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Zoonotic Diseases of Sheep

Dr. Madhu Ravi, DVM, MSc
Diplomate of American College of Veterinary Pathologists
Veterinary Pathologist, Edmonton
Animal Health and Assurance Division
Alberta Agriculture and Forestry



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Zoonotic Diseases of Sheep

- What are zoonotic diseases?
 - Zoonotic diseases are those infectious diseases that are transmitted from animals to humans
 - contact with contaminated environment and diseased animals
 - by contact with infected tissues
 - abortions
 - consuming contaminated food and water
 - transmitted through insect bites



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Zoonotic diseases of Sheep

- Routes by which different diseases transmitted from sheep to humans:
 - Direct contact by handling sheep
 - Contagious Ecthyma (soremouth/orf)
 - Ringworm
 - Handling contaminated tissues during lambing
 - Oral
 - Chlamydiosis, Campylobacteriosis, Cryptosporidiosis, Listeriosis, Q fever, Salmonellosis, Toxoplasmosis, Leptospirosis
 - Inhalation
 - Q fever, Listeriosis, Chlamydiosis
 - Vector-borne – tick bites
 - Q fever






Image source: CDC and Merck Vet Manual



Zoonotic diseases of Sheep

- This talk emphasize zoonotic diseases of reproductive importance
- Some of the important infectious zoonotic agents that cause abortions/stillbirths in sheep
 - Chlamydiosis
 - Campylobacteriosis
 - Listeriosis
 - Q Fever (Coxiellosis)
 - Toxoplasmosis





Zoonotic diseases of Sheep

- Why it is important to know the cause of abortions in your flock?
 - Contain the spread of infectious diseases within your farm
 - Implement/strengthen on-farm biosecurity
 - Reduce the **Zoonotic risk**
 - Everyone are at risk
 - elderly, young children and pregnant women may show clinical effects of the disease
 - Improve hygienic measures
 - Reduce further production losses
 - Prompt treatment
 - Implementing preventive strategies
 - vaccination





Zoonotic diseases of Sheep

- Ontario abortion investigation study (2009-11)
 - At least 1 infectious agent deemed as a causative agent in 90 of 163 submissions (55%)
 - Toxoplasma gondii – 33%
 - Campylobacter spp. – 22%
 - Chlamydia abortus – 20%
 - Q fever (Coxiella burnetii) – 12%

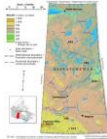


Source: Hazlett MJ et al., J Vet Diagn Invest, 2013 May;25(3):359-68



Zoonotic diseases of Sheep

- Saskatchewan study (2014)
 - Sheep Abortion Surveillance Program (44 submissions)
 - 50% of the abortions were found to be due *Chlamydophila abortus*
 - *Chlamydophila* is predominant cause of ovine abortion
 - 50% of the farms submitting fetuses had at least one abortion caused by *Chlamydophila abortus*



Source: PDS Animal Health Perspectives FEBRUARY 2015 • Volume 11 • Issue 1



Zoonotic diseases of Sheep

- Investigation of abortions in small ruminants of Alberta (2013-15)
 - *Chlamydophila abortus* – 26/92 (28%)
 - *Campylobacter* spp. – 7/92 (7.6%)
 - *Coxiella burnetii* (goats) – 1/40 (2.5%)
 - Listeriosis
 - Toxoplasmosis
 - Others: **Leptospirosis, Brucellosis** etc.





Zoonotic diseases of Sheep– Chlamydiosis

- Cause: **Chlamydomphila abortus**
- Present in most sheep-raising countries except Australia & New Zealand
- Species affected: Sheep, goats, deer, cattle, llamas etc.





Sheep Zoonoses – Chlamydiosis

- How it is transmitted in animals?
 - Contamination of feed and water, and bedding
 - Organisms shed in placenta, uterine discharges and other abortion products
 - Ingestion, aerosol
 - Venereal contact
 - Not a common route





Sheep Zoonoses – Chlamydiosis

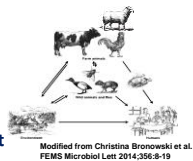
- What are the symptoms in animals?
 - Females
 - Causes late term abortions (enzootic abortion), stillbirth, weak or low birth weight lambs and birth of premature lambs
 - Males
 - Orchitis, epididymitis (not very common)
 - Decreased fertility or infertility in flock
 - **Note:** other infections can also cause orchitis, epididymitis in rams
- Some animals can carry and shed these organisms asymptotically

11



Sheep Zoonoses – Chlamydiosis

- How it is transmitted to humans?
 - Direct contact
 - Mucous membranes
 - e.g. touching your eye with contaminated hands
 - Ingestion
 - Contaminated environment
 - Unwashed hands after contact with sheep
 - Aerosol
 - Contaminated dust, splash from infected animal tissues or while assisting lambing





Sheep Zoonoses – Chlamydiosis

- What are the symptoms in humans?
 - Flu-like symptoms
 - fever, body aches, headache, reddened eye and pneumonia
 - Can progress to septicemia
 - Severe cases:
 - Heart and kidney infections can occur
 - Pregnant women may abort
 - 14-36 weeks of pregnancy



Source: Center for Food Safety and Public Health



Sheep Zoonoses – Campylobacteriosis

- Causes: **Campylobacter jejuni**, **Campylobacter coli** & **Campylobacter fetus**
- Distribution: Worldwide
- Survives in moist environments
 - Cold tolerant
 - Weeks to months
- Remains viable in:
 - Feces
 - Milk
 - Water
 - Vaginal discharges

14



Sheep Zoonoses – Campylobacteriosis

- **C. jejuni** and **C. coli**
 - Both can cause diarrhea in animals and humans
 - **C. jejuni** sporadically causes abortions in sheep
- **C. fetus**
 - Causes abortions in sheep
 - Opportunistic human pathogen
 - Immunocompromised (septicemia)



15



Sheep Zoonoses – Campylobacteriosis

- How it is transmitted in sheep?
- C. jejuni, C. coli & C. fetus
 - Fecal-oral
 - Contact with feces, vaginal discharges, aborted feti and their membranes
 - Fomites
 - Contaminated instruments, bedding
 - Bacteria found in/on:
 - » Vaginal discharges, aborted materials (C. jejuni & C. fetus)
 - » House flies can serve as mechanical vectors





Sheep Zoonoses – Campylobacteriosis

- What are the symptoms in animals?
 - Enteritis (C. jejuni and C. coli)
 - resolves in 3 to 7 days
 - Many species affected
 - Young animals
 - Intermittent diarrhea may persist
 - Diseased or stressed adults



- Abortions(C. fetus and C. jejuni)
 - Late term abortions
 - Weak lambs
 - Uterine infections
 - Ewes can be persistently infected and shed bacteria in feces





Sheep Zoonoses – Campylobacteriosis

- What are the symptoms in humans?
 - Incubation period 1 to 10 days (Source: CDC)
 - C. jejuni
 - diarrhea, abdominal pain, and fever within two to five days after exposure
 - diarrhea with or without blood
 - C. fetus
 - Opportunistic human pathogen
 - Immunocompromised persons at risk





Sheep Zoonoses – Campylobacteriosis

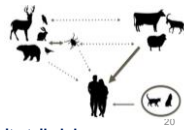
- **How to diagnose the disease in animals?**
 - Contact your veterinarian
 - Symptoms: diarrhea in young lambs and abortions in pregnant animals
 - Post-mortem examination of aborted fetuses
 - Laboratory testing required for confirmation
 - » *Campylobacter* can be isolated from aborted fetuses and fetal membranes
 - » Fecal testing in diarrheic animals can be used for diagnosis





Sheep Zoonoses – Q Fever

- **Cause: *Coxiella burnetii***
- **Distribution: Worldwide**
 - Except New Zealand
 - Between 1998 and 2011, there were 39 human cases in Alberta
 - Contact with farms and/or livestock, predominantly cattle, sheep and goats
 - B.C. Centre for Disease Control reported 6 human cases between 1999 and 2008)
- **Reservoirs**
 - Domestic animals
 - Sheep, cattle, goats, dogs, cats
 - Wild Birds and animals
 - snowshoe hares, moose and white-tailed deer





Sheep Zoonoses – Q Fever

- **2007–2009 human Q fever epidemic in The Netherlands**
 - Q fever abortions detected in 30 dairy goat and dairy sheep farms between 2005 and 2009
 - A total of 3523 human cases were notified between 2007 and 2009
 - Proximity to small ruminant farms experiencing abortions was determined as a potential risk to human cases

21
Ref. Adv. Exp. Med. Biol. 2012:984:329-64



Sheep Zoonoses – Q Fever

- 1985, Nova Scotia human Q fever cases
 - 33 human positive cases
 - 25 were exposed to pregnant cat
 - Symptoms
 - Fever, sweats, chills, fatigue, myalgia, headache, cough and pneumonia
 - Cat tested positive for *C. burnetii*
 - Pregnant queen



Source: Marrie TJ et al. *Chest*. 1988;93(1):98-103



Sheep Zoonoses – Q Fever

- Who are at risk?
 - Livestock producers and farm workers
 - Veterinarians and technicians
- Ontario study:
 - Shannon Meadows, PhD student from U of Guelph
 - *Coxiella burnetii* seropositivity and associated risk factors in sheep, goats, their farm workers and veterinarians in Ontario
 - highlighted the importance of farm hygiene and biosecurity measures
 - failure to disinfect lambing/kidding pens
 - presence of other sheep/goat farms within 5km
 - dairy goat farms
 - Increasing proportions of seropositive sheep/goats on farm

23



Sheep Zoonoses – Q Fever

- How the disease transmission occurs?
 - Ingestion
 - Lack of hygienic precautions while handling of infected ewes shedding organisms, conducting necropsies
 - Urine, feces, milk, accidental ingestion of fetal fluids while assisting lambing
 - Aerosol
 - airborne droplets or dust contaminated by dried placental material, birth fluids, or feces of infected animals
 - It was estimated that 10⁹ bacteria released per gram of placenta
 - few organisms are infective
 - Fomites
 - contaminated bedding, wool, clothing & tools
 - Arthropods
 - Ticks – vectors from wildlife to sheep





Sheep Zoonoses – Q Fever

• What are the symptoms in Sheep?

– Reproductive failure

• Abortions & stillbirths

- Endometritis
- Retained placenta

• Weak newborns

- Low birth weights



– Carrier state

- Organisms may be shed in milk and feces for several days after lambing/kidding





Sheep Zoonoses – Q Fever

• How to diagnose the disease in sheep?

- Contact your veterinarian for investigation if there are multiple abortions in a short period

• Postmortem examination and confirmatory laboratory testing

- » Fetal tissues and placenta
- » Serology





Sheep Zoonoses – Listeriosis

- Also called 'Circling disease'

- Cause: *Listeria monocytogenes*

- Widespread in the environment in soil, plants, mud and streams

- relatively resistant to freezing
- killed by cooking or pasteurization or dry heat

- How do sheep get infected?

- Feeding poor quality silage & spoiled hay (black spots)
 - pH of greater than 5 (e.g. spoiled silage) favors the growth
- Eating and/or drinking contaminated feed/water
- Newborn lambs can be infected through pregnancy

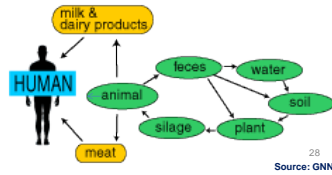
- What are the symptoms in animals?

- walking in circles, seizures, head pressing, incoordination, recumbency, death and abortion



Sheep Zoonoses – Listeriosis

- How do humans get infected?
 - Foodborne illness: Consuming unpasteurized milk and dairy products, and improperly cooked meat
 - Humans can be infected by direct contact with contaminated fetal tissues/fluids during lambing
 - handling aborted fetuses and placentas of infected ewes and lambs without wearing personal protective equipment (PPE)





Sheep Zoonoses – Listeriosis

- How to diagnose disease in animals?
 - Contact your veterinarian
 - Symptoms
 - Postmortem examination and laboratory confirmation through testing
 - Tissues from dead animals, placenta, fetus or uterine discharges after an abortion





Sheep Zoonoses - Prevention

- How to prevent & control these diseases in animals?
 - Good husbandry
 - Purchasing replacement animals from known sources free from disease and good health records
 - Separate newly acquired or sick animals from healthy sheep on the farm
 - removing ewes that have aborted to a separate pen away from pregnant animals
 - Removing and properly disposing of aborted feti, placenta and contaminated bedding materials from the pens as soon as possible





Sheep Zoonoses - Prevention


- How to prevent & control these diseases in animals?
 - Good husbandry
 - Preventing household pets from scavenging aborted materials and spreading them around
 - Restricting stray cats, wild birds/animals accessing pens
- If tick infestation is a problem on the farm, implement measures to control tick infestation
 - Q fever can spread through tick bites!



31



Sheep Zoonoses - Prevention

- How to prevent & control these diseases in animals?
 - Good husbandry (continued..)
 - Feeding good quality hay & silage
 - Avoid feeding spoiled or moldy silage
 - Vaccinating the flock if the disease has been confirmed in the flock
 - For Campylobacteriosis, Chlamydia and Q Fever
- Prompt cleaning and disinfection of pens, tools, contaminated clothing, boots etc.
 - 10% Bleach solution, Quaternary ammonium compounds
- Practice Biosecurity to Keep Flocks Healthy
 - All actions to prevent disease entry, to contain disease spread once on farm, and to reduce the risk of animal infection and illness
 - Good husbandry, care & handling of sheep
 - For additional information on biosecurity please refer to
 - National Biosecurity standards & Biosecurity online Manual 
 - http://www.abvma.ca/Biosecurity/documents/Lambbooklet_loaded.pdf





Sheep Zoonoses - Prevention

- How to prevent & control these zoonotic diseases in humans?
 - Practice good personal hygiene
 - Use personal protective equipment (PPE)
 - Wash hands after contact with animals on the farm
 - Alberta Agriculture does not recommend consumption of raw milk and uncooked meats
 - Q fever, Campylobacteriosis and Listeriosis can spread through milk
 - Pasteurization of milk and milk products
 - Thorough cooking of meats
 - Young children, immunodeficient individuals and pregnant women should limit contact with sheep
 - Pregnant women should not work with pregnant sheep when abortions occurring on the farm
 - Contact your physician immediately if you are exposed to an animal carrying these diseases





Sheep Zoonoses: Take home message

- Never ignore an abortion - Consider investigation if multiple abortions occur in a short period - Consult your Veterinarian
 - Preserve freshly aborted fetus and placenta
 - Double bag and refrigerate or freeze the samples for investigation
- Chlamydophila, Campylobacter, Coxiella and Listeria were identified in some of abortion cases in Alberta
- 'Zoonotic alert' – Use of PPE while handling sick animals, aborted ewes, aborted fetuses placenta
- Observe strict on farm biosecurity, cleaning and disinfection procedures and personal hygiene measures on the farm to reduce spread of contagious diseases
- Consult your physician for any exposure to these zoonotic agents from confirmed cases on the farm





Sheep Zoonoses: Take home message

Know that animals carry germs that can make people sick

Never eat, drink, or put things into your mouth in animal areas

Older adults, pregnant women, and young children should be extra careful around animals

Wash your hands with soap and water right after visiting the animal area

How to be Safe Around Animals!

cdc.gov



Thank you
