

- Testing of goats, farm owners, and farm visitors was offered to each farm with goats linked to the goat that tested positive.
- Some neighbors were also given the same offer of testing.
  - All declined to participate.
- Goats were tested from 13 farms in 7 counties:
  - Adams, Chelan, Clark, Franklin, Grant, Thurston, and Pend Oreille.
  - Samples were collected by WSDA, USDA, CDC, and WA DOH veterinarians and technicians:
    - 326 Blood samples
    - 313 Vaginal swabs
    - 108 Fecal swabs
    - 37 Milk samples
INVESTIGATION – TEST RESULTS

PEOPLE
- Of 61 people tested in Washington, 11 (18%) were positive
  - 7 of 11 people with positive results also had symptoms (were sick), and so are considered Q fever “cases”
  - 4 of 11 people didn’t have symptoms but were infected and tested positive
  - Remember: only half of people who are infected will get sick
  - Data current as of August 2011

GOATS
- Of 428 goats tested in Washington, 146 (34%) were positive by at least one Q fever test
  - Some positives were from serology (antibodies in blood)
  - Other positives were from PCR of vaginal, milk, or fecal samples
    - 10 of 13 farms (77%) had evidence of shedding C. burnetii based on PCR
Documented that many goats were infected and some were actively shedding bacteria when we tested

- 3 positive does on one farm were not from original farm
  - One of those goats had never been off of the farm
  - Possible explanations for these infected goats:
    - 1. Spread to these goats via contact with goats that were from original farm
    - 2. Environmental contamination at other farms
- Some does bred at original farm were serology positive and PCR negative
  - This means they were infected but not shedding at time of testing
  - Could have been shedding earlier and could shed again later
- All people who tested positive had contact with goat herds in which goats tested positive
Some farms had goats shedding but no people tested positive

- If goats are shedding bacteria **there is a chance** that people (and animals) will be exposed and might get sick
- Positive test = there is a risk of getting Q fever
  - (but negative test ≠ no risk)
- People should take precautions to reduce risk (**next section**)

Infected goats may shed during next kidding

- Potential for more people to be exposed... and get sick
- So it is important to take precautions

**C. burnetii** is in many places in nature, so positive animals may be found throughout the state (not just farms that were tested)
Department of Health and Agriculture
PREVENTION AND CONTROL
PREVENTION AND CONTROL

- Eradication (getting rid of Q fever completely) is not possible because there are too many sources of *C. burnetii* in nature
  - Infected animals (with off and on shedding)
  - Contaminated environment and stability of agent in environment with potential for wind dispersal

- Prevention and control recommendations
  - Basic hygiene and protective clothing
  - Reducing high risk exposure activities
  - Good animal husbandry and best management practices
Designated “barn” clothes are highly recommended in farm/animal environment
+ Wear coveralls and boots in animal areas
+ Remove these before leaving the animal area (prior to entering house)
+ Wash clothes and disinfect boots

Thorously wash hands and arms with soap and warm water after all animal contact
+ Alcohol sanitizer can be used if soap and water not available

Do not drink or use raw (unpasteurized) milk
PREVENTION AND CONTROL

Selling raw milk

- WSDA now requires testing on all raw milk being sold for human use in Washington State
  - Started in 2008
  - Enforcement has been primarily through the market place (legal issue of selling contaminated milk)

- Positives are:
  - Treated (though questionable how beneficial this is)
    - Tetracyclines for extended periods preparturient
    - May reduce shedding in the birthing area
  - Culled/Re-tested
  - Milk is pasteurized or used for other purposes
PREVENTION AND CONTROL

- Limit visitor access to barns and animal areas
- Inform visitors about who may be at greater risk for Q fever
  - Education of persons at high risk
  - Discourage persons at high risk from visiting animal areas
  - These persons should not assist in animal birthing activities
Good husbandry practices

- Disposal of birth products
  - Incinerate or bury (at least 3 feet of soil covering)
- Compost by approved methods only
  - See WSDA resources on website
- Disinfection after removal of organic matter
  - 0.05% chlorine
  - 1:100 Lysol
- Isolate new animals (seek veterinary advice)

Use protective clothing, gloves and possibly masks and eye protection for abortion event
PREVENTION AND CONTROL

- Keep good records especially:
  - Track adverse pregnancy events ("APE") including:
    - Abortions, poor breeding performance, or weak offspring
  - Track sale of live animals
- Consult your veterinarian if your herd/flock has excessive abortions and he/she will do a work-up
- Q Fever is a reportable disease in Washington State
PREVENTION AND CONTROL

- Practice good rodent and pest control
- Keep pets and other animals (poultry and other fowl) away from birth products
C. burnetii is found in the environment in most countries around the world. Because it is present in the environment it is possible for people and animals to be infected. Cattle, sheep, and goats are the primary reservoir. Other animals can be infected too. It is difficult to trace Q fever infections to a specific source. No single farm can be blamed for having infected goats. All farmers should follow best management practices and recommended prevention advice to reduce the risk of transmission to animals and people.
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