



Caseous Lymphadenitis (CL)

- "Cheesy gland"
- *Corynebacterium pseudotuberculosis*
- Sheep, goats, horses (different biotype)
- Through skin or mucous membranes
- 2-6 months before clinical signs



Photos courtesy of Dr. Mary Smith

CL: Clinical Signs

- **External form:** Abscesses in superficial lymph nodes (LN)
- **Internal form:** Internal LN, lungs and organs.
- Chronic weight loss
- Coughing, nasal d/c

Photos courtesy of Dr. Mary Smith

CL: Spread

- Ruptured abscesses contaminate environment
- Persists in the soil for several months
- Contamination of feeders, equipment, milking stands, etc.
- Curious herd mates

Photos courtesy of Dr. Mary Smith

CL: Diagnosis

- **Herd with history** of CL: presence of firm, swelling in location of lymph node = CL
- **Bacterial culture** of lesion
- **Serology (antibody) testing**
 - for internal form?
 - few weeks to produce antibody response
 - colostral antibodies if <6 m old
- **Necropsy** +/- culture of abscess



CL: Treatment

- **Drain or surgically remove** (don't allow to rupture in pen)
- Pus must be collected, burned
- **Isolated the animal until completely healed** (~ a month)
- **Injection of abscess with antibiotics** may decrease spread to other LN
- May still have internal abscess
- **Zoonotic**-can spread to humans



CL: Control

- **Prevent entry:** Examine and test new additions
- **Vaccination**
- **Cull, or split herd**
- **Remove environmental hazards:** barbed-wire, nails, jagged edges
- **Disinfect** instruments
- **Control ectoparasites:** lice
- **Monitor** for reoccurrence



Caprine Arthritis Encephalitis (CAE)

- Caused by a lentivirus (like OPP virus in sheep)
- Infection is lifelong
- Mostly shed in colostrum and milk
- Direct/close contact transmission
- Blood contaminated equipment



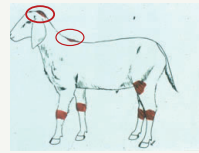
Photos courtesy of Dr. Mary Smith

CAE: 4 Main clinical forms

Subclinical

1. Arthritis in mature goats
2. Progressive neurologic disease (mostly in 2–6 month-old kids)
3. Respiratory (interstitial pneumonia)
4. Interstitial mastitis

CAE: Arthritic



Photos courtesy of Dr. Mary Smith

CAE: Neurologic

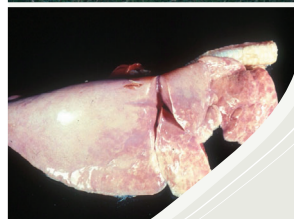


Photos courtesy of Dr. Mary Smith

CAE: Respiratory



Photos courtesy of Dr. Mary Smith

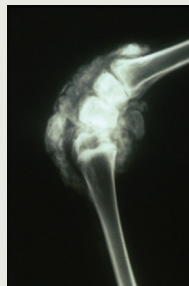


CAE: Mastitis



Photos courtesy of Dr. Mary Smith

CAE: Diagnosis



Antibody test: (lentivirus cELISA)

- avoid periparturient period (possible false negatives)
- colostral antibodies (possible false positive)
- can take months to produce antibodies (possible false negatives)
- careful interpretation

PCR?

Radiographs of joints

Necropsy findings with histology

Combination of herd history, clinical signs and tests



CAE: Treatment

- No known treatments for any forms
- Supportive care, pain relief

CAE: Control

Strategies:

- **Attempt to raise CAE-free kids**
 - remove from dams immediately
 - raised separately from infected herd
 - feed heat-treated colostrum (1 hour 133° F), or pasteurized milk or milk replacer



Photos courtesy of Dr. Mary Smith

CAE: Control

- **Periodic serologic testing** (est. prevalence)
 - all goats >6 months old
 - twice yearly
- **Culling or separation**
 - cull positives or two herd approach milk negative goats first
 - test new additions, and quarantine, then re-test (6 months?)
 - use individual needles, etc.
 - include sheep on premises in testing/control program



Photos courtesy of Dr. Mary Smith

Ovine Progressive Pneumonia (OPP)

- Lentivirus (similar to CAE)
- Lifelong infection
- Less likely to spread through colostrum and milk
- Direct/Close contact transmission
- Latent for months or years, most sheep never show symptoms



OPP: 4 Main clinical forms

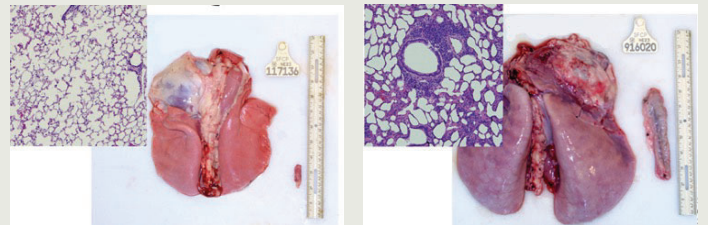
Subclinical-most common

1. Respiratory (sheep lag behind flock, breath harder) *

2. Interstitial mastitis "hard bag" -rare

3. Arthritis- rare

4. Neurologic- rare



OPP Diagnosis: *Similar to CAE*

Serology: Lentivirus cElisa

PCR?

Necropsy findings with histology

Combination of herd history, clinical signs and diagnostic tests

OPP Treatment/Control

Treatment: supportive care

Control :

- Ideally remove lambs at birth and rear isolated from flock.
- If infection is suspected, screen all animals >1 year.
- Isolate lambs from adults after weaning and test them 4months later, then 1-2/year. (Minnesota Project)

Unlike CAE, not readily spread through milk and colostrum



Diagnosing Infectious Causes of Abortions



What to do if your sheep/goat aborts:

Personal Protective Equipment	Wear gloves and rubber boots
Save fetus & placenta	Collect fetuses and placentas: refrigerate
Isolate	Put the doe/ewe in isolation if possible
Temperature	Take the doe's temperature
Call	Call your veterinarian

WEAR GLOVES!!



Abortion of Sheep and Goats

- Sheep and goats have a high incidence of abortion compared with other farm animals
- 5% is common
- <5% good
- <2% excellent
- “Abortion storm” >20%



Involving your veterinarian

Veterinarian may ask questions about your herd:

- Open or closed herd?
- Recent travel to shows?
- Other species on premises?
- Vaccines given?
- Stage of gestation at time of abortion?
- Number / % of abortions
- Health status of dams
- Diet-any changes



Sample collections for diagnostic testing

- Examine the doe that aborted, fetus, and placenta
- Collect blood from doe/ewe- antibody testing
- Collect fluid and tissue samples from fetus
- Collect placenta



Viral/Protozoal Causes of Abortion

Viral:

- Cache Valley Fever virus- Bunyavirus ***Z**
- Border Disease- Pestivirus

Protozoa:

- *Toxoplasma gondii* * **Z**
- (* = most common causes; **Z** = zoonotic)

Bacterial Causes of Abortion

*Chlamydomphila abortus** (Enzootic abortion of Ewes) *Z

Campylobacter fetus (*Vibrio*) and *C. jejuni* *Z

Coxiella burnetii (Q fever)* Z

Listeria monocytogenes Z

Other bacteria (*E coli*, *Salmonella*, *Brucella*, *Leptospira*) Z

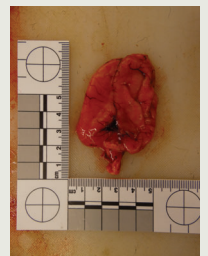
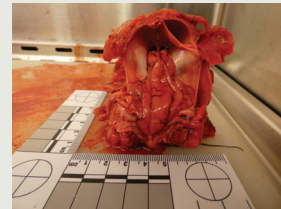
(* = most common causes; Z = zoonotic)

Cache Valley Fever Virus

- Spread by mosquitoes and no-see-ums
- Bite naïve pregnant doe/ewe in the fall
- Deformed fetus born January – March
- Uptick in CFV abortions in the northeast
- Virus can invade the placenta, then fetal brain, spinal cord, and skeletal muscles

Days Gestation Infected	Fetal signs
28-32d	Embryonic death and mummification
32-37d	Deformities in brain, spinal cord and muscle (arthrogryposis)

Cache Valley Fever Virus



Cache Valley Fever Diagnosis

- **Antibody titer on fetal fluid**
 - Heart blood*
 - Fluid in thorax*
 - Fluid in abdomen*
- **Antibody titer from doe**
 - Negative: rules it out*
 - Positive: could be exposure*
- Virus is cleared before abortion



The good news

- Immune for years to life
- Ideal to breed outside mosquito season
- Climate change



Pestivirus: Border Disease

- Infected animal sheds virus directly
- Reproductive issues in sheep
- Fertility
- Abortions/ stillborn/premature lambs
- Hairy Shakers (persistently infected lambs)

Exposed <60-85 days gestation

Hair - like fleece

Rhythmic tremors

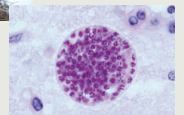


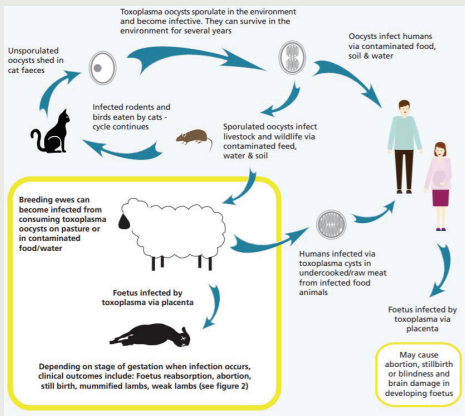
Nettleton, P.F. and Willoughby K. *Diseases of Sheep, Fourth Edition*. Chapter 18 Border Disease. Editor(s): I.D. Aitken (Edinburgh), MRCVS, First published: 15 March 2007 Copyright © 2007 by Blackwell Publishing. Pp 119-126

Protozoa: *Toxoplasma gondii*

"Cats are EVERYWHERE"

- Cat is the definitive host
- Ingests infected intermediate host
- Shed millions of oocysts in feces for 7-12 days
- Goats > Sheep
- Pregnant does/ewes ingest oocysts in pasture, feed, water
- EED/Mummies, Mid-Late Abortion

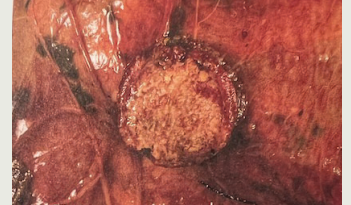




30% adults in US have antibodies

Toxoplasma Diagnosis

- HISTOPATH of placenta (calcified cotyledons) and fetal brain
- Antibody titer from fetus and doe



Sheep, Goat and Cervid Medicine, 3rd edition, page 194

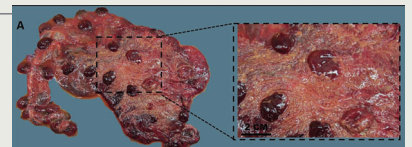


The good news

- After the abortion, she will have protective antibodies
- Don't kill the barn cat! Only shed when first infected.
- Keep cat population stable

Chlamydophila abortus (Enzootic abortion of ewes)

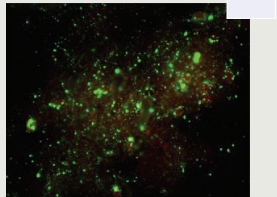
- Gram negative, intracellular bacteria
- Lives in GI tract
- Shed in feces
- Travels blood stream to placenta
- Fetus dies, is aborted last 2 months gestation
- Placenta looks thickened and necrotic
- Transmission to other animals can occur by licking or sniffing vaginal discharge



Can also cause arthritis and pinkeye
Zoonotic- pregnant women can abort!

Chlamydia abortus diagnosis

- PCR or FA testing on placenta
- Histopath of placenta and fetus



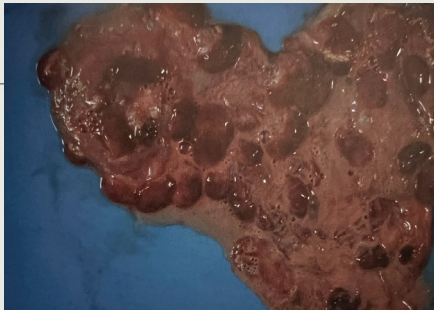
The good news

- Vaccine available
- Antibiotic to control an abortion storm:
Tetracycline (injection/feed)
- Only yearlings abort



Coxiella burnetii: "Q fever"

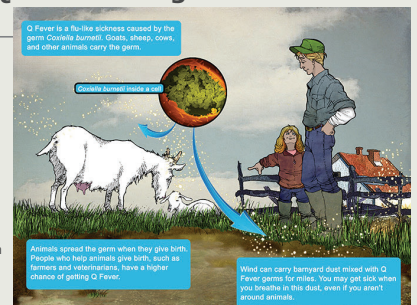
- Bacteria
- All animals (domestic and wildlife) can shed it
- Can float 2 miles
- **Select Agent with CDC**
- **Reportable disease with USDA**
- Shed mainly during kidding/lambing



Courtesy of Sheep, Goat and Cervid Medicine

Coxiella burnetii "Q fever" Diagnosis

- 3rd trimester abortions
- Stillborn or premature
- Affects Placenta- **WE NEED PLACENTA!**
- Histopath and PCR of placenta
- Need BOTH for causation
- May be there and not cause abortion



Coxiella burnetii "Q fever" Zoonosis

Transmission:

- Contact during animal birthing
- Ingestion of unpasteurized dairy
- Inhalation 1-10 organisms

Symptoms:

- May be asymptomatic
- Flu like symptoms, pneumonia
- Endocarditis, hepatitis, severe disease in immune-compromised individuals

Stays in environment



The good news

- Can be there and not cause abortion
- Animals can have titer and not abort
- It is possible to already be immune



Campylobacter fetus (Vibrio) and *C. jejuni*

- 1 bacteria, 2 different strains.
- Late gestation abortion, still births, weak offspring
- More common in sheep
- Shed in feces of sheep, dogs, birds
- Spreads when animals ingest feces or infected placenta/fetus (guard dog)
- Zoonotic- diarrhea in people
- Affects placenta and fetal liver - test these 2 tissues



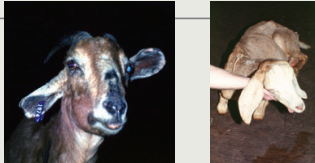
The good news

- Vaccine available
- Antibiotic options to control an abortion storm:
 - Tetracycline (withhold time)*
 - Sulfamethazine and Tylosin*
- Once in the herd, only the yearlings abort



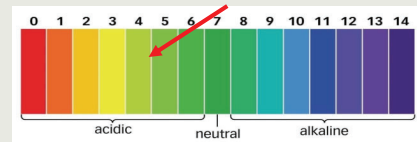
Listeria monocytogenes

- Gram positive bacteria
- Found in soil, feces, silage (pH>5.5)
- Likes "refrigeration temperatures"
- Causes neurologic disease (circling disease), septicemia and abortion in goats
- Don't see both at the same time



Listeria monocytogenes

- Diagnose by culture or PCR from placenta and fetal lung
- If feeding silage, check pH
- Try to clean up environment to decrease consumption of listeria



Other Causes of Abortion:

- Brucella
- Leptospira
- Neospora
- Herpes
- Nutritional deficiencies
- Toxins



Thank you!

