



## Q Fever in Washington, 2011

**WASHINGTON STATE DEPARTMENTS OF  
AGRICULTURE AND HEALTH**

# TOPICS FOR TODAY

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- ✗ 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 BASICS

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- ✘ 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 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)

Department of Health

# **DISEASE IN HUMANS**

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# HOW DO PEOPLE GET SICK?

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- ✘ 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

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- ✘ 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

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- ✘ 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

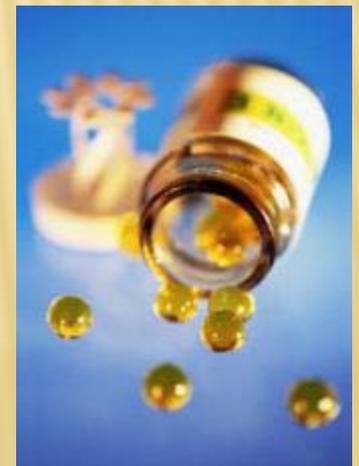
# LABORATORY DIAGNOSIS



- ✘ 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



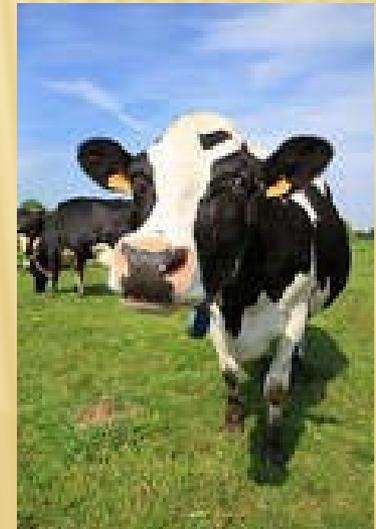
Department of Agriculture

# **Q FEVER IN ANIMALS**

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# 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

# CLINICAL DIAGNOSIS IN ANIMALS

- ✘ 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)

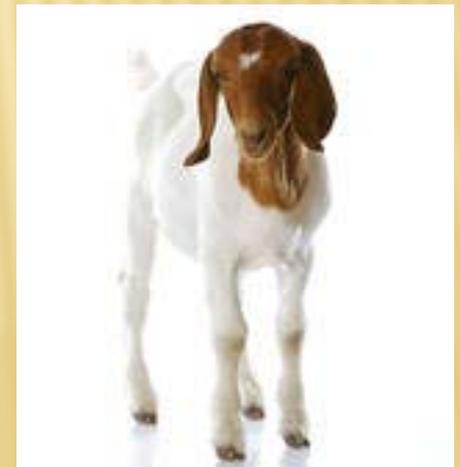


- ✘ Testing for Q fever in animals may include
  - + If you experience an abortion outbreak in your herd, your veterinarian may need to examine or test the placentas following births/abortion
  - + PCR = polymerase chain reaction
    - ✘ Detects the DNA from bacteria
    - ✘ Determines whether an animal 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 (ANIMALS)

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- ✘ 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

**Lewis County Public Health & Social Services**  
**News Release**  
*Always Working For a Safer and Healthier Community*

**For immediate release: June 28, 2010**

Contact: Marie Tucker, MPH, RD, CN  
Health Educator  
360-740-1234  
Monday PM, Wednesday

Dr. Rachel Wood, MD, MPH  
Health Officer  
360-740-1316  
Tuesday AM

\*note – no one available on Tuesday after 12 p.m. – sorry for inconvenience

**Unusually high rates of pertussis reported in Lewis County**  
*Public health working to investigate cases*

Chelan, WA – Lewis County Public Health is reporting an unusually high rate of laboratory confirmed pertussis (whooping cough) cases in the county. Just halfway through 2010, the numbers are more than double that of 2009. With outbreaks being reported in several parts of the nation, Lewis County Public Health is working with the Washington State Department of Health to investigate the cases and potential causes. The 2010 cases have all been children and teens, but there could be undiagnosed cases among adults. Health Officer, Dr. Rachel Wood states, "Often, teenagers and adults have mild cases of pertussis and may not visit the doctor. These teenagers and adults can infect younger children; and unfortunately, the disease can be more serious for young children and infants."

The best ways to prevent pertussis include:

- Stay up to date on pertussis vaccinations. Teenagers and adults who have not had vaccination against pertussis since age 5 need a booster.
- If you have been in close contact with a person who had pertussis (confirmed by laboratory test), talk with your medical provider.
- As always: cover your cough, wash hands often (especially before touching your face, nose, eyes, and mouth), and stay home when you are sick.

For more information about pertussis and to hear what "whooping cough" sounds like

**BREAKING NEWS**  
**MEASLES EXPOSURE RISK**

**EVERGREEN PEDIATRICS**  
FEB. 14 BETWEEN 1:30-6PM

**SOUTHWEST WASHINGTON MEDICAL CENTER OUTPATIENT LABRATORY**  
FEB. 14 BETWEEN 4:30-8:30PM

**FOX 12**

**People, Rodents and Plague**

Chipmunks, ground squirrels and other wild rodents found at Seven Falls may be infected with plague. Plague is a bacterial disease that naturally occurs in small rodent populations. It can be passed on to humans from the bite of an infected flea. The risk of human disease is relatively low if precautions are taken while visiting this area of Seven Falls.

**For your safety:**

- Do Not Feed or play with wild animals.
- Avoid all contact with chipmunks, ground squirrels and other wild rodents.
- Please stay on all walkways and marked trails.
- Use insect repellent on all exposed skin.
- Do not touch dead or sick animals.
- If a dead or sick animal is spotted - please report the incident to a manager on duty.

**Seven Falls**

**Infection kills zoo monkeys**

Warnings posted for other animals

By Carol Sowers  
The Arizona Republic

Two exotic tamarin monkeys at the Phoenix Zoo and other critters in the surrounding Papago Park have died of a rare bacterial infection, prompting warnings to visitors not to risk in-



Jill DiPasquale/The Arizona Republic

A golden-lion tamarin, like this fellow at the Phoenix Zoo, succumbed to a rare bacterial infection, lab tests confirm.

# 2011 INVESTIGATION IN WASHINGTON

- ✘ 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

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- ✘ 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 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

# INVESTIGATION LESSONS – THINGS TO KEEP IN MIND FOR THE FUTURE

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- ✘ 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

# INVESTIGATION LESSONS – THINGS TO KEEP IN MIND FOR THE FUTURE (2)

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- ✘ 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  
Department of Agriculture

# **PREVENTION AND CONTROL**



# PREVENTION AND CONTROL

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- ✘ 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



# PREVENTION AND CONTROL

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- ✘ 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
- ✘ Thoroughly 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

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## 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

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- ✘ 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



# PREVENTION AND CONTROL

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- ✘ 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

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- ✘ 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

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- ✘ Practice good rodent and pest control
- ✘ Keep pets and other animals (poultry and other fowl) away from birth products

# CONCLUSIONS

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- ✘ *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

# ACKNOWLEDGEMENTS

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- ✘ Centers for Disease Control and Prevention
- ✘ Center for Food Security and Public Health at Iowa State University
- ✘ USDA- veterinarians and logistic support
- ✘ WSU- Field Disease Investigative Unit and Lab
- ✘ All local county health jurisdictions

Washington State Department of Agriculture  
Washington State Department of Health

**QUESTIONS?**

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