

ARTHROPODS

Class Arachnida

Superfamily Ixodoidea: Ticks

Family Ixodidae - hard ticks

General Life Cycle

- Hard ticks have 1, 2 or 3 host life cycles
- Hosts may include mammals, birds and reptiles
 - Reservoir hosts are asymptomatic carriers for tick-borne pathogens
 - Incidental host usually are symptomatic when infected with tick-borne pathogens
- There are 4 tick life stages - egg, larva, nymph, adult
- After feeding and mating, females lay eggs. Eggs covered with waxy coating to resist desiccation and keep egg mass in clump. Several thousand eggs. Maximum = 22,891, *H. nuttall*. Female hard tick dies after laying eggs
- Larvae hatch in ~ 2 weeks to 7 months. Larvae feed for 3 to 10 days, detach and molt to nymphs.
- Nymphs feed for 3 to 10 days detach and molt to adults.
- Adults attach to host; females feed for 1 to 3 weeks; males feed but do not engorge. Mate on host; males die. Females detach and drop to ground to lay eggs.

Morphology

- Have a dorsal scutum that nearly covers the back of the male's but only the anterior part of female's back.
- The gnathostome projects anteriorly.

Life cycle and epidemiology

3-host tick

- Adult females mate and engorge only once and drop off to lay batches of eggs
- The newly hatched larvae wait for a host to come by (questing)
- Larva feeds, drops off, molts to a nymph
- Nymph waits for another host to come by, feeds, drops off, molts to an adult
- Adult waits for a host to come by, feeds for third time, mates; female drops off to lay eggs

Examples

Amblyomma americanum -- lone star tick; *Rhipicephalus sanguineus* – brown dog tick, kennel tick; *Dermacentor variabilis* – American dog tick; *Ixodes scapularis* – black legged tick, deer tick

2-host tick

- Feed on 2 separate hosts as larvae and adults
- Adults mate and female lays eggs without feeding a third time.

Example

Ripicephalus evertsi sub-Saharan Africa

1-host tick

- Feeds in all 3 stages of life on the same host.
- Only recently hatched larvae need look for a host

Examples

Rhipicephalus (Boophilus) microplus

R. (B.) annulatus eradicated from USA, reportable vector of bovine piroplasmosis (*Babesia*)

Dermacentor albipictus

Economic Importance

- Of all external parasites of livestock, from a worldwide view, ticks are the most important in terms of effect on the well being of man's domesticated animals, especially cattle.
- In the U.S., annual losses to the cattle industry due to the reintroduction of bovine babesiosis is estimated at > 1 billion dollars/year. Losses may result from several factors.

Disease transmission -- Ticks are the most important transmitters of a variety of disease agents to domestic animals and are second to mosquitoes as transmitters of diseases to man.

Protozoal diseases

- Bovine piroplasmiasis (bovine babesiosis, cattle tick fever, Texas cattle fever), Equine piroplasmiasis (equine babesiosis, horse tick fever), Theilerioses (East Coast fever in Africa), *Babesia vogeli* and *Babesia gibsoni* (canine pathogens), *Cytauxzoon felis* (feline pathogen)

Rickettsial diseases

- Canine, equine, bovine, ovine, human ehrlichiosis, Heartwater (Cowdria), Bovine and equine anaplasmosis, Spotted-fever group *Rickettsiae* (Humans, dogs among other mammals).

Other bacterial diseases

- Lyme disease, Tularemia (rabbit fever), Spirochetosis of livestock and poultry, Brucellosis

Viral diseases

- Nairobi sheep disease, Louping ill, African swine fever

Other Pathology

- Tick paralysis, tick toxicosis from toxin in tick saliva
- Blood loss (may result in severe anemia or death)
- Wound production
 - i) Secondary bacterial infection. ii) Invasion sites for screwworms or other blow flies
- "Tick worry"
 - i) Decreased grazing ii) Weight loss
- Damage to hides

Tick Behavior

- Wooded-brushy habitat. (exception is the brown dog tick which will breed indoors)
- Host acquisition - odor, vibration, air currents, heat, moisture, shadows.
- Immature stages generally feed on small animals; adults on large animals.
- Survival - availability of host; humidity of 85%+

Control

- Large scale – difficult. Feeding habits, Developmental habits, Reproductive potential
- Chemical -- Dips or dip-vat, Whole body spray, Topicals, dusts, Insecticide impregnated ear tags. Injectants and insecticide - acaricide boluses
- Oral preventatives for dogs and cats
- Nonchemical
 - Brush or vegetation removal . Most effective on large scale. Time, labor, equipment and money needed; if combined with pasture management, is attractive.
 - Resistant cattle breeds (Hereford most susceptible, Brahman least susceptible)
 - Vaccines against tick -- Australian tick vaccine
 - Predators and parasites -- Naturally present but have little impact