Diseases of Concern during Pregnancy
Dr. Charlotte Clifford-Rathert
Lincoln University
Jefferson City, MO

This talk will focus at first on conditions producers ask about during pregnancy. Then we will discuss diseases that are associated with abortion that have the potential to infect humans (zoonotic). This is intended to be informative, not scary. My intention is to bring awareness to producers about situations we often take for granted and forget to be careful.

Pregnancy Toxemia (Ketosis)

- A nutritionally based condition
- Final 6 weeks of gestation
- Overweight/underweight does, carrying multiples
- Brought on by stress, storms, transport, fasting, excessive heat, and poor nutrition
- Causes hypoglycemia leading to ketosis, and liver failure.

Symptoms:
- Decreased appetite or refusal to eat
- Swollen pasterns
- Ketones in urine
- Reluctant to stand and move
- Depression
- Head pressing
- Coma
- Death

Treatment:
- PREVENTION, PREVENTION, PREVENTION
- Early detection
- Treatment not always successful
- Increase exercise
- Propylene glycol, maple syrup
- Yogurt, calcium drench, CMPK (oral), bicarb
- Dextrose IV with IV fluids – requires vet’s help
- End pregnancy - Induce labor or c-section

Prevention:
- Proper management of weight during early pregnancy; monitor body condition scores (2-3.5)
- Good nutrition that supplies adequate energy especially during the last 6-8 weeks of gestation;
- Exercise
- Avoid stress

Caprine Arthritis Encephalitis Virus (CAE)

- Common in dairy goat
- Several clinical forms
  - Neurological disease common is young kids (2-6 mo)
  - Decreased lactation or no milk at all (young does)
Arthritis (2 yrs & older) – front legs
Respiratory Disease Complex (adults at any age)
Chronic weight loss
• Lifelong infection
• Transmission: oral consumption of infected colostrum or milk – not heat treated
  ▫ Contaminated milking machines
  ▫ Contaminated needles, tattoo pliers
• Diagnosis
  ▫ Serological testing (ELISA)
• Prevention
  ▫ Isolate infected animals (seropositive)
  ▫ Remove kids at birth (do not allow to suckle)
  ▫ Feed newborn kids heat treated colostrum & milk
  ▫ Heat treat colostrum to 132.8°F for 60 min
  ▫ No maternal antibody protection
  ▫ Kids infected at birth can show an active antibody response as early as 4-10 weeks of age. These antibodies are present for life.
  ▫ Test kids fed virus-free colostrum/milk at 12 weeks of age
  ▫ ELISA – test of choice
• Treatment: NONE
• Control:
  ▫ Periodic serological testing
  ▫ CAE free kids
  ▫ Cull, cull, cull
  ▫ No vaccine available

Mastitis
• Inflammation of the mammary gland or udder of the doe
• Gland is painful, hot, and hard. Will not allow lambs/kids to nurse
• Kids from infected does nurse on other does spreading the bacteria to others in the herd.
• Control and Treatment:
  ▫ Primary control = good management practices
  ▫ Good milking hygiene, clean equipment
  ▫ Clean and dry bedding material, when does lie down to rest with a full udder the bacteria in dirty bedding can easily enter the teat
  ▫ Isolate infected animals - helps to control the incidence.
  ▫ Milk these does last.
  ▫ Peppermint oil helps relieve inflammation
  ▫ Antibiotics and pain medication
  ▫ Culture milk sample - proper antibiotic
  ▫ Antibiotics and pain medications must be prescribed by a veterinarian
  ▫ Mastitis can get serious enough to cause irreparable damage to the mammary gland, rendering the gland scarred and unable to produce milk
  ▫ Can cause sepsis and death of doe in acute cases
Abortion Diseases

- What is a Zoonotic disease?
  - A disease agent is transmitted from animals that causes disease in humans

- Zoonotic diseases from small ruminants:
  - Infectious abortion agents
  - Some infectious agents from neonatal diarrhea (scours)
  - Some skin diseases
  - Infectious agents in raw milk

- How do humans get these diseases?
  - Handling of placentas, birth fluids, or fetuses
  - Handling sick animals
  - Drinking raw milk

- Prevention
  - Wear dedicated barn clothes
  - Don’t wear in the house
  - Includes barn hat, coat and boots
  - Wear disposable gloves
  - Wash hands and arms with disinfectant soap after done
  - Avoid aborting animals if pregnant women or very young and very old person
  - Immuno-compromised people
  - Raw milk concerns

- What about children?
  - Keep young children out of the barn if abortions are occurring
  - Keep infants out of the barn!
  - Keep people with compromised immunity out of barn
  - Make sure children helping with chores follow same rules as adults:
    - Clothing
    - Wash hands and arms

- Chlamydophila abortus - Enzootic Abortion

  - Most common cause of abortion in North America
  - Zoonotic potential- placenta, uterine fluids, feces and lungs
  - Affects both goats and sheep
  - Infected at 30-120 day gestation
  - If infected during last month of gestation, will have a normal birth then abort next pregnancy.
  - Recovered females are immune but carriers
  - Control and Prevention
    - Isolate affected ewes/does
    - Vaccinate, Colorado Serum Co. (labeled for sheep)
    - Extra-label for goats- requires veterinary prescription
    - Vaccinate 60 days prior to breeding
    - Booster 30 days later
    - Withdrawal for slaughter = 60 days
    - Booster annually

- Zoonosis
  - Not common but IMPORTANT
Pregnant women assisting with birth
Mucus membrane contact
Severe illness

**Coxiella burnetti - Q-Fever**

- Zoonotic abortion disease
- **Coxiella burnetti**
- Ticks are the primary reservoir
- Organism can survive in the environment for extended periods (dust in barn)
  - Shed in placenta, uterine fluids, raw milk, colostrum, urine, feces, and semen
  - Goats shed for up to 4 months in vaginal secretions, 1 month in feces, and 52 days in milk
- Abortion or stillbirth in the last trimester, but second trimester abortion can occur, may occur in successive pregnancies
- Abortion storm up to 80%
- Causes inflammation of placenta (placentitis), failure to dilate cervix, ruptured uterus, stillbirths, weak kids.
- Infected animals may seroconvert, recover, clear infection or be persistently infected
- Zoonosis:
  - Highly infective
  - 1 organism inhaled can infect a human
  - Outbreaks associated with assisting with dystocia, handling placentas and aborted fetuses, dusty conditions + small ruminants
  - Group “B” Bioterrorist organism
  - Incubation 2-3 weeks
  - Some infected people seroconvert and become asymptomatic
  - Acute flu-like illness- mild to severe, 1-2 weeks duration
  - More severe = hepatitis and atypical pneumonia

**Toxoplasmosis**

- Cats become infected by eating infected rodents, birds, and aborted material
- Cats shed oocysts in feces
  - Oocysts survive a long time in the environment
  - Fecal contamination of feed, hay, and pastures
- Non-pregnant does develop an immune response
  - If pregnant – organism infects placenta and fetus
- Goats more susceptible than sheep
- Placenta is infected 14 days after ingestion
  - Infection: <40 d gestation = fetal death/ reabsorption
  - 40-120 d gestation = fetal mummification and abortion
  - 120 d gestation = premature, stillborn or weak
  - Abortion late pregnancy = 15-20%
  - Fetuses within same litter affected differently
- Infected does likely to be resistant to reexposure and abortion in following pregnancies
- Found in goat semen but venereal transmission unlikely
- Seropositive ewes gain immunity but organisms persist in cysts in brain and muscle
- May still transmit organism to placenta at lower rate
- Zoonosis
Pregnant women
- New infection
- Premature birth or underweight
- Damage to brain and eyes
- Milder damage not apparent until older
- Infection postnatal
- Healthy humans- mild illness with fever and enlarged lymph nodes
- Infection lifelong

• How do Humans get Toxo?
  - Consumption of live spores from poorly cooked meat
  - Infected kid meat, mutton
  - Consumption of sporulated oocysts from food or handling objects contaminated with cat feces
  - Fresh vegetables
  - Unwashed hands after cleaning litter box
  - Consumption of unpasteurized goat’s milk and unripened cheeses
  - Contamination in barn
  - Cat / kitten feces

**Campylobacter - Vibrio**

- *Campylobacter fetus* and *Campylobacter jejuni*
- More common in sheep
- Ingestion of organisms
  - Can have carrier state 20-70%
- Abort late gestation, last 6-8 weeks
- Lambs/kids born weak or dead
- Ewes/does are sick and can die,
  - IF they recover will be immune next year but become carriers
- Diagnosis: Placenta & fetus (stomach fluid & liver)
  - Fetus is edematous (“Water belly babies”)

**Listeriosis**

- Causes abortion, septicemia and encephalitis in goats
- Abortion form and encephalitic form do not usually occur at the same time.
- Commonly associated with poorly prepared silage
- Environmental contaminant
- Fecal shedding peaks in winter
- Found in soil, water, poorly prepared silage (pH >5.0) and digestive tracts of ruminants and humans
- Organism can survive in soil and feces for long time
- Incubation 10-21 days
- Intermittent shedding through milk of healthy does
- Organism is shed in milk – human risk
- Control:
  - Remove source of infection
  - Long acting Oxytetracycline in face of outbreak (Extra-label use in small ruminants)
  - Do not feed hay on ground
  - Silage needs to be good quality and low acidity
- Zoonosis:
- Shed in milk
- Unpasteurized mild and unripened cheeses are most important source of organism
- Grows in refrigerated foods
- Septicemia in elderly, young, and immunocompromised
- Severe illness
- Encephalitis
- Abortion in women
- Death
- Mild disease causes diarrhea
- Can cause severe disease in healthy humans too!

**Salmonella**

- Two species associated with abortion
  - *Salmonella enterica enterica* (7 serovars)
  - Most important cause of systemic disease and abortion in small ruminants
  - *S. enterica arizonae* – small ruminant abortion
- Transmission by oral ingestion of contaminated feed, aborted fluids by goats in herd, cattle, dogs, rodents, birds and wildlife
- Abortions peak at 100-120 days gestation
- Causes abortion, metritis, septicemia and subsequent death of doe / ewe
- Aborting does may not show signs of illness
- Diagnosis:
  - Bacterial culture of aborted placenta, fetus, or uterine discharge
  - PCR of fecal or vaginal swabs – rapid test
- Treatment:
  - Antibiotic therapy based on antibiotic sensitivity
  - Prevention and control
  - Limiting contamination by vectors
  - Clean environment
- Zoonosis:
  - Handling aborted placenta, fetus, fluids
  - Shed in milk
  - Killed by pasteurization

**Leptosporosis**

- Several strains
- Sheep considered relatively resistant, can become maintenance host
- Goats more susceptible
- Degree of losses is unknown
- Infection occurs as result of exposure to an environment contaminated by urine of other species
- Recovered goats can continue to shed organism in urine
- Organism shed in milk Not a common cause of abortion in small ruminants in United States
- Diagnosis: paired serum samples from aborting dams
- More concern in cattle
- Zoonosis:
  - Skin contact with infected aborted placenta and fetus, urine (dogs)
  - Can cause severe illness resulting in renal and liver failure in humans
Brucellosis

- Not common in US
- *Brucella melentensis* – goats (Middle East, So. America)
- *Brucella ovis* – sheep (western North America)
- Transmitted in milk, urine, feces, semen, vaginal discharge, and placental membranes
- Malta fever in humans

Extra-label Drug Use

- Only FDA labeled approved drugs can be used legally without restrictions as indicated on label, otherwise it is considered “extra-label” use and subject to specific regulations as outlined by the FDA
- Must have a valid Veterinary Client Patient Relationship (VCPR)
- Goats are a minor livestock species (AMDUCA)
- Very few drugs approved for use in goats

References

- Goat Medicine, Dr. Mary Smith & Dr. David Sherman
- Sheep and Goat Medicine, Dr. David Pugh
- www.extension.org/goat
- www.sheepandgoat.com