Non-sporeforming Obligate Anaerobes

- **Gram-negatives**
  - *Bacteroides*
  - *Fusobacterium*
    - long, fusiform filament
  - *Dichelobacter*
    - large, curved rod
  - *Prevotella*
    - coccobacilli
  - *Porphyromonas*
    - coccobacilli

- **Gram-positives**
  - *Actinobaculum suis* - sows
    - Cystitis, necrotizing ureteritis/pyelonephritis
  - *Eubacterium tortuosum*
    - Liver/spleen granulomas
  - *Peptoniphilus (Peptostreptococcus) indolicus*
    - Summer mastitis – headfly activity (*Hydrotæa irritans*)

- Often found as part of normal flora (mucosal, rumen) or environment
- Infections are polymicrobial: abscess, empyema, necrotizing
- Dx should include direct smear: morphology, compare to culture results
- Use anaerobic transport (Cary-Blair) or tissue blocks (O₂ kills)

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**Bacteroides spp.**

- GIT source: up to 50% of vet hospital anaerobic isolates

- *Bacteroides* spp.
  - Soft Tissue Infections (STI's): cellulitis, abscesses (periodontal, lung/liver), empyema, mastitis, osteomyelitis
  - Multiple animal species

- *Bacteroides fragilis*
  - neonatal diarrhea (food animals) pyometritis, mastitis

- Dx – direct smears are valuable
  - Cary-Blair transport medium, ambient temp., culture O₂ + no O₂
  - Tissue blocks > cubic inch in airtight jar, needle aspirates
  - species diff'n – carbohydrate fermentation

- Tx with Pen G, Clavamox – dogs/cats
**Fusobacterium spp.**

- Gram -ve, long rods with tapered (fusiform) ends
- Typically originate from normal oral or GIT flora
- Necrobacillosis – leukotoxin
  - Calf Diptheria
  - **Bovine Rumenitis** - liver abscess complex
  - Equine Thrush
  - **Ovine** and Bovine Footrot
  - Necrotic Rhinitis “Bull-nose” swine

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**Fusobacterium spp.**

- Calf Diptheria – not uncommon
  - Focal necrotic laryngitis, tracheitis
  - Therapeutic Abx: Oxytet

**Equine Thrush** – keratinolytic in frog area
- hoof-care (O2 exposure)
- Kopertox (Fort Dodge), Hooflex® Thrush Remedy (Absorbine)
**Fusobacterium spp.**

- **Bovine Rumenitis/liver abscess**
  - Hepatic necrobacillosis + *A. pyogenes*
  - Very significant problem (beef)
  - ↑'d CHO → rumenitis
  - Focal inflammation in rumen wall
    - *F. necrophorum* → hepatic portal circulation
      → bacterial thrombi → liver
  - Vaccine(s)?
    - Fusogard® *F. necrophorum* (Canada-USA)
    - (Centurion: Schering Plough) *F. necrophorum* / *A. pyogenes*
  - Virginiamycin (V-Max®) in feed
  - Lambs – umbilical to liver, lungs

- **Fusobacterium spp.**
  - Bovine **Footrot** – Interdigital Necrobacillosis
  - Pathogen partner: *Prevotella melaninogenica*
  - Contagious, warm wet weather
  - Signs – single hoof lameness, fever, necrosis, foul exudate
  - Vaccination
    - Fusogard®: Canada and USA
  - **Footbath** (CuSO₄, formalin)
  - **Abx** – Ceftiofur (Excenel)
Ovine Interdigital Dermatitis - Footrot

- $$$ imp. 90% of lameness
- Australia, New Zealand, U.K., N.A.
- *Dichelobacter nodosus*

- Pathogenesis – *F. necrophorum, A. pyogenes?*
  - digestion/invasion of horn laminae
  - Hoof separation
- Dx – signs, culture and i.d.


Ovine Footrot – Interdigital Dermatitis

- Intervention – within 3 days of seeing

- Management – quarantine, treat
  - Genetics
  - hoof care
  - foot bath (5% formalin, 10% ZnSO4)
  - Cull

- Vaccine
  - Footvax®: *D. nodosus* – sheep (UK, NZ, Australia)

- Parenteral Abx - effective
  - Oxytetracycline, Penicillin/ Streptomycin
**Prevotella (Bacteroides) spp.**

- Bovine footrot – less common than ovine
  - *F. necrophorum + /− Prevotella melaninogenica, Porphyromonas levii*

- Summer mastitis
  - U.K., Northern Europe, Japan a bit in Florida
  - Sheep headfly (*F. necrophorum > Peptoniphilus indolicus > Porphyromonas levii > Prevotella melaninogenica*)

- STI’s (bite wounds) polymicrobial infection in dogs/cats/humans
- Culture and i.d. – not commonly done
- No vaccines
- Abx as per other non-spore forming anaerobes

**Porphyromonas (Bacteroides) spp.**

- Non-motile, pleomorphic G−ve rods
- 13 species: oral cavity (animals/man)
  - *P. gingivalis* (human/animal biotypes)
    - Role in **periodontal disease**
      - Pain, early tooth loss, nutrition
      - Bacteremia’s → cardiovascular disease
      - “Broken-Mouth” sheep
- Dx: culture and morphology
- Intervention – gum, tooth care
- Vaccine? – for canine periodontal disease
  - Pfizer **conditional license** for canine *Porphyromonas* spp. vaccine
- *P. levii* can participate in:
  - Summer mastitis, polymicrobial infections with *Actinomyces* (dogs)
  - *F. necrophorum* in bovine/ovine footrot