

LECTURE #11: TICKS

A. Superfamily Ixodoidea.

1. Family Ixodidae - hard ticks

General Life Cycle

- (a) There are 4 life stages - egg, larva, nymph, adult
- (b) After feeding and mating, females lay eggs. Eggs covered with waxy coating to resist desiccation and keep eggmass in clump. Several thousand eggs. Maximum = 22,891, *H. nuttal*. Female hard tick dies after laying eggs
- (c) 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

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

Life cycle and epidemiology

- (a) 3-host tick
 - 1) Adult females mate and engorge only once and drop off to lay batches of eggs
 - 2) The newly hatched larvae wait for a host to come by (questing)
 - 3) Larva feeds, drops off, molts to a nymph
 - 4) Nymph waits for another host to come by, feeds, drops off, molts to an adult
 - 5) Adult waits for a host to come by, feeds for third time, mates and female drops off to lay eggs

Examples

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

- (b) 2-host tick
 - 1) Feed on 2 separate hosts as larvae and adults
 - 2) Adults mate and female lays eggs without feeding a third time.

Example

Rhipicephalus evertsi sub-Saharan Africa

- (c) 1-host tick
 - 1) Feeds in all 3 stages of life on the same host.
 - 2) Only recently hatched larvae need look for a host

Examples

Rhipicephalus (Boophilus) microplus
R. (B.) annulatus eradicated from USA, reportable vector of bovine piroplasmiasis (*Babesia*)
Dermacentor albipictus

B. ECONOMIC IMPORTANCE

1. 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.
2. In the U.S., annual losses to the cattle industry due to the reintroduction of bovine babesiosis is estimated at > 1 billion dollars/year.
3. Losses may result from several factors
 - (a) Disease transmission
 - 1) 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.
 - 2) Protozoal diseases
 - a) Bovine piroplasmiasis (bovine babesiosis, cattle tick fever, Texas fever)
 - b) Equine piroplasmiasis (equine babesiosis, horse tick fever)
 - c) Theilerioses (East Coast fever in Africa)
 - 3) Rickettsial diseases
 - a) Canine, equine, bovine, ovine and human ehrlichiosis
 - b) Heartwater (Cowdria)
 - c) Bovine anaplasmosis
 - 4) Other bacterial diseases
 - a) Lyme disease
 - b) Tularemia (rabbit fever)
 - c) Spirochetosis of livestock and poultry
 - d) Brucellosis
 - 5) Viral diseases
 - a) Nairobi sheep disease
 - b) Louping ill
 - c) African swine fever
 - (b) Other Pathology
 - 1) Tick paralysis, tick toxicosis
 - 2) Blood loss (may result in severe anemia or death)
 - 3) Wound production
 - i) Secondary bacterial infection
 - ii) Invasion sites for screwworms or other blow flies
 - 4) "Tick worry"
 - i) Decreased grazing
 - ii) Weight loss
 - 5) Damage to hides

C. Tick Behavior

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

D. Control

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