Strategies for Infectious Disease Control: CL, CAE & Mycoplasma



Joan Dean Rowe, DVM, MPVM, PhD, DACVPM
School of Veterinary Medicine
University of California, Davis, USA

UC DAVIS VETERINARY MEDICINE

Goat Health Management Program

- Herd Disease Surveillance
- Routine Preventive Medicine
- Nutritional Management
- Reproductive Management
- Culling Practices



How to prioritize:





- **Which diseases to exclude?**
- **Which diseases to control?**
- **Which diseases to eradicate?**
- **Which diseases to tolerate?**

Preweaning Exposures Resulting in Lifelong Infection of Stock Moving to Other Herds



- Caseous Lymphadenitis
  - Market wethers
  - Seedstock
- CAE, Mycoplasma
- Johnes
- Scrapie

Prioritizing disease:

- **Which diseases cause death losses in adults/ in kids? (Kill rapidly)**
- **Which diseases kill slowly or cause early culling?**
- **Which diseases inefficiencies in production, growth, etc.?**
- **Which diseases are transmissible to humans?**
- **Which diseases are exotic to my specie/region?**

Quiz- What diseases are the most important in a herd?

- **Diseases which can kill quickly?**





Mycoplasma (kids & adults), Mastitis (Staph aureus, Pseudomonas) GI (clostridia, neonatal diarrheas, parasites), FAD's (FMD, etc)

- **Diseases which can kill quickly**




Quiz- What diseases are the most important in a herd?

- **Which diseases kill slowly or cause early culling (shorten life in herd)?**





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CLA **CAEV** **Johnes**





Quiz- What diseases are the most important in a herd?

- **Diseases which can decrease efficiency (production, growth, etc.)?**




Coccidia, subclinical mastitis, pneumonias, parasites, etc.

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Quiz- What diseases are the most important in a herd?

- Diseases transmissible to man?



Infectious Disease Control Multiple Disease Complex



- **Mycoplasma**
- **CAEV**
- **CLA**
- **Johnes**
- **(Scrapie)**
- **Abortion agents**

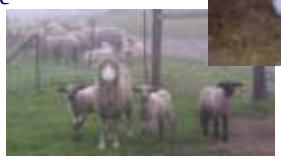
Strategies - Disease Control

- Does an ID & record system exist to allow monitoring of disease?
- What is the current herd status?
  - Is this disease being monitored?
  - What other diseases should be considered?
- Do the goats comingle with other species?
- Is the herd "closed" and to what degree?

Sheep & Goat Commingling – Consider risks for all diseases for goats and sheep – integrated health management strategies

- CLA
- Johnes
- Lentiviruses
- Scrapie





Considerations for disease control (cont.)

- What are the owner's goals for source of herd replacements?
- What are the owner's goals for the herd?
- What will the budget allow?
- What will the human resources allow?
  - Prioritize disease strategies
  - Owner's and veterinarian's views my differ!

Replacement Female Strategies



Infectious Disease Control Multiple Disease Complex*



- **Mycoplasma**
- **CAEV**
- **CLA**
- **Johnes**
- **Scrapie**
- **Abortion agents**

Incorporate plan for as many agents as possible in any disease control program

(Pathogen Prevention Program)

****Note the important role of mineral deficiencies (Cu, Se) in increasing the severity of clinical disease**

Flock/Herd Biosecurity



- Disease surveillance plan
- Necropsy surveillance
- Herd introduction protocol
- Animal movement protocol
  - (Fairs, breeding animals)
- Human biosecurity management

Adult-Onset Diseases Transmissible by Milk/Colostrum



- **CAEV**
- **Mycoplasmosis**
- **Johnes**

How to manage these in grazing vs hand-reared systems?

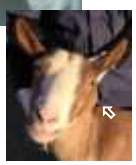




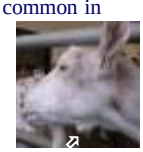
Caseous Lymphadenitis (CL)

Corynebacterium pseudotuberculosis



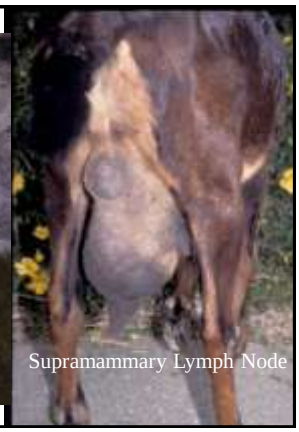


- **Abscessation** of peripheral lymph nodes ("caseous lymphadenitis")
- Internal abscesses (more common in sheep)



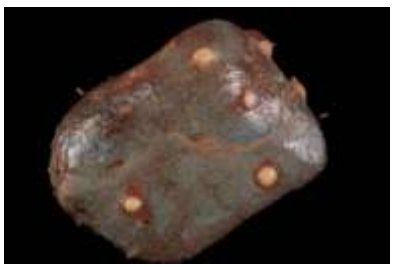


Prefemoral Lymph Node



Supramammary Lymph Node

Internal Abscesses



Internal abscesses can complicate other diseases (e.g. pregnancy toxemia, pneumonia) making them more likely to die when sick from another disease

Diagnosis

- Clinical signs
- Necropsy
- Culture
- Serologic testing (titer with exposure or vaccination)



Serology - CLA

- Synergistic Hemolysin Inhibition Test (SHI test)
- Exposed or infected?
  - <1:8 indeterminant
  - 1:8 to 1:256 infection or vaccine exposure
  - >1:512 suggestive of internal abscesses

Transmission



- Direct inoculation of skin
  Intact/disrupted skin
- Ingestion of organism
- Inhalation?

Look for common points of infection

CLA Prevention/Control

- **Segregation of goats with ripe or lanced abscesses**
- **Thorough lancing/flushing of abscess away from herd**
- **Disinfection of area**
- **Detection of environmental sources of organism (feeders, fences, etc.)**
- **Vaccination strategies**

CLA Prevention & Control

- **Maintain rigid hygiene and segregation practices**
- ***C. pseudotuberculosis* vaccines may reduce the number of clinical cases and severity of disease in endemic herds**

Goal of Vaccination

- **Reduce number of clinical cases**
- **Reduce number of abscesses per clinical case**
- **Result: Reduce number of organisms in herd environment**

i.e. ↑ immune status of herd

↓ herd exposure level



Segregation by Age & Prior Abscess Status



- ***Preweaning***
- ***Postweaning***
- ***Unexposed adult***
- ***Exposed adult***
- ***Known infected***

- ***No exceptions***

Premises Clean-up

- **Power washing/pen scraping**
- **Removal of organic material**
- **Replace wooden feeders or other fence/feeder fomites**
- **Disinfection**

- **Look for common sites of inoculation**
- **Attention to Fomites**





Fomites

- ***Pens & Feeders***
- ***Stanchions***
- ***Chutes/ handling facilities***
- ***Clothing & Boots***
- ***MilkingEquipment***
- ***Clippers/Shears***

Premises cleanup - Challenges





Pasteurized Rearing as a Critical Control Point for Caprine Arthritis-Encephalitis Virus and Mycoplasma Prevention in Dairy Goat Kids



"Pasteurized Rearing" Elements

- ***Removal from Dam at Birth***
- ***Heat treated or 'Safe' Cow Colostrum***
- ***Pasteurized Milk until Weaning***
- ***Segregation by Age***

Dam-reared systems –
May use pasteurized rearing strategically to break infection cycles/ conserve genetics





Parturient Doe & Kidding Management

Strategy for observing kiddings

Video, Infant room monitors, vaginal exams





Meat, Dairy & Companion Breeds – Kidding density related to *M. paratuberculosis* exposure





Maintain heat-treated colostrum bank (Avoid introducing disease with risky colostrum)

Heat Treatment of Colostrum

- ***Minimum 131 F (135 F) for 60 min.***
  - ***56 C***
- ***Methods***
  - Thermous bottle
  - Stove top
  - Dual Pasteurizer
  - Water bath (Weck)



Pasteurization - Milk

- **74 C (165 F) for 15 sec (for *C. Burnetti*)**
- **Take start & stop temperatures**
- **Use multiple thermometers**
- **Prevention of zoonotic disease**





Caprine Arthritis-Encephalitis Virus Infection (CAEV - lentivirus)



- Polyarthritis
- Leukoencephalomylitis
- Hard Udder/ agalactiae
- Interstitial pneumonia
- Lifelong infection



Clinical Signs





Which Goat Has CAEV Infection?

They both carry CAEV

Only ~35% of infected goats show clinical signs





CAEV Diagnosis - Serology



cELISA
AGID
Assume seropositive = infected



PCR for proviral DNA – recommended as supplementary test for problem solving (expensive)

Major Route of CAEV Transmission

- **Milk or colostrum from infected does**
  - **From infected dam or colostrum donor**
  - **From the "pooling" of milk or colostrum from multiple does**
  - **Only 1 cc of infected milk is needed to infect a kid for life**





Minor Routes of CAEV Transmisson (less efficient)

- *In-utero*
- Venereal
- Genital secretions
- Biosecretions
  - *Respiratory*
  - *Saliva*



CAEV CONTROL (U.S.)

1. Prevent perinatal transmission
2. Prevent milk-borne transmission
3. Rigorous serologic surveillance
4. Segregation or removal of positives
5. Milk seronegative does first
6. Avoid iatrogenic transmission
7. Avoid risk of venereal transmission

Even pasteurized kid raising without testing will greatly reduce the economic impact of CAEV





Strategies for Herd Prevention & Control of CAEV

- **Eradication/Prevent Introduction**
- **Testing & Removal (Control)**
- **Testing & Segregation**
- **Pasteurized Rearing Methods Alone**



Infectious disease control strategies in the absence of pasteurized rearing:

Maintain "negative" herd
Testing and segregation
Selective artificial rearing





Testing Strategies

- **Identifying Risk Periods**
- **Prebreeding/Prekidding**
- **Identifying High Risk Groups**
- **Identifying High Risk Animals**

Host Factors Affecting Serologic Test

- **Time to seroconversion**
- **Delayed seroconversion**
- **Host titer**
- **Colostral antibody titer (heat treated)**

CAPRINE MYCOPLASMOSIS

- Kids
  - Polyarthritis
  - Encephalitis
  - Septacemia, death
  - Fibrinous pleuropneumonia



CAPRINE MYCOPLASMOSIS



Adults
- Polyarthritis
- Mastitis
- Septacemia, death
- Fibrinous pleuropneumonia



CAPRINE MYCOPLASMOSIS

- Oral milk-borne transmission
- Intramammary milk borne transmission
- Ear mite (*Psoroptes cuniculi, Raillietia capri*) as potential reservoir



CAPRINE MYCOPLASMAS

- *Mycoplasma mycoides* subsp. *capri* (*mycoides* large colony type)
- *Mycoplasma putrifaciens*
- *Mycoplasma californicum*
- *Mycoplasma agalactiae*



Localized (self limiting)

Keratoconjunctivitis

(Pinkeye)

Mycoplasma conjunctiviae



Mycoplasmosis - Diagnosis

- **Culture milk, synovial fluid, tissue**
  - **Requires selective medium, microaerophilic**

Treated animals remain lifelong carriers/ shedders
Test & cull



Mycoplasma Diagnosis &Control



- **Cultures require special media**
- **Bulk tank cultures**
- **String/pen grouping**
- **Culture fresh goats**
- **Culture clinical cases**

Preventing Mycoplasma Transmission in the Parlor



- **Milking hygiene**
- **Post-milking teat dipping**
- **Milking machine function**
- **Milker's hands (gloves)**
- **Disinfect milking units**



Exposure on and off the farm



Milk hygiene at shows
- Milking practices
- Judge's hands
- Leaking milk



Milking Hygiene on the farm

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Multiple Disease Complex*



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(Pathogen Prevention Program)

American Association of Small Ruminant Practitioners

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