



Top 15 Small Ruminant Dz, part 1: Orf, Clostridial Dz, GI parasites, CL, Pneumonia

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Have you *herd*? This top 5 of small ruminant diseases will prepare you for the boards.

Feeling *sheepish* about small ruminants? We can help!

1. Contagious ecthyma ("orf")

o Classic case:

- Usually young or newly introduced animals
- Lesions:
 - Painful papules
 - Vesicles/pustules
 - Crusts at mucocutaneous junction of lips
- Additional locations:
 - Around erupting incisor teeth +/- buccal mucosa, causing anorexia
 - Coronary bands, causing lameness
 - +/- Perineum, eyes, ears
- Also may see:
 - Weight loss due to poor appetite
 - Gangrenous mastitis in ewes

o Dx:

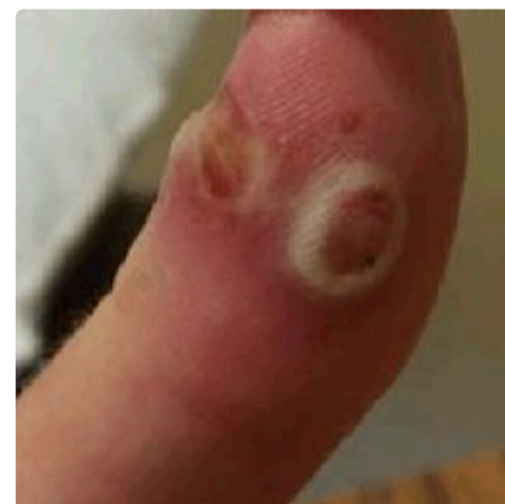
- Etiology: parapox virus (related to pseudocowpox and bovine papillary stomatitis virus)
- History and exam usually sufficient
- PCR or electron microscopy

o Tx:

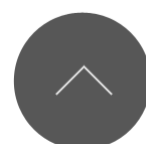
- Typical course is 1-4 wks
- Usually heals without scars
- Isolate or cull affected animals and vaccinate the rest
- Antibiotics - topical or parenteral for secondary infections



Classic orf



Contagious ecthyma on a human thumb



- +/- Larvicides/repellants to prevent larval screw worm myiasis
- High resistance to reinfection after recovery
- **Pearls:**
 - Zoonotic! Very contagious by direct contact with affected animals OR live vaccine - wear gloves
 - Vaccination is effective during outbreak, but don't vaccinate on orf-free farms because vaccine can cause disease
 - More severe in goats than sheep, but less common in goats

2. Clostridial diseases ([enterotoxemias](#), [tetanus](#))

○ Classic case:

- Enterotoxemia type C (a.k.a. "bloody scours")
 - Bloody diarrhea in kids and lambs
 - Anorexia, lethargy, GI pain
 - Seizures, opisthotonus, ataxia
 - Peracute death without premonitory signs
- Enterotoxemia type D (a.k.a. "pulpy kidney" & "overeating disease")
 - Largest, fastest-growing lambs (less commonly kids)
 - Anorexia, lethargy, GI pain
 - Seizures, opisthotonus, ataxia
 - Peracute death without premonitory signs
- Tetanus
 - History of wound 10-14 d prior
 - Stiffness - often starting in masseter muscles ("lockjaw")
 - Generalized stiffness ("sawhorse stance")
 - Tachypnea, tachycardia, sweating
 - Hyper-reflexive
 - Normal consciousness
 - Respiratory paralysis leads to death
- **Dx:**
 - Etiologies:
 - Enterotoxemia: *Clostridium perfringens*
 - Type C: Beta toxin causes severe intestinal damage
 - Type D: Epsilon toxin
 - Tetanus: *C. tetani* neurotoxin
 - Enterotoxemias:
 - Smears of GI contents: large numbers of gram+, rod-shaped bacteria
 - Necropsy: hemorrhagic, ulcerative enteritis
 - Type D (pulpy kidney): rapid post-mortem renal autolysis
 - Toxin identification: ELISA or PCR on intestinal fluid
 - Chloroform (1 drop/ml) helps stabilize toxin in sample
 - Tetanus
 - Gram+ bacteria seen in smear from wound
 - Toxin analysis rarely done
- **Tx:** Vaccinate annually with "CD&T" ~ 1 mo before parturition after initial 2-dose series when young
 - Enterotoxemia type C
 - Rx rarely successful
 - Hyperimmune sera and oral antibodies: probably more helpful for at-risk herd-mates
 - Prevent: good udder hygiene, vaccinate
 - Enterotoxemia type D
 - Prevent: minimize rapid feed changes, vaccinate
 - Tetanus: rarely done, try supportive care



Tetanus in a young ewe

- *C. perfringens* normally present in small numbers in GI tract
- Enterotoxemia type C due to drinking too much milk/indigestion
- Enterotoxemia type D also due to overeating
 - More common in sheep than goats
 - Most common in lambs
- Tetanus:
 - Sporulates in anaerobic, necrotic tissue and produces neurotoxin
 - Neurotoxin causes spasmodic, tonic muscle contractions

3. Gastrointestinal parasitism

○ Classic case:

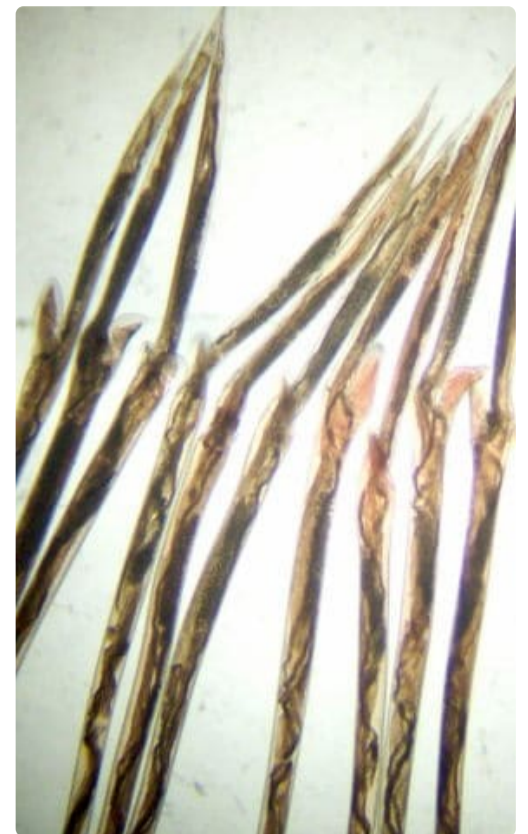
- Weight loss, diarrhea
- Anemia with pale mucous membranes
- "Bottle jaw" (submandibular edema)
- Generalized weakness
- Poor coat or decreased milk production
- "Wool break"
- +/- Death

○ Dx:

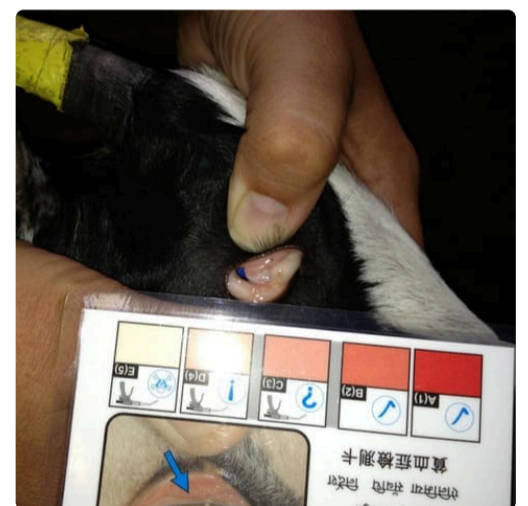
- Etiologies
 - *Eimeria* spp.: Host-specific coccidian
 - *Teladorsagia* (formerly *Ostertagia*) *circumcincta*
 - *Trichostrongylus* spp.
 - *Haemonchus contortus*: "barber pole worm"
- Fecal egg count (FEC): eggs per gram of feces
 - NOT very sensitive!
 - Perform pre- and post-treatment
 - Dx of coccidiosis: need >20,000 oocysts/g feces
- Necropsy: ID parasites and count worms
- *Teladorsagia* spp.: Increased plasma pepsinogen levels
- PCV and/or FAMACHA score:
 - Sensitive indicator of anemia (from *H. contortus*)
 - Compare inferior palpebral conjunctiva with FAMACHA card to score anemia on scale of 1-5 (normal to very anemic)

○ Tx:

- Only treat affected animals to help **slow anthelmintic resistance!!**
 - Use "targeted selected treatment"
 - Use FEC or FAMACHA score to determine need
 - Strategically time Rx based on knowledge about season and parasite life cycle
- Anthelmintics:
 - Routes of administration: drench, bolus, injection, pour-on or topical, and in feed/water
 - e.g.: benzimidazoles, probenzimidazoles, imidazothiazoles, macrocyclic lactones
- *Eimeria* spp./coccidiosis:
 - Rx of affected sheep is ineffective once coccidiosis is diagnosed
 - Reduce severity with toltrazuril, diclazuril, or sulfaquinoxaline; pasture rotation
 - Prevent: minimize stress (shipping, ration changes, crowding, severe weather, lambing pens, intensive grazing areas, feedlots)
 - Prophylactic coccidiostats for 28 d after lambs introduced to new environment
 - e.g.: monensin, lasalocid
- Sheep:
 - See a "periparturient rise" in egg count due to decreased immunity



H. contortus, the "barber pole" worm



Using FAMACHA on palpebral conjunctiva

- Prevention:
 - Rotational grazing (alternate pastures with cows, horses)
 - Don't overgraze or overcrowd pastures
 - Maintain a good plane of nutrition
- Pearls: All inhabit small intestine/abomasum
 - Fecal-oral transmission:
 - Eggs shed in feces
 - Mature into 3rd stage larvae
 - Ingested by host
 - Tissue migration
 - Mature in GI tract to pass eggs into feces
 - *T. circumcincta* and *Trichostrongylus* spp.:
 - More common in cooler winter/rainfall climates
 - Enteritis/decreased nutrient absorption
 - *H. contortus*:
 - Most common in tropical or subtropical climates
 - Does not cause diarrhea alone; causes anemia

4. Caseous lymphadenitis

- Classic case:
 - Peripheral lymph node abscesses
 - Esp. submandibular, parotid, prescapular, prefemoral
 - Once draining: odorless, creamy (goats) to caseous (sheep) purulent discharge
 - Heal with a scar
 - Recurrence common
 - Internal infection: weight loss, "poor doer" a.k.a. "thin ewe syndrome"
 - Specific clinical signs based on the organ system affected
- Dx:
 - Etiology: *Corynebacterium pseudotuberculosis*, a gram+, facultative, intracellular bacterium
 - Culture abscess material
 - Internal lesions: ultrasonography, radiography, aspirate
 - Serology: synergistic hemolysin inhibition titer
 - Interpretation tricky because often positive due to ubiquitous nature of disease
 - Can repeat titer to see if rising in 2-4 wks
- Tx:
 - Culling is most practical for commercial operations
 - If valuable animal:
 - ISOLATE!
 - Lance, drain, lavage with iodine solution
 - Surgical excision
 - Formalin injection of lesions
 - NOT okay in animals intended for food
 - Forbidden by FDA
 - Antibiotics in extra-label manner: systemic or intralesional
 - Penicillin & rifampin, tulathromycin
 - Likely to recur even if treated
- Pearls:
 - Zoonotic! Highly contagious!
 - *C. pseudotuberculosis* enters through breaks in skin or mucous membranes
 - Worldwide, causes significant economic impact

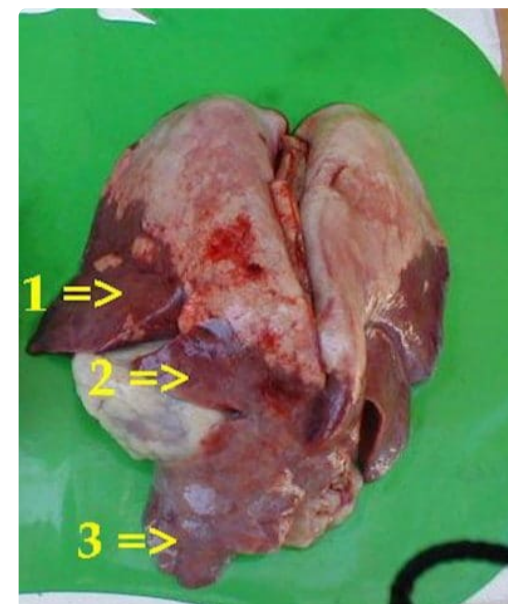


Caseous lymphadenitis - 3 stages of lesions (from L to bottom R: purulent exudate, necrotic, unopened)

- Susceptible to bleach and chlorhexidine
 - Very resilient: can reside in organic debris for long periods
- Prevention:
 - Strict biosecurity
 - Don't contaminate environment: collect purulent abscess material & lavage fluid
 - Careful use of fomites (clippers & dipping tank solutions)
 - Vaccinate if endemic: reduces incidence, does NOT prevent
 - Fly control

5. Pneumonia

- **Classic case:** Coughing, dyspnea, nasal discharge, weight loss, *and...*
 - Ovine progressive pneumonia (OPP) and maedi-visna (M-V): progressive wasting, respiratory distress
 - Sheep greater than 4 yrs old
 - +/- Indurative mastitis
 - +/- Neuro signs
 - Ovine pulmonary adenocarcinoma (OPA):
 - Respiratory distress, crackles t/o lung fields
 - Copious serous nasal discharge
 - Caprine arthritis encephalitis (CAE):
 - Mostly arthritis and neuro signs
 - +/- Indurative mastitis with respiratory signs
 - Chronic enzootic pneumonia: high morbidity, low mortality
 - Bacterial: thicker nasal discharge
 - Lungworms: coughing, tachypnea, +/- respiratory distress
- **Dx:**
 - Etiologies:
 - Lambs and kids:
 - Usually viral: PI-3, adenovirus, respiratory syncytial virus; secondary bacterial also possible
 - Adults:
 - Viral: retroviruses
 - Sheep: OPP, M-V, OPA - Jaagsiekte sheep retrovirus
 - Goats: CAE
 - Bacterial
 - *Mannheimia haemolytica*, *Pasteurella multocida* (these are also normal flora of upper respiratory tract)
 - +/- *Chlamydia pneumoniae*, *Salmonella* spp.
 - *Mycoplasma* spp. (chronic enzootic pneumonia)
 - *Corynebacterium pseudotuberculosis* (caseous lymphadenitis)
 - Parasitic:
 - *Dictyocaulus filaria* (bronchi), *Muellerius capillaris* (alveoli and lung parenchyma - worse in goats than sheep), or *Protostrongylus rufescens* (bronchi)
 - Affects margins of diaphragmatic lung lobes
 - Rarely clinical
 - Parainfluenza-3 (PI-3): virus isolation on nasal swab or serology (2 titers, 2-4 wks apart)
 - OPP, M-V, CAE:
 - Ultrasonography of lungs
 - Agar gel immunodiffusion or ELISA
 - Necropsy (lungs heavy and don't collapse)
 - PCR, virus isolation
 - OPA
 - Ultrasound lungs



Enzootic pneumonia: consolidation at ventral part of diaphragmatic lobe (1), cardiac lobe (2), and apical lobe (3)

- Clear frothy fluid flows from nostrils when hind end of sheep lifted
- Necropsy
- Bacterial: culture tracheal wash/lung material
 - Chronic enzootic pneumonia: necropsy, can be challenging to diagnose
- Parasitic:
 - 1st stage larvae seen on fecal float or in bronchoalveolar lavage fluid
 - Baermann technique may be better than fecal float
- Tx:
 - Viral: supportive care, antibiotics for secondary infections
 - OPP, M-V, CAE, and OPA: none
 - Serology twice a year for OPP, M-V, and CAE and cull positive animals
 - Bacterial: antibiotics, supportive care, improve ventilation
 - Chronic enzootic pneumonia: maybe long-acting oxytetracycline (off-label)
 - Parasitic: anthelmintics +/- vaccine
- Pearls:
 - *M. haemolytica* and *P. multocida* are also normal flora of upper respiratory tract
 - *D. filaria* and *P. rufescens* affect bronchi
 - *M. capillaris* affects alveoli and lung parenchyma - worse in goats than sheep
 - Parasitic usually affects margins of diaphragmatic lung lobes and is rarely clinical

Images courtesy of [Keven Law](#) (lamb in field), Sarah Reuss, VMD, DACVIM (classic orf, FAMACHA), [CDC](#) (orf on thumb), Lucyin ([tetanus](#), [caseous lymphadenitis](#)), [CSIRO](#) (*H. contortus*), [L. Mahin](#) (enzootic pneumonia), [Seb powen](#) (girl and goat)

Ruminants

