Common Diseases of Small Ruminants

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Drug use in Small Ruminants

- Goats and Sheep are FOOD ANIMALS in the eyes of FDA.
- There are no “pet” food animals
- We must use drugs according to label
- OR
- Follow the Animal Medicinal Drug Use Clarification Act (AMDUCA)
- Goats are a minor species and all drugs used in goats are minor drugs

ELDU= not approved by FDA

- Extralabel Drug Use (ELDU) includes a change in route, dosage, duration, frequency, indication, or species from what is on the label
- Very few drugs approved for goats, so we go off label frequently
  - If have food animal drugs, use those
  - Do NOT use illegal drugs
  - Must establish meat/milk withdrawal
    - Food Animal Residue Avoidance Databank (FARAD) at www.farad.org

- 1994 Congress passed AMDUCA, which allows vets to have extra-label drug use (ELDU) privileges (use drugs differently as labelled)
- Vets must follow AMDUCA
  - http://www.fda.gov/AnimalVeterinary/NewsEvents/FDAVeterinarianNewsletter/ucm100268.htm
**ELDU: Requirements for Use**

- ELDU is permitted only by or under the supervision of a veterinarian.
- ELDU is allowed only for FDA approved animal and human drugs.
- A valid Veterinarian/Client/Patient Relationship (VCPR) is a prerequisite for all ELDU. Visit to premise, examine animal(s); assume responsibility; provide follow-up.
- ELDU for therapeutic purposes only (animal's health is suffering or threatened). Not drugs for production use.
- Rules apply to dosage form drugs and drugs administered in water. ELDU in feed is prohibited.
- ELDU is not permitted if it results in a violative food residue which may present a risk to public health.
- FDA prohibition of a specific ELDU precludes such use.

**AMDUCA**

- Cannot go off label if there is:
  - an approved food animal drug for particular disease/condition.
  - approved food animal drug for different disease/condition.
  - Approved veterinary or human drug
    - Distinction?
    - orgs like AASRP can lobby drug company support?

**ELDU**

- OTC drugs
  - Clients-no ELDU
  - Only veterinarian
- VCPR
  - Don’t let them tempt you over the phone.

**AMDUCA**

- Prohibited list/ELDU not permitted
  - Some not approved
  - Some approved in food animals, no ELDU
    - Baytril!
      - Only respiratory disease in beef cattle, dairy heifers, swine
      - Not for another condition (calf diarrhea)
      - Not in another species (goats)
  - ELDU of medicated feeds not permitted under AMDUCA
  - Minor species.
Prohibited Drugs for ELDU in Food Animals

- Chloramphenicol
- Clenbuterol
- Diethylstilbestrol (DES)
- Dimeglumine
- Ipronidazole and other nitroimidazoles
- Metronidazole
- Furazolidone, Nitrofurazone, other nitrofurans
- Sulfonamides in lactating dairy cattle (except approved use of sulfadimethoxine, sulfabromomethazine, and sulfathiazole)
- Fluoroquinolones
- Glycopeptides

Vaccinate

- Pregnant breeding does
- Yearlings
- Rams
- Kids

Herd and Flock Management

Basic Vaccination Program for Goats

PREGNANT DOES
- Vaccinate does during last month of pregnancy for Clostridium perfringens types C and D and C. tetani; RIDS
- Immunize kids from immunized does at 3-2 months of age for Clostridium perfringens types C and D and C. tetani; repeat immunization in 3-4 weeks.
- Immunize kids from nonimmunized dams at 1-3 weeks of age for Clostridium perfringens type C and D and C. tetani; repeat immunization twice at 3-to-6-week intervals.

BUCKS AND YEARLINGS
- Immunize bucks and yearlings at the same time pregnant does are vaccinated, with emphasis on Clostridium species.
- In endemic areas, vaccines for rashes and leptospirosis may be of value.

BREEDING DOES
- Vaccinate breeding does for Chlamydia (Chlamyphila) and Campylobacter before breeding, and repeat in refrigeration.

Basic Vaccination Program for Sheep

PREGNANT DOES
- Vaccinate does the second month of pregnancy for Clostridium perfringens types A, C, and D and C. tetani; repeat immunization in 3-4 weeks.
- Vaccinate ewes, yearlings, and does 2 weeks prior to lambing.
- Vaccinate ewes, yearlings, and does every year.

BURS
- Vaccinate in the fall.
- Repeat vaccinations in the fall.

LAMBS
- Vaccinate in the fall.
- Repeat vaccination twice at 3-to-6-week intervals.

NAME AND YEARLINGS
- Vaccinate lambs and yearlings in the fall, with an emphasis on C. perfringens species.
- Vaccinate against C. perfringens in endemic areas.

JMAhrens in Fugt DG and AN Baird. Sheep and Goat Medicine. 2nd ed
Quarantine Principles

1. Quarantine area should be located away from herd.
2. Quarantine and sick pens should not be the same pen.
3. Quarantine all animals arriving on farm:
   - Show
   - Animals returning from breeding
   - New acquisitions
4. Maintain quarantine period of 2-4 weeks.
5. Observe quarantined animals daily for any signs of disease:
   - "Pinkeye"
   - Orf
   - Caprine arthritis-encephalitis (CAE)
   - Footrot
6. Perform appropriate tests on quarantined animals:
   - Anthelmintic resistance testing
   - CAE
   - Caseous lymphadenitis
   - Johne’s disease
7. Administer anthelmintics to quarantined animals.

Good Farm Practices = Good Biosecurity

Gastrointestinal Diseases

Gastrointestinal Diagnostics

Rumen Fluid Analysis

- Helps differentiate diseases of forestomachs
- Mouth speculum with orogastric tube (weighted)
- Rumenocentesis
  - 16ga caudal to xyphoid and L of midline
- Color, smell, consistency - green, aromatic
- pH - 6.5-7.5
- Protozoa - 40X with coverslip 40 organisms per field
- Chloride - <25 to 30 mEq/L
Protozoa

Drop on slide- at 40X normal fluid have around 40 organisms per field

Abdominocentesis

• Used to differentiate causes of abd swelling
• 20 ga needle or teat canula into EDTA tube for analysis and sterile tube for culture
• Four sites- if suspect peritonitis (often localized)-
  — 2 cranial sites- slightly caudal to xyphoid and medial to milk veins
  — 2 caudal sites- slightly cranial to mammary and to L and R of midline
• One site- tap lowest point of abdomen
• Ultrasound can help
• Small EDTA tube
• Heat if suspect urine
• Normal 1-5g/dL pr- and <10,000 cells

Liver Biopsy

• Sedation and ultrasound guidance
• 9-10 intercostal space slightly above imaginary line from tuber coxae to point of elbow
• Local anesthetic and surgical prep
• Liver disease
• Trace minerals
• Tru-cut® Temno ® Monopty ®
• Formalin- histopath
• Plastic tube- mineral analysis
Gastrointestinal Diseases

- Pharyngeal lesions
  - *Fusobacterium necrophorum*
    - Poor hygiene milk replacers
    - Balling gun
    - PPG 50000IU daily 1 week
### Gastrointestinal Diseases

#### Bloat
- Cattle > sheep > goats
- TX: pass tube, if E... then rumenotomy
- Frothy= diets that form froth
  - Legumes, lush cereal pastures
  - TX: poloxalene, DSS
  - high grain diets (low pH= < 5.5)
    - Mineral oil or vegetable oil (100ml)
- Free Gas= diets that promote excessive free gas or failure to eructate
  - TX: pass tube

#### Simple Indigestion
- CS= anorexia, mild diarrhea, bloat
- Most commonly ass’d with change in grain type or amount, moldy hay, weeds, toxic plants

#### Rumen Acidosis
- Rapid fermentation carbs
  - Oats, wheat, barley, beets, potatoes, bread, M&M’s
  - Rumen pH decreases
- Clinical Signs
  - Varies but anorexia→ recumbency
  - Rumen “splashy” and rumenstasis
  - Diarrhea
  - Secondary thiamine deficiency → neurologic
- Diagnosis
  - Rumen pH <5.5, milky gray, protozoa decreased

#### Tx
- IV fluids 5% Sodium Bicarb
- NSAIDs- Flunixin (1.1-2.2 mg/kg)
- Severe cases perform cleansing rumenotomy
- Transfaunation
- Thiamine supplementation
- PPG- 22000IU/kg IM BID
- Limit feed until rumen motility restored then offer hay
Gastrointestinal Diseases

• Rhododendron family
  – Projectile vomiting, death

Gastrointestinal Diseases

• Diarrhea in Neonates
  – 1st month of life
    • E coli
    • Rotavirus
    • Cryptosporidium
    • Salmonella

Gastrointestinal Diseases

• Diarrhea in Neonates
  – E coli
    • 1-10 days of age
    • Outbreak
    • Acidosis
    • Diagnosis
      – Must serotype to k99 or F41 b/c non-path E coli in gut
    • Treatment
      – Fluid Therapy
      – Abs – some use oral; some use ampicillin inj (10-20mg/kg)
      – NSAIDS
    • Prevention
      – Colostrum
      – Sound management
      – Shear ewes pre-partum decrease fecal contamination

Gastrointestinal Diseases

• Diarrhea in Neonates
  – Rotavirus
    • 2-14 days of age
    • Depression, dehydration
    • Supportive care
### Gastrointestinal Diseases

**Cryptosporidium parvum**
- Yellow diarrhea 5-10d of age
- Zoonotic
- Diagnosis
  - Acid fast staining of air dried fecal smear or PCR
- Prevention
  - Hygiene
  - Some use decoquinate or monensin
  - Isolate animals during outbreak
  - Tough to eliminate in environment
    - May use ammonia (5-10%)

### Salmonella
- Fever depression, tenesmus, shock
- Diarrhea may have blood
- Zoonotic
- Diagnosis
  - Culture in feces; PCR developing
- Treatment
  - Supportive
  - Abics- should be based on C&S.
    - Cefotiofur 1.1-2.2mg/kg

### Diagnostic Samples and Testing Methods Required for Differentiation of the Most Common Causes of Infectious Diarrhea in Lambs and Kids

<table>
<thead>
<tr>
<th>Causative Agent</th>
<th>Sample Type</th>
<th>Required Sample</th>
<th>Required Method</th>
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<tr>
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**Gastrointestinal Diseases**

**Diarrhea in Older Lambs and Kids**
- Nematodes- talk about parasites later
- Clostridium perfringens
- coccidiosis
Gastrointestinal Diseases

• *Clostridium perfringens*
  – Types A, B, C, D--- D most common in USA
  – Enterotoxemia or Overeating Disease
  – Most commonly ass’d with high concentrate feeds and quick growing lambs- can happen in any group even vaccinated
  – Peracute- rapid onset depression, abdominal pain, profuse and bloody diarrhea, neurologic signs➔ death
  – Chronic form- more common in goats
  – Diagnosis- tough to confirm. Use ante-mortem signs

Gastrointestinal Diseases

• *Clostridium perfringens*
  – Treatment
    • Supportive care-fluids, flunixin,
    • guarded prognosis
    • Admin *C. perfringens* antitoxins type D during outbreak
  – Vaccinate non-vacc animals; antitoxin and toxoid
  – Prevention
    • Routine vaccination
      – 4-6 wks age and boost 3-4 weeks
      – If endemic, then give lambs/kids antitoxin w/in 1st yr life
    – Boost pre-partum in sheep
    – Endemic goat herds give vaccine 3-4 times yearly
    – Diet management

Gastrointestinal Diseases

• Diarrhea in Adult Sheep and Goats
  – Parasitism*
  – Acidosis, endotoxemia, toxin ingestion
  – Johne’s Disease

Gastrointestinal Diseases

• Johne’s Disease-
  – *Mycobacterium avium paratuberculosis*
  – Infected early- dz appear later
  – Chronic wt loss
  – Diagnosis
    • Fecal culture- takes long time
    • PCR less sensitive than culture
    • Serologic testing
      – AGID and ELISA- high specificity (95%) but lower sensitivity (50%)
Gastrointestinal Diseases

- **Rectal Prolapse**
  - More common in sheep
  - Short tail docking and GI dz
  - Closer than the attachment of caudal tail folds predisposes
- Hemorrhoidal ointment
- Mineral oil PO, restrict feed 24 hrs
- Epidural
- Purse string

Gastrointestinal Diseases

- **Pregnancy Toxemia**
  - Fatty liver
  - ewes last month pregnancy
  - Ass’d with over or underconditioned ewes
  - Multiple fetuses
  - Decrease feed, increase E needs
- CS
  - Anorexia, depression, dullness, altered behavior → recumbency
  - Neurologic signs, star gazing, bruxism

Gastrointestinal Diseases

- **Fatty Liver**
  - Treatment
    - If early can use oral or IV glucose
      - (25 ml of 23% calcium borogluconate/L), potassium (10-20mEq) and 5% dextrose
    - Propylene glycol PO
    - Transfaunation and B complex and thiamine
    - IF RECUMBENT
      - Remove fetuses
      - flunixin

Gastrointestinal Diseases

- **Fatty Liver**
  - Prevention
    - Proper BCS- 2.5-3 throughout gestation
    - Keep E and protein levels up in late gestation
      - 2-3X maintenance for multiple fetuses
    - Ultrasound identification of fetal number and separate feeding groups
    - Some feed monensin (1mg/kg/day)- beware toxicity
    - Niacin feed 2-4 weeks prior to parturition
    - No stress
Gastrointestinal Diseases

- **White Liver Disease**
  - Fatty liver in Angora and Angora-cross goats
  - Cobalt deficiency
  - Young animals
    - +/- photosensitivity, ill thrift
  - TX with B12 injections or oral cobalt (1mg/hd/day)

Gastrointestinal Diseases

- **Copper Toxicosis**
  - More common in sheep than goats
  - Most common source of excess copper in small ruminants are trace minerals mixtures and feeds formulated for horses or cows
  - Hemolytic crisis, anorexia, depression, diarrhea
  - Anemia, hemolysis, death
  - Acute renal failure

Gastrointestinal Diseases

- **Internal Parasites**
  - *Haemonchus contortus*
  - Causes most of clinical parasitism in sheep and goats
    - But not always
  - Anthelmintic resistance problems
  - Voracious blood sucker
    - Anemia
      - Pale MM, weakness, acute death

Haemonchosis

- A diagnosis of clinical parasitism is not indicative of an anthelmintic deficiency, but of a management problem
- Sometimes stuck with management problems and have to resort to anthelmintics
  - This option is gone on some (most?) farms

- C. Navarre, DVM, MS, DACVIM
Diagnostics

- Must know:
  - If Haemonchosis is the problem...
  - Anthelmintic resistance pattern on farm...
- History alone won’t work
- Need fresh or refrigerated/anaerobic feces

Resistance check

- **Drenchrite® test**
  - In vitro test
  - Eggs incubated with different concentrations of anthelmintics, dose response curves
  - $250 but single fecal sample tested for all classes
  - Pooled sample from 10 animals
  - Must have EPG>350
  - Special sample handling
  - CONTACT LAB BEFORE GETTING SAMPLES!
  - Results in 14-21 days

Internal Parasites

- Treatment and Control Programs
- Management Strategies-
  - FAMANCHA and parasite control
    - www.scsrpc.org

Steps for Implementation of Integrated Parasite Control Strategy for Goat Herds

1. Quarantine new arrivals
   - Place new animals in dry lot.
   - Perform fecal egg count (number of parasite eggs per gram [EPG]).
   - Deworm with double-dose broad-spectrum anthelmintics from two different classes.*
   - Perform follow-up EPG count 14 days after initial treatment.
   - Release new animals onto “dirty” pasture.
2. Administration of anthelmintics
   - Weigh individual animals or base weight on heaviest animal.
   - Administer anthelmintic over base of tongue.
   - If using avermectins or benzimidazoles, withhold feed 24 hours before administration.
3. Work with owner to determine the anthelmintic resistance profile of the herd.
   - Fecal egg count reduction test
   - Larval development assay
   - Adjust anthelmintic regimen used on farm on the basis of FECRT and LDA results.
4. Treat selected animals only
   - Evaluate individual animals based on FAMACHA
   - Administer anthelmintic only to animals that score 3, 4, or 5.
   - Train producers in this methodology.
   - In grazing dairy goat herds:
   - Administer anthelmintics to first-lactation does and multiparous does before turnout.
5. If documented resistance in herd:
   - Consider administration of two different anthelmintics at once.
   - Perform regular FECRT to assess for effectiveness of chosen anthelmintics.
   - Develop and maintain management approach that complements parasite control.
**Herd/Flock Management Systems and Parasite Control Strategies**

1. **Zero grazing**
   - Ensure good quality forage/feed.
   - Place forage/feed in bunk off the ground.
   - Monitor fecal egg count reduction test (FECRT).
2. **Seasonal pasture rotation**
   - Practice pasture rotation.
   - Ideally, allow pastures 1 full year of rest.
   - Maintain high forage height.
   - Prevent overstocking.
   - Provide areas of browse around fences.
   - Administer anthelmintics to pregnant does 30 days before kidding.
   - Administer anthelmintics to weanlings before turnout.
   - Release animals onto “clean pastures.”
   - Monitor FAMACHA.
   - Monitor FECRT.
3. **Continuous grazing**
   - Provide amble browse areas.
   - Decrease stocking densities.
   - Pasture rotation every 30 days may decrease larva numbers on pasture.
   - Consider mixed grazing to decrease larva numbers on pasture.
   - Monitor FAMACHA.
   - Monitor FECRT.

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**Parasite Control**

- Preventing anthelmintic resistance (may be too late)
  - Increase refugia (FAMACHA©)
  - Kill partially resistant parasites (Smart-Drenching)

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**FAMACHA©**

- Salvage deworming program
- Strategic and tactical deworming should be performed in context of salvage program
- Should slow development of resistance
  - Selective treatment
  - Increased refugia
    - Increase sensitive genes/dilute resistant genes
- Only for haemonchosis!
- Only for adults (except periparturient)

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**FAMACHA©**

- Examination of MM color of eye and comparison to chart every 2-4 weeks
- High score (4-5 = pale MM)
  - Deworm
- Low score (1-3 = pink MM)
  - Don’t treat unless show other signs (bottle jaw, etc.)
- **CULL REPEATS**
  - Genetic selection of resistant animals
  - 20% of animals harbor 80% of worms
Anemia

Bottle Jaw

FAMACHA Guidelines

1. Ensure that all personnel using FAMACHA have been properly trained.

2. Because Haemonchus is the only parasite monitored with FAMACHA, attention, should be paid to identifying and controlling other parasites when needed (e.g., by fecal egg count [FEC] or fecal culture).

3. Herd or Flock examinations should be properly carried out every 2 to 3 weeks, and more often during peak parasite transmission times (i.e., hot and humid weather).

4. Monitor lambs and kids and animals that lag behind very carefully.

5. Identify individual animals and keep accurate records.

6. All animals needing deworming treatment three times more often than the flock or herd average should be culled.

7. Institute sound nutritional, management, and selection practices that maximize health and minimize parasitic disease.

More info

• Southern Consortium for Small Ruminant Parasite Control
  – SCSRPC.org, wormx.org

• ACVIM.org
  – Consensus statement

• showell@vet.uga.edu (Drenchrite test)
Summary of Recommendations for Parasite Control

1. Make certain that the anthelmintic or combination of anthelmintics used on the farm actually works (kills at least 90% of the viable worms). Check for resistance with fecal egg counts before and after deworming. Use strategies to avoid drifting into the spring and continue assessing every 2-4 weeks until the hazard of Haemonchus infestation no longer remains in cold weather.

2. Utilize FAMACHA “smart drenching” in the spring and continue assessing every 2-4 weeks until the hazard of Haemonchus infestation no longer remains in cold weather. Use strategies to avoid drifting into the spring and continue assessing every 2-4 weeks until the hazard of Haemonchus infestation no longer remains in cold weather.

3. Use strategic deworming. Deworm the flock while the parasites are in hypobiosis and are being transmitted at low levels (i.e., the winter). This strategy reduces the frequency of exposure to deworming products.

4. Employ pre- and postbirthing deworming starting at 1 month before birthing at 2- to 4-week intervals and ending 2-4 weeks after the last lamb or kid is born.

5. Tactical dewormings (based on increased levels of parasite eggs or 10-14 days after rainfall) enhance the effectiveness of a parasite program.

6. Graze above 4 inches; use “clean” or safe pastures when possible (aftermath of crops, annual forage such as chicory); utilize rotational grazing or co-grazing with cattle or horses. (BEWARE: Permanent pastures and promote parasites.)

7. Deworm new animals and place them in a nonpasture environment such as a dry lot or barn after treatment for as long as 72 hours before moving them to a safe pasture. Check fecal egg count 10-14 days after treatment for fecal egg shedding.

8. Rotate anthelmintics yearly if effective drugs are available.

9. Do not underdose. Determine dose for the heaviest animal in a production group.

10. Identify and select individual animals resistant to internal parasites for flock/herd retention and breeding.

Respiratory System

- **Oestrus ovis** (Nasal bot)
  - More common sheep
  - Nasal discharge, sneezing
  - Ivermectin late summer or overwintering
    - (0.2mg/kg SC) WD milk= 40 days if admin SC
    - (0.4mg/kg PO) WD milk= 11d
    - Eprinomectin (pour-on) (0.5mg/kg)
      - WD= O milk

- **Mycoplasma ovipneumoniae**
  - *Enzootic pneumonia of sheep* or atypical pneumonia
  - Associated with intense managed lambs
    - Chronic nonprogressive pneumonia
      - Mild chronic cough
      - If Pasteurella involved signs more severe
    - Diagnosis: consolidation of CV lung lobes gray to reddish-brown
    - Treatment: tetracycline, decrease stocking density

- **Pneumonia**
  - *Pasteurella and Mannheimia*
  - Spring or Fall outbreaks lambs
  - Associated with stress
  - Treatment
    - Tetracyclines

- **Respiratory System**
Respiratory System

- Mycoplasma spp in goats
  - Pneumonia, mastitis, polyarthritis
  - Ask for mycoplasma culture to lab

- Ovine Progressive Pneumonia (OPP)
  - RNA lentivirus
  - Decreased production
  - Usually seen in older animals long-incubation time
  - Transmission: direct and colostrum; carriers
  - Clinical Signs
    - Stress → ADR; wt loss, regional lymphadenopathy; “hardbag,” proliferative arthritis
    - Dyspnea develops, cough

Respiratory System

- OPP
  - Diagnosis
    - Serology
      - ELISA and AGID-ELISA better
    - Necropsy- heavy wet firm lungs
  - Prevention
    - Eliminate the virus from flock
    - Test and cull
    - Feed OPP negative colostrum

Diseases of the Integumentary System

- Diagnostic Tests
  - Skin Scraping
  - Microbial culture
  - Impression smear
  - biopsy
Diseases of the Integumentary System

• **Contagious Ecthyma (Orf) sore mouth-contagious pustular dermatitis**
  - poxvirus
  - young animals- crusting at mucocutaneous junction, occas udders
  - Occasionally on udder. Female may resent nursing
  - Papules → vesicles → pustules→ Crusty scabs, not erosions or ulcers! (FMD)
  - Resolve 3-6 wks
  - Zoonotic – wear gloves

• **ORF**
  - Prevention
    - Buy from orf free herds
    - Quarantine incoming animals
    - Live vaccine-
      - Colorado serum
      - Scarify inside flank and apply
      - Only use on endemic farms

Diseases of the Integumentary System

• **Dermatophilosis**
  - Lumpy Wool Disease, Rain Scald, Rain Rot
  - *Dermatophilus congolensis*
  - Skin abrasions, stress, wet weather
  - Papules and pustules coalesce and rupture→ matting wool/hairs
  - Also causes strawberry foot rot in coronary band of sheep
  - Ears and tails of goat kids

• **Dermatophilosis**
  - Diagnosis
    - Direct smear of lesion
      - Gram stain or NMBlue
      - branching hyphae or RR tracks
  - Treatment
    - Topical
      - Iodophors- 2-5%
      - Lime sulfur 0.2%
      - Zinc sulfate
      - Potassium aluminum sulfate 1%
Diseases of the Integumentary System

• **Fleece Rot**
  – Exudative bacterial dermatitis of sheep
  – Greenish matted wool
  – *Pseudomonas aeruginosa*
  – Susceptibility reportedly heritable
  – Problem in Australia

• **Malignant Edema**
  – Swelled Head or Big Head
  – *Clostridia spp*
  – Young rams → associated with butting heads and fighting...
  – depression, swelling around head, subcutaneous crepitation, death

Diseases of the Integumentary System

• **Caseous Lymphadenitis**
  – *Corynebacterium pseudotuberculosis*
  – Found in environment
    • Survives long time
  – Organism enters through cuts or MM through grooming, feeders, shearers, bedding, etc.
  – Enlargement and abscess lymph nodes - parotid, submandibular, supramammary, prescap, prefem
  – Internal l.n. abscess – thoracic, mediastinal, -- coughing, chronic wt loss
  – CS vary based upon location of abscess formation

• **Caseous Lymphadenitis**
  – Diagnosis
    • Clinical signs
    • Culture
  – Treatment
    • **Most cost effective is to cull**
    • Isolation 1 month
    • Removal of whole l.n. v/s lance and drain/flush
      – Incinerate material
    • Abics not really that effective; however penicillin or tulathromycin have been used in conjunction with open/closed lavage of l.n.
• **Caseous Lymphadenitis**  
  – Prevention  
  • BEST is to maintain a CLA free flock/herd  
  • Serological testing- screening test  
  • Vaccine for sheep.  
  – Reported will not totally prevent disease  
  – Do not use in goats

• **Dermatophytoses**  
  – Ringworm, Lumpy wool, club lamb fungus  
  – *Tricophyton verrucosum, T. mentagrophytes, Microsporum canis*  
  – Transmission  
  • Direct contact  
  • Fomites- clippers, spandex, blankets,  
  – Zoonotic  
  – Primary lesions Ears, head, neck – but may be over whole body

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Dermatophytoses

Dermatophytoses

- **Diagnosis**  
  - CS and Signalment  
  - Definitive DX- Scrapings submitted for culture  
- **Treatment**  
  - Isolate affected animals  
  - Spontaneous resolution 4-6 wks  
  - **Many tx have been tried**  
    - Topical- apply to periphery of lesion  
    - 3% captan or 5% lime sulfur 5d; then 1x wk for 4wks  
    - Listerine scrubbed in daily for 1 week  
    - 7% iodine mixed with bag balm applied lesions once daily for 1 week  
    - Griseofulvin  
    - Natamycin  
    - IV sodium iodide
Dermatophytoses

- Prevention
  - Spores exist for years so prevent entry onto farm
  - Cleanliness and sunlight
  - Wash all fomites
    - 5% bleach
    - or
    - 5% formalin

Diseases of the Integumentary System

- Lice
  - More common in goats than sheep in USA
  - More problem in winter
  - Goats
    - Pruritus, wt loss, rubbing scratching, alopecia, rough hair coat,
    - Sucking lice add anemia and hypop-
  - Diagnosis
    - Sucking lice
      - Around nose, poll, eyes, neck, brisket, and tailhead

- Sheep keds
  - *Melophagus ovinus*
    - Direct contact transmission
    - Wingless fly sheep definitive host
    - Scratching rubbing
    - Numerous pesticides effective
    - Shearing helps

Diseases of the Integumentary System

- Lice
  - Treatment
    - Dust, dip, spray, pour-on
    - Few treatments approved for goats
    - Avermectins- 200micrograms/kg SQ
    - Pour on ivermectin (1ml/22lbs)
Diseases of the Integumentary System

• **Mange Mites**
  – Not common in sheep
  – Relatively common in goats
  – Chorioptic
  – Psoroptic- *Psoroptes cuniculi*
  – Demodectic- *Demodex caprae*
  – DG: Skin scrapings
  – TX: coumaphos (0.3%), toxaphene (0.5% dip), lime sulfur (2% dip), phosmet ~0.2% dip

• **Psoroptic Mange**
  – Rare in sheep in USA- *Psoroptes ovis*
  – Goats- *cuniculi*
  – Alopecia around ears, pruritis, head shaking
  – Sarcoptic mange
  – *Sarcoptes scabei var caprae and ovis*
  – RARE- not present in USA.

• **Chorioptic Mange**
  – *Ovis and caprae*
  – Host-specific – live only 2-3 days off host
  – Sheep- lesions on scrotum and distal limb
  – Goats- lesions lower limb, abdomen, and hindquarters
  – Alopecia, crusting, excoriation, pruritis- feet chewing
  – Lime sulfur dips

Diseases of the Integumentary System

• **Other skin dzes**
  – Copper deficiency
    • Decreased crimp in wool, wool fades to gray-white
    • Lack of Cu or excess Mb
    • Assess blood Cu
      – <0.7 mg/dl blood
  – Iodine Deficiency
    • Goiter newborn lambs
    • Alopecia, thick scaly skin
  – Zinc Deficiency
    • Parakeratosis, wrinkled skin on face, feet and scrotum
    • Affects sperm output too
  – Photosensitization
    • St Johns wort and other plants

Diseases of the Integumentary System

• **Musculoskeletal System**

• **Congenital Conditions**
  – Myotonia congenita
  – Fainting goats-
  – Tetanic muscle contraction when startled
Musculoskeletal System

- Hereditary Chondrodysplasia
  - Spider lamb syndrome
  - Suffolk and Hampshire

- Visual Signs
  - abnormally long and bent limbs
  - twisted spines
  - shallow bodies
  - flattened rib cages
  - abnormal bone and cartilage growth
  - long necks
  - They are born abnormal and will not be able to stand.
  - They appear normal at birth but develop into a spider at two to six weeks of age.

Diseases of the Musculoskeletal System

- Caprine Arthritis Encephalitis (CAE)
  - Lentivirus
  - Chronic polyarthritis most common clinical presentation
  - Transmission: colostrum and horizontal
  - Pathogenesis: infects monocyte-macrphage→lifelong infection
  - Polyarthritis; chronic pneumonia, wt loss, dypsnea

- Clinical Signs
  - Asymptomatic
  - Arthritis
  - Neurologic
    - leukoencephalomyelitis
  - Pneumonia
  - Mastitis
- Diagnosis- Serology
- Treatment- aim for prevention
Diseases of the Musculoskeletal System

- **Caprine Arthritis Encephalitis (CAE)**
  - Prevention
    - Colostrum management
      - Remove kids at birth
      - Give heat treated colostrum
      - (133°F for 1 hour)
      - Raise kids on milk replacer
      - Does horizontal play a role?
    - In dairy herds, milk CAE positive last

Diseases of the Musculoskeletal System

- **Blackleg**
  - *Clostridium chauvoei*
  - Appears in sheep periodically
  - Associated with abrasions or trauma
  - Vaccination

Diseases of the Musculoskeletal System

- **Foot and Mouth Disease**
  - FMD- highly contagious viral dx sm rum and swine
  - Fever, vesicles of feet and mouth
  - Sheep and goats have fewer signs
  - Be aware.

Diseases of the Musculoskeletal System

- **White Muscle Disease**
  - Deficiency of Selenium or Vitamin E
  - USA- NE, SE and NW
  - Poor quality hay and no access to pasture
  - Young rapidly growing animals
    - Stiff gait and trembling when standing or remain sternal
    - Firm muscles on palpation
    - Elevated CK
    - Measure blood Se levels in 10% of flock
  - Prevention- good forages
Diseases of the Musculoskeletal System

**Infectious Footrot**

- Severe contagious disease
  - Sheep>goats
  - Primary agent = *Dichelobacter nodosus (Bacteriodes nodosus)*
    - Differ in virulence and subsequent clinical disease
  - Previous infection with *Fusobacterium necrophorum*
  - Warmth and wetness
  - Transmission - *D. nodosus* comes from the hooves of infected animals → soil

- Usually begins with *F. necrophorum* infection (interdigital dermatitis)
  - Benign footrot
    - Inflammation and necrosis of interdigital tissue
    - Soft horn loose, pale and pitted
    - One or few animals affected
  - Virulent footrot
    - Severe lameness multiple animals
    - Underrunning of the hard horn from axial heel
    - Malodorous

**Diagnosis**
- Clinical presentation

**Treatment**
- Trim hooves
- Topicals
  - Tetracycline
  - Antiseptics – copper and zinc sulfate, or 4-5% formalin
- Flock treatment
  - Footbaths (16 lbs of 10% zn or cu in 20gal water)
  - Dry ones - 85% powdered limestone, 15% zinc sulfate
- Systemic therapy
  - Penicillin (20-30,000IU/kg IM BID)
  - LA200 - (20mg/kg q72 hrs)
  - Florfenicol (20mg/kg IM q48hrs)
Prevention of Foot Rot

- Never buy sheep with foot rot or from a flock infected with foot rot, even if the animal(s) appear unaffected.
- Avoid buying sheep at sale yards or livestock markets where clean and infected sheep may have been commingled or run through the same area.
- Avoid using facilities (trails, corrals, dipping areas) where infected sheep may have been in the last two weeks.
- Never transport sheep in a vehicle that has not been properly cleaned and disinfected.
- Trim and treat the feet of all new arrivals, then re-examine them periodically during the 30-day isolation period.

Diseases of the Musculoskeletal System

- Laminitis
  - Ingestion of concentrate or lush forage
  - Stiff gait
  - Chronic foot deformity, turning up toes
  - NSAIDs

• Vaccines
  - Primary use in herds where footrot is endemic
  - Serogroup specific vaccination if possible

• management
### Diseases of the Urinary System

- **Urinalysis**
  - Ketone strips do not detect beta-hydroxybutyrate-the primary ketone produced...

### Diseases of the Urinary System

- **Kidneys**
  - *C. perfringens* type D-enterotoxemia, overeating dz, and pulpy kidney dz
  - CDT Vaccination and
  - slow addition of feed to diet

### Obstructive Urolithiasis

- **Etiology:** multifactorial
  - Diet, urine pH, body water
  - Struvite= Magnesium ammonium phosphate
  - Apatite= calcium phosphate
  - Calcium carbonate- ass’d with high legume diets
  - Known to form in alkaline urine
  - Most common sites
    - Distal sigmoid flexure and vermiform appendage→ rupture urethra and/or urinary bladder

### Urolithiasis

- Intact and castrated males
- Water intake may be single most important factor
  - Dirty water
  - Cold weather
  - Other illness
Obstructive Urolithiasis

- **Clinical Signs**
  - Incomplete or intermittent obstruction lead to:
    - Anorexia
    - Lethargy
    - Urination posture
    - Vocalization
    - Rupture → swelling around prepuce or ventral abdominal distention
    - Clin path= +/- azotemia

Pathophysiology

- Most common sites of lodging are urethral process and/or sigmoid flexure
- Three syndromes
  - Urethral obstruction
    - Partial
    - Complete
  - Urethral rupture
  - Bladder rupture
  - Clinical signs vary based on degree of disease

Obstructive Urolithiasis

- **Treatment**
  - Establish patency of urinary tract
  - Analgesia
  - Fluids
  - Decrease inflammation
  - Antibiotics
  - Surgery*

Treatment: Urethral Obstruction

- Exteriorize penis
  - Difficult to impossible in early castrated males
  - Caution in breaking down preputial attachment manually
  - Sedation (acepromazine) and/or epidural may help
- Remove urethral process
  - May relieve obstruction
  - High recurrence rate
  - Local anti-inflammatory
Treatment: Urethral Obstruction

• Antispasmodics
  – Acepromazine may work before urethral swelling is advanced

• Urethral catheterization
  – Use caution!
  – Urethra may be friable at site of obstruction
  – Can rupture if too much pressure applied
  – Urethral diverticulum at ischial arch
  – 1 part 2% lidocaine to 3 parts water

• For slaughter
  – Urethrostomy
  – Penile amputation
  – Urethrotomy at site of obstruction (if visible)

• Stricture formation will occur in weeks to months following urethrostomy

General anesthesia is best;
Animal in sternal incise.
Locate retractor penis mm.
Find sigmoid flexure and exteriorize penis

Noordsy. Food Animal Surgery 3rd ed
Dissect and push away the dorsal vessels, then make a wedge shaped incision into the CVP to spatulate urethral opening.

Treatment: Urethral Obstruction

- For breeding animals and pets
  - Chemical dissolution
  - Cystostomy
  - Tube cystostomy
    • Prolonged hospitalization
    • Requires second SX if fails
  - Bladder marsupialization
    • Urine scald
    • Mucosal eversion
  - Laser lithotripsy

Cystotomy

- Paramedian incision
- Stay sutures in bladder
- Suction
- Incise bladder
- Intraluminal palpation and lavage
- Normograde flushing with polypropylene catheter
- Double layer inverting closure
**Tube Cystotomy**

- *Bypass the inflamed urethra; give time to rest*
- Perform cystotomy
- Make 2nd incision for 8-20 French Foley through incision
  - Tunnel through SQ; then into cystotomy incision and secure with two purse string
- Leave catheter open to divert urine
  - After 4-5 days occlude to see if urinates
- E-collar
- Anti-inflammatories and antibiotics; skin care
- Reported 70% success rates

**Bladder Marsupilization**

- 10cm paramedian incision
- Cystotomy, lavage
- Make 2nd 4cm paramedian incision contralateral
- Exteriorize stay sutures in 2nd incision
- Suture seromuscular layer of bladder circumferentially to abdominal wall and rectus abdominis with interrupted horz mattress
- Skin to bladder mucosa simple interrupted
Post-op

- E-collar
- Antibiotics
- Anti-inflammatories
- Check hydration
- Observation for urination

Chemical Dissolution

- General anesthesia
- Locate bladder with ultrasound
- Place 18 gauge 4 inch needle in bladder
- Aspirate urine
- Add 30-60 mls Walpole’s, hemiacidrin (Renacidin®)
- Remove and repeat until turbidity of urine decreased
- Leave one dose in bladder

Chemical Dissolution

- Urine flow in 24-36 hours
- May need to repeat
**Prevention**

- Delay castration as long as possible?
- Females better than males as pets
- Increase water intake
- Avoid grain supplements/alfalfa hay in pets
  - Maintain on good quality grass hay and loose trace mineralized salt
- Urinary acidifiers- goal to keep urine pH at 5.5-6.5
  - Anionic salts added to rations

**Ulcerative Posthitis**

- Pizzle rot; sheath rot
- Infectious disease of external genitalia
- *Corynebacterium renale*- usu normal inhabitant
  - Other organisms too
    - Parapoxviruses, caprine herpesvirus 1 and C. spp
- Risk Factors
  - High Pr- diets
  - Wet conditions
  - Thick fiber coats (Merino and Angora)
  - Can be transmitted venerally

**Ulcerative Posthitis**

- Clinical Signs
  - Moist ulcers, scabs at mucocutaneous junction of prepuce
  - Malodorous
  - Prepuce may swell
  - Necrosis and discharge
  - Stenosis of preputial opening
  - Dysuria due to pain, irritation

**Ulcerative Posthitis**

- Treatment
  - Reduce protein in diet to less than 16%
  - Shear fiber
  - Antiseptics
  - Parenteral Abics in severe cases
  - Dispose fiber from affected animals- burn
Neurologic System

- Testing
  - Neurological exam
  - CSF Analysis
  - Plain and contrast radiographs
  - CT/MRI
    * Possible due to small size

Lumbosacral CSF Tap

- Septic neonates with CNS signs, adults with CNS signs
- Standing, sternal (dog-sitting) or lateral
- Keep pelvis straight and level
- Palpable indentation at LS space
- May admin 0.5ml 2% lidocaine SQ
- <30kg: 20-21 ga 1 in
- >30kg: 18-20 ga 1.5 in
- 1 to 2ml fluid plenty
  - EDTA- cytology
- Violent reactions rare
- Analyze quickly
• CSF
  – Normal is clear and colorless
  – Red- blood
    • iatrogenic- usually clots
  – Turbid CSF- high WBC
  – Normal CSF
    • Less than 10 nucleated cells/microL
    • Bacterial – neutrophilic pleocytosis
    • Listeria- monocytic pleocytosis
    • Abberant parasite migration- eosinophilic
  – Protein
    • Sheep normal <40mg/dL
    • Goats normal <10mg/dL

Neuro Dzes

• Cerebral
  – Clio pen, Land D
    • Listerial encephalitis, CAE and Maedi-Visna or OPR
    • Primary signs in adult sheep and arthritis in adult goats
    • Hemorhagic necrosis, myelopathy, encehlopathy, paraparesis
    • Polioencephalomalacia
    • Toxocosis: Sulfur, Lead, Sodium
    • Respiratory
    • Rickets
    • Scrofula
    • Anesthesia Toxicity
• Cerebellar
  • Grass staggers
• Brain Stem and Cranial Nerves
  • Listeriosis
  • Uthra myelitis/lenticles
• Spinal cord and peripheral nerves
  • Botulism
  • Listeriosis
  • Herpes
  • Spinal paraparesis
  • Tetanus
  • Tick paralysis

Common Neurological Diseases

• Polioencephalomalacia
• Listeriosis
• Rabies should always be on list

Polioencephalomalacia

• Etiology
  – Disruption of cerebral E metabolism→ sodium and water accumulation→ edema swelling pressure necrosis of cerebral neurons
  • Thiamine deficiency
  • Sulfur toxicosis
  • Sodium toxicosis
  • Water deprivation
  • Lead toxicosis
Polioencephalomalacia

• Any age
• Disruption of normal diet
• Stress

Clinical Signs
• Central blindness
• Dorsomedial strabismus
• Depression
• Vocalizations
• Incoordination
• Head pressing
• Recumbency
• Opisthotonus
• Seizures

Polioencephalomalacia

• Thiamine Deficiency- Vitamin B1
  – High concentrate diets → rumen acidosis → thiaminases
• Sulfur Toxicosis
  – Gypsum (used as feed intake inhibitor), ammonium sulfate (urinary acidifier)
• Lead Toxicosis
  – Insecticides, herbicides, batteries, paints, gasoline, oil
  – DG: blood lead levels (>0.3ppm); check with your lab
  – Chronic cases: normocytic normochrmonic anemia

Polio and Lead Toxicity

• Central blindness classic presentation of both diseases
• Seizures can occur with both
• GI signs secondary to lead toxicity, polio secondary to GI diseases
• Both respond to thiamine, lead will usually relapse
• Lead levels may be normal in chronic lead cases
Polioencephalomalacia

- **Treatment**
  - Thiamine (5 mg/lb TID SQ) until improvement has stopped
  - Usually respond within hours if treated early
  - If no response in 1-2 weeks, prognosis is poor
  - Transfaunation

Listeriosis

- *Listeria monocytogenes*
- focal encephalitis and occas abortions
- Can have herd outbreaks
- Winter and early spring
- Grazing close to ground
- Wet rotting hay
- Silage

Listeriosis

- Depression and anorexia
- Circling can occur but not as common as in cattle
- Differential for any cranial nerve deficit
- **Diagnosis**
  - Response to treatment
  - CSF tap
    - Normal to increase protein and mononuclear cells
    - Culture?
- **DDX:** Paralaphostrongylus
  - Eosinophils on CSF
**Listeriosis**

- **Treatment**
  - Hard to predict response, use history
  - Tetracycline (5-10mg/kg IV BID)
  - Penicillin
  - Florfenicol?
  - Flunixin (1.1-2.2mg/kg SID-BID IV)
- **Supportive care**
  - Fluid support
  - Acid base support

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**Meningeal Worm**

- **Paralaphostrongylus tenuis**
  - Nematode parasite of white-tailed deer
  - Snail intermediate host
  - Late summer to winter
  - C.S. vary based upon number of larvae
  - Unilateral to bilateral hindlimb paresis/ataxia
- **Aberrant migration in other species causes clinical signs**
  - llamas/alpacas
  - sheep
  - goats
  - cattle
  - other deer

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**Meningeal Worm**

- **Treatment**
  - full recovery may not occur
  - Fenbendazole
    - 15-50mg/kg PO SID 5d
  - +/- macrocyclic lactone
    - Ivermectin (BBB 7) 200-400 microg/kg SC 5 d
  - Oxadecin (greater lipid solubility)
  - Flunixin
  - Glucocorticoids
  - Vitamin E

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**Plants Associated With Neurologic Diseases**

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Plant Category</th>
<th>Plant Name</th>
<th>Clinical Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paralysis</td>
<td>Toxic</td>
<td>Aconite</td>
<td>Shakies, tremors, death</td>
</tr>
<tr>
<td>Paralysis</td>
<td>Toxic</td>
<td>Yew</td>
<td>Shakies, tremors, death</td>
</tr>
<tr>
<td>Paralysis</td>
<td>Toxic</td>
<td>Hemlock</td>
<td>Shakies, tremors, death</td>
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<td>Paralysis</td>
<td>Toxic</td>
<td>Violet</td>
<td>Shakies, tremors, death</td>
</tr>
<tr>
<td>Paralysis</td>
<td>Toxic</td>
<td>Larkspur</td>
<td>Shakies, tremors, death</td>
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<tr>
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</tr>
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*Symptoms associated with neurologic diseases in domestic animals.*

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*Graphical representation of various plants associated with neurologic diseases.*
Enzootic Ataxia or Swayback

- Copper deficiency in unweaned lambs and kids
  - Congenital
    - Affects neonates born to dams with low Cu intake
    - Stillborn, weak, unable to stand, tetraparesis, death
  - Delayed onset
    - Affects lambs 2-4 months of age
    - Hindlimb ataxia → ataxia → paresis → death
  - DG: Cu in diet, plasma, and liver

Tetanus

- Clostridium tetani
  - Ubiquitous, soil
  - Wounds, tail docking, etc
- Clinical Signs
  - Stiffness head neck tail, sawhorse stance, erect ears, 3rd eyelid prolapse, salivation, convulsions
- Sedation, Penicillin
- Prevention
  - CD/T vaccine to pregnant females
  - Lambs and kids 2-3 months age, booster

Periparturient Diseases

- Pregnancy toxemia
- Vaginal prolapse
- Uterine prolapse
- Retained fetal membranes
- Metritis
- Pyometra- rare
- Hypocalcemia
As a general rule, these problems are more common in sheep than goats

Pregnancy Toxemia

- Final trimester of pregnancy
- Multiple fetuses
  - Twin pregnancy requires 180% more energy than singletons
  - Triplets require 240% more energy than singletons
- Negative energy balance
  - can’t eat enough food to take care of multiple fetuses
  - Lipases activated → break down fat → ketosis
- Obese or extremely thin ewes more prone to developing condition
Pregnancy Toxemia

- Clinical Signs and Diagnosis
  - depression
  - recumbency
  - tremors
  - bruxism
  - staggering
  - incoordination
  - ↑ in urine ketones

- Treatment must be immediate & aggressive
  - remove fetuses (c-section, induction)
  - glucose IV
  - 50% dextrose IV
  - propylene glycol by mouth
  - B vitamins to stimulate appetite
  - transfaunation

Pregnancy Toxemia

- Prevention
  - Maintain good level of nutrition
    - Proper BCS throughout year (2.5 to 3)
  - I.D. animals with multiple fetuses and supplement feed intake slowly over gestation
  - Spot herd checks of urine ketones

Vaginal Prolapse

- Occurrence
  - Typically prepartum
  - Estrogen (clovers)
  - Tail-docking (proximal to ccg 6)
  - Obesity
  - Multiple fetuses
  - Genetics
Vaginal Prolapse: Ewe

- Treatment
  - Replacement - epidural, clean, replace
  - Retainment options:
    - Plastic prolapse retainer
    - Shoelace pattern
    - Buhner
  - Cull

Uterine Prolapse: Does, Ewes

- Post-partum
  - Increased w/dystocia
- Treatment
  - Elevate hindquarters to aid in reduction

Retained Fetal Membranes

- Placenta should be expelled by 6 hours
- May be caused by...
  - mineral deficiencies
  - infectious abortions
  - obesity in doe
  - hypocalcemia
  - dystocia
### Retained Fetal Membranes

- **Treatment**
  - Wait and see if expel by 12 hours if animal seems well
  - Oxytocin or PGF2a

### Metritis and Endometritis

- Uncommon in sheep/goats
- Increased incidence in:
  - Dairy goat breeds
  - RFM
  - Dystocia
  - Abortion
- **Diagnosis**
  - Foul smelling discharge
  - Animal may be ill
- **Treatment**
  - Abics, ecbolics, NSAIDs, IV fluids

### Milk Fever or Hypocalcemia

- Seen in last 2 weeks of gestation
- May look like pregnancy toxemia
  - Often seen concurrently
  - Uncoordinated & hyperactive
  - Become recumbent
- Tx: IV or oral calcium
- Prev: balanced ration gestation

### Diseases of the Eye

- **Infectious Keratoconjunctivitis**
  - Mycoplasma spp. with most common M conjunctivae
  - **Dg:**
    - Culture: swab and into Mycoplasma transport media
    - RT-PCR on swabs
    - ELISA for sheep
  - **Treatment**
    - Will self resolve but very infectious
      - Speed recovery
        - Oxytet (10-20mg/kg SQ)
        - Topical tetracycline +/- polymyxin B SID 5d
    - Some do chlortetracycline in feed (80mg/hd/day)
Disease of the Eye

- Chlamydophila Keratoconjunctivitis
  - C abortus
    - Abortion and orchitis in small rums
  - C pecorum
    - Keratoconjunctivitis and polyarthritis outbreaks in sheep flocks
- High morbidity – c.s. look like Mycoplasma
- Treatment - same as Mycoplasma
  - Some recommend 150-200mg/hd/day tetracyline in feed

Common Procedures Small Ruminants

C-Section

- Sedation
  - Xylazine
- Local
- Halfway between lateral and sternal
- Person at head
- Tie legs
- Left flank
- Have O2 ready if possible

Nerve Blocks

- Similar to other species
- Lidocaine toxicity potential
  - Maximum dose
    - Lidocaine or mepivacaine 6 mg/kg
    - 2 mg/kg bupivacaine
  - Dilute half and half with sterile saline to increase volume
Castration

• Tetanus prophylaxis
• Commercial goats-just like calves or lambs-in first week of age
• Pets-wait until puberty?
  – Heavy sedation or general anesthesia
  – Local block of scrotum and testicles/cord
  – Remove bottom third of scrotum
  – Emasculate and double ligate-one fixed

Disbudding kids

• Ideal age less than 2 weeks
  – 3-5 days for buck kids
  – 5-7 days for doe kids
• Electrothermal dehorning
  – 200-watt dehorner
  – copper tip
Dehorning

- Tetanus prophylaxis
- Heavy sedation or general anesthesia
  - Xylazine
  - Have reversal ready
- Dilute lidocaine and ring block
- **Goats have 2 nerves to block**
  - Cornual branch of Lacrimal N and Infratrochlear N
- Scalpel then hoof nippers for kids
- OB or gigli wire for adults
- bandage

Disbudding kids

- Restraint
  - Disbudding box
  - Provide sedation/analgesia
    - Sedation
      - xylazine (0.025-0.05 mg/#)
      - butorphanol (0.05 mg/#)
      - mix together in same syringe and give IM or IV
    - Sedation may be used in conjunction with,
      - 1% lidocaine ring block around base of horn bud
    * if necessary, reverse xylazine with tolazoline (2mg/#)
Disbudding kids

Thermal meningitis

Fluid Therapy: Catheters

- Adult sheep/goats/llamas/alpacas and crias: 16 G 3.25" in jugular
- Kids/lambs: 18G 2" in jugular
- Always make stab incision completely through skin with #15 blade, will save time and catheters
- Glue and tape in place
- J-loop in crias
Alternative to Jugular Catheters

- Ear vein
- Intraosseous in neonates
- Subcutaneous fluids should be avoided
- Intraperitoneal fluids only if no other route

Alternative Fluids

- Hypertonic saline/dextran + oral fluids
  - O.K for lambs and kids
  - Variability of sodium in crias makes this less than ideal as compared to calves

Fluid therapy: Sheep and Goats

- Treat like any other species
  - Stick with balanced electrolytes unless have specific bloodwork
  - Have rumen-take advantage
- Neonates more likely to be acidotic
  - May need bicarb

Adult Sheep and Goats

- Alkalotic
  - Except:
    - Pregnancy toxemia
    - Grain overload
- Mild hypokalemia
- Mild hypocalcemia
Llamas/Alpacas

- Unpredictable electrolyte and acid/base status so always try to run bloodwork, esp. in crias
- Adults get fatty liver commonly when off feed so consider PPN if anorexic for more than a few days
- Camelids get hypoproteinemic easily
  - Careful with fluid amounts and rates
  - Monitor PCV/TP
  - Bolus fluids
- Due to stoic nature, camelids can hide serious illness until very late
  - Be aggressive in treatment

Oral Fluids

- Avoid gatorade, sugar water, etc.
- Use calf electrolytes if possible
- Fecal water content may increase

Is a Transfusion Necessary?

- Acute vs. chronic anemia
- Let animal decide
  - If respiratory distress, extreme weakness, anorexia, consider transfusion
- May speed recovery
- Risks
  - Stress
  - Anaphylaxis

Transfusions

- Make sure donor PCV is normal before collecting blood!
  - Hard in haemonchosis/lice infested herd
- Collect 10-15 ml/kg BW from donor
- Administer 10-20 ml/kg
  - Expect PCV increase 3-6 points
  - IV or intraperitoneal
Anemia Therapy

- May need iron supplementation if chronic blood loss anemia
  - INJECTION!
- Treat underlying cause