VMP 930
Veterinary Parasitology

Ticks
Ticks

- Family Argasidae - soft ticks
  - Only 4 genera of Argasidae - Argas, Ornithodoros, Otobius (not covered) and Carios (not covered)

- Family Ixodidae - hard ticks
  - 4 main genera of Ixodidae covered because of their presence in North America - Ixodes, Rhipicephalus, Dermacentor, and Amblyomma
  - 1 Introduced Hard Tick - Haemophysalis longicornis, Asian longhorned tick.
Argasidae - Soft Ticks

- Leathery body without plates or scutum
- Ventral gnathostome
- Feed on multiple individual hosts - generally live in burrows or nests and lay multiple batches of eggs
Argas persicus (Fowl tick)

- Primarily parasites of birds
- Ecology
  - live in nests, rarely found on host, feeds quickly and gets off bird
  - live for up to 12 years
  - egg to adult in as little as 30 days
  - lay clutches of 25 to 100 eggs
  - adults may live up to 2 yrs without feeding
- Gulf of Mexico & Mexican border in USA
Pathology

- Pathology - anemia, secondary infection at wound site
- Disease transmission - Fowl borreliosis (*B. anserina*) in South America
- Tick paralysis in chickens
Ornithodoros

- Feeds on rodents
- Mainly in Rocky Mountain and Pacific Coast region.
- Found in burrows, not on host.
- Nocturnal, quick feeding.
- A vector for relapsing fever in humans (Borrelia spp.).
Ornithodoros
Hard Ticks

- General Arachnid characteristics
- Ornate or inornate **scutum** covers the full dorsum of males, but only the anterior dorsum of females.
- The gnathostome (capitulum) projects anteriorly.
3-Host Tick Life Cycle

Adults attack, mate, & feed on 3rd host

Engorged female drops off 3rd host & lays eggs

Eggs hatch in environment

Larvae attack & feed on 1st host

Larvae drop off & molt to nymphs

Nymphs attack & feed on 2nd host

Nymphs drop off & molt to adults

Veterinary Parasitology Group
Important 3-host ticks (to memorize)

- *Amblyomma americanum* - Lone Star tick
- *Rhipicephalus sanguineus* - Brown Dog tick, Kennel tick
- *Dermacentor variabilis* - American Dog tick
- *Ixodes scapularis* - Black-legged tick, Deer tick
Ticks to memorize

*Ixodes scapularis*  
(Black-legged Tick, Deer Tick)

*Dermacentor variabilis*  
(American Dog Tick)

*Amblyomma americanum*  
(Lone Star Tick)

*Rhipicephalus sanguineus*  
(Brown Dog Tick Kennel Tick)
2-Host Tick Life Cycle

- Adults attack, mate, & feed on 2nd host
- Engorged female drops off 2nd host & lays eggs
- Nymphs drop off & molt to adults
- Eggs hatch in environment
- Larvae attack & feed on 1st host
- Larvae molt to Nymphs on 1st host
- Nymphs feed on 1st host

Ex. Rhipicephalus evertsi
1-Host Tick Life Cycle

Ex. Rhipicephalus (Boophilus) annulatus
Which is “Easier” to control / eradicate?

1-Host Tick Life Cycle

2-Host Tick Life Cycle

3-Host Tick Life Cycle
Eradication of Texas Cattle Fever

Boophuilus annulatus (1-host tick) vector for Babesia bigemina
Asian Longhorned Tick (Introduced)
  - Australasian and Western Pacific Region
  - Confirmed cases in VA, WV, NJ, NY, PA, NC, MD, TN, AR, CT, KY

Emerging parasite problem
  - NC bull was exsanguinated by 1000+ ticks
  - Very aggressive, “mob” a host

Potential vector of several viral, bacterial, and protozoan agents of livestock and human disease

Ecological Success
  - Females are parthenogenetic, and produce 2,000 clones
  - 3-host tick
Haemaphysalis longicornis
Haemaphysalis longicornis

**Rhipicephalus**

**Haemaphysalis**

Used by permission, USDA APHIS, Agriculture Handbook No. 485.
Behind mosquitoes, ticks are the second most important group of ectoparasites.

- Ticks are most important as a scourge to man’s domesticated animals, especially cattle.
Tick Associated Pathology

- Tick paralysis, tick toxicosis
- Blood loss *(may result in severe anemia or death)*
- Wound production
  - Secondary bacterial infection
  - Invasion sites for screwworms / blow flies
- “Tick worry”
  - Decreased grazing, Weight loss
- Damage to hides
Tick Associated Pathology

DISEASE TRANSMISSION

Protozoal diseases
- Bovine babesiosis (Texas Cattle fever)
- Equine babesiosis
- Canine babesiosis
- Theilerioses (East Coast fever)

Rickettsial diseases
- Canine, equine, bovine, ovine & human ehrlichiosis
- Heartwater (Cowdria)
- Bovine anaplasmosis

Other Bacterial Diseases
- Tularemia (rabbit fever)
- Spirochetosis of livestock and poultry
- Brucellosis

Viral diseases
- Nairobi sheep disease
- African swine fever
Tick Associated Pathology
DISEASE TRANSMISSION

Why are Ticks Excellent Vectors?
1. Persistent feeders -- hard to dislodge

2. Slow feeders
   - much time for transmission of pathogen
   - geographic dispersal

3. Low host specificity -- diverse host sources of pathogens

4. Longevity -- much time to acquire & transmit a pathogen throughout life
Tick Associated Pathology
DISEASE TRANSMISSION

Why are Ticks Excellent Vectors?

5. Transovarian Transmission  --  Pass pathogen to next generation

6. Transstadial Transmission  --  Retains pathogen throughout life stages

7. Hardy  --  persists in environment

8. High fecundity  (Some ticks up to 18,000 eggs per female)
Tick Control

- Nonchemical Control
  - Brush or vegetation removal
    - Much labor & expensive
  - Resistant cattle breeds
    - Hereford most susceptible
    - Brahman least susceptible
  - Vaccines against ticks
    - Australian tick vaccine
  - Predators and parasites
    - Naturally present but have little impact
**Tick Control**

- **Chemical Control**
  - Dips or dip-vat
  - Whole body spray
  - Topicals, dusts
  - Insecticide impregnated ear tags & collars
  - Injectants & acaricide boluses (systemics)
Important Points

- Know the tick life stages and the life cycles of 1-host, 2-host, & 3-host ticks.
- Know the 4 common ticks listed (scientific & common names)
- Know the introduced tick and its importance.
- Know tick associated pathology
- Appreciate the magnitude & diversity of DZ’s transmitted by ticks
- Know tick characteristic that make the excellent vectors
- Types of chemical control of ticks
Important Points

MEMORIZE the 4 ticks listed
(scientific & common names)

- **Amblyomma americanum** - Lone Star tick
- **Rhipicephalus sanguineus** - Brown Dog tick, Kennel tick
- **Dermacentor variabilis** - American Dog tick
- **Ixodes scapularis** - Black-legged tick, Deer tick