

TICKS

Glossary/Terminology

Tick Anatomy Terms

Basis capituli: portion of the tick anatomy that attaches the head to the body of the tick

Cuticle: outer covering of the tick

Festoons: distinguishing characteristic of some hard ticks; small rectangular areas separated by grooves along the posterior edge of the scutum in both male and female ticks

Hypostome: barbed structure located between the palps which anchors the tick to the host during feeding

Palps: paired, leg-like sensory structures protruding from the basis capituli at the head of the tick that allow the tick to detect an approaching host

Scutum: hardened dorsal plate or shield on the back of a tick

Tick Lifecycle Terms

1-host tick: tick species capable of completing all three life cycle stages of larvae, nymph, and adult on the same host

3-host tick: tick species that requires feeding on three different hosts to complete its life cycle, one host for each of the three life cycle stages of larvae, nymph, and adult.

Engorged: Enlargement or distention of a tick following a blood meal

Larvae: immature stage of the tick life cycle following molt from an egg

Molting: shedding of the cuticle

Nymph: immature stage of tick life cycle following molt from a larvae

Categories

Tick species can be generally categorized into two different family groups: hard ticks (Ixodids) and soft ticks (Argasids). Hard ticks have a scutum and are more commonly seen, including the Ixodes, Dermacentor, Amblyomma, and

Rhipicephalus ticks, just to name a few. Soft ticks do not have a scutum and are less prevalent with Otobius species being the most frequently seen soft ticks on cattle and horses.

Lifecycle/Biology

Distribution and activity of each species of ticks in the U.S. is both geographical and seasonal.

While most tick species in the U.S. are active in moderate climates from the spring through the fall, some tick species in warmer parts of the country can be active year round. Additionally, one tick in particular, *Dermacentor albipictus*, is active primarily in the winter throughout the continental U.S.

There are four stages in the life cycle of the tick: the egg, the 6-legged larvae or seed tick, the 8-legged nymph, and the adult (male and female). Transition from one stage to the next is made by one or more moltings (shedding of the cuticle). After hatching from eggs, ticks must ingest a blood meal from a host during each successive life stage to survive. Many tick species have a 3-host life cycle and some have a 1-host life cycle.

In ticks with a 3-host life cycle, development of the tick from larvae to nymph to adult requires feeding on a different host at each stage (i.e. 3 different host species are needed to mature to adult stage). The larva and nymphs of these ticks usually feed on a variety of host species, such as birds and small mammals, while the adult stages often feed on larger mammals such as cattle, horses, and deer. Three-host ticks typically can complete their life cycle in one to two years.

Ticks with a 1-host life cycle will attach to a specific host in the larval stage and will molt into the nymph and adult stages all on the same host. One-host ticks can complete their life cycle in a few months to a year.

3-host tick life cycle: <http://tickapp.tamu.edu/images/three-host%20lifecycle.jpg>

1-host tick life cycle: <http://tickapp.tamu.edu/images/One-host%20tick%20lifecycle.jpg>

Identification

Identification of tick species requires visual examination of specific morphology of the tick either with the unaided eye or under a magnifying lens. Factors to consider during evaluation include lifecycle stage of the specimen, whether the tick is male or female, and characteristics of key anatomical features such as scutum, festoons, basis capituli, and palps. Additionally, consideration of the common geographic distribution of certain tick species can aid the evaluator in correct species identification. The following link can be used to explore the distribution maps of common ticks in the U.S.:

http://www.cdc.gov/ticks/geographic_distribution.html

When examining the tick for identification, it is recommended that you first determine the correct life stage of the specimen (egg, larvae, nymph or adult). If the specimen is an adult, you should next determine whether the tick is male or female. Female ticks tend to be larger than males and the scutum, or hard shell, extends over the male's entire back, but extends only one-third of the way down the female's back. Finally, evaluate the colors and morphology of the scutum and palps (mouth parts) to identify the distinctive species of tick. If you are unable to determine the species or want confirmation of your field identification, consider submission of the specimen to a laboratory with a qualified entomologist. Additional guidance for tick submission to a laboratory is included in the "Clinical Signs and Diagnosis" section.

The following is a list of common tick species in the U.S. with links to pictures of the tick at various lifecycle stages:

***Ixodes scapularis* (Deer Tick or Blacklegged Tick)**

http://www.tickencounter.org/tick_identification/deer_tick#top

 TickEncounter Resource Center ***Ixodes scapularis* (Blacklegged ticks or Deer ticks)**



***Ixodes pacificus* (Western Blacklegged Tick)**

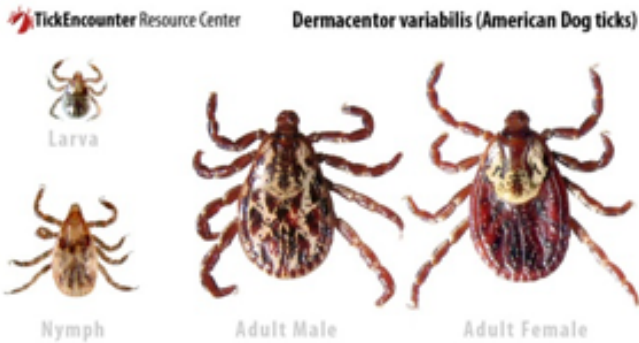
http://www.tickencounter.org/tick_identification/westernblacklegged_tick#top

 TickEncounter Resource Center ***Ixodes pacificus* (Western-Blacklegged Tick)**



Dermacentor variabilis (American Dog Tick)

http://www.tickencounter.org/tick_identification/dog_tick#top



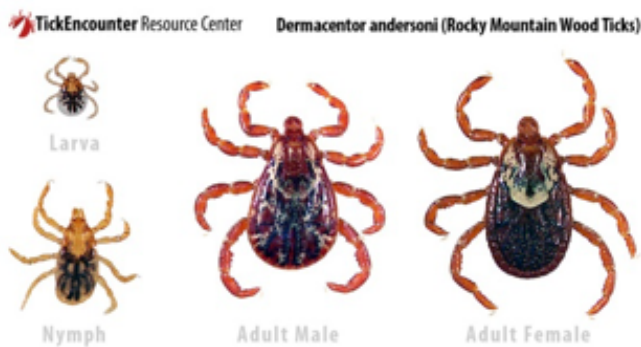
Dermacentor albipictus (Winter Tick)

http://extension.unh.edu/resources/files/Resource001955_Rep2885.pdf



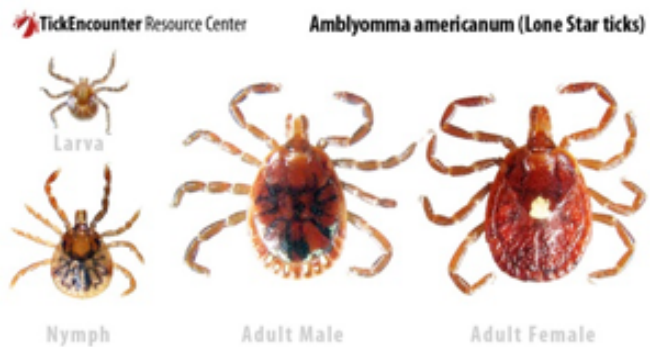
Dermacentor andersoni (Rocky Mountain Wood Tick)

http://www.tickencounter.org/tick_identification/rocky_mountain_wood_tick#top



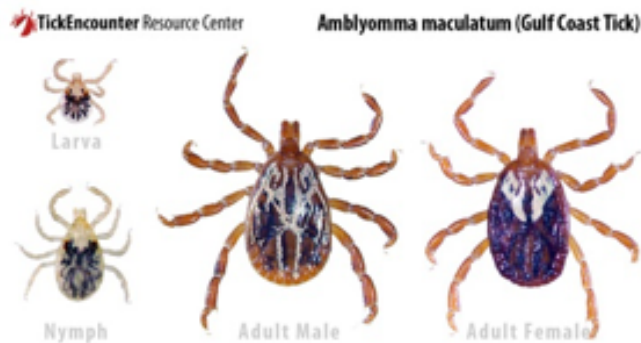
Amblyomma americanum (Lone Star Tick)

http://www.tickencounter.org/tick_identification/lone_star_tick#top



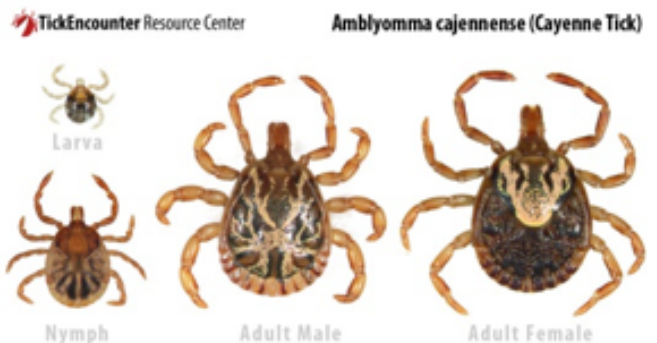
Amblyomma maculatum (Gulf Coast Tick)

http://www.tickencounter.org/tick_identification/gulf_coast_tick#top



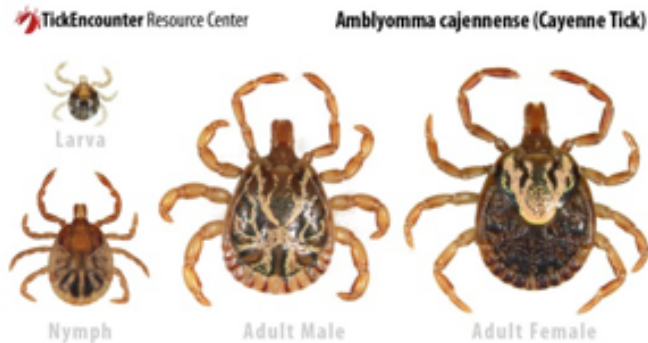
Amblyomma cajennense (Cayenne Tick)

http://www.tickencounter.org/tick_identification/cayenne_tick#top



Rhipicephalus sanguineus (Brown Dog Tick)

http://www.tickencounter.org/tick_identification/brown_dog_tick#top



Clinical Signs and Diagnosis

Examination of horses for the presence of ticks involved both visualization and careful palpation over all parts of the horse with specific focus on locations in which certain tick species prefer to attach. This combination of visualization and palpation in the examination for ticks is termed “scratching” for ticks. Scratching for ticks is a systematic procedure.

Taking into account the safety of the examiner and the horse, attempts should be made to thoroughly examine the following anatomical locations:

- Beginning at the horse’s head, examine the false nostrils visually and palpate with a forefinger;
- Slowly palpate the ears beginning around the base of each ear, moving to the caudal side of the pinna, and then around to the rostral side of the pinna of each ear sliding a finger down toward the ear canal as far as the horse will allow. (Note: some ear ticks may attach further down the ear canal than is reasonable to palpate, so consider performing an otoscopic exam on horses that have clinical signs of tick-borne disease, especially tick paralysis)
- Move to the forelock of the mane and with thumb opposed to fingers, palpate the forelock and continue palpating down the

Otobius megnini (Spinous Ear Tick)

<http://www.forestryimages.org/browse/detail.cfm?imgnum=1418002>



- manne from the forelock to the withers.
- Examine and palpate the submandibular/intermandibular space with fingers of the flattened hand feeling for any unevenness of the skin.
- Examine and palpate with a flattened hand down each side of the neck and to the center of the chest between the forelegs
- Examine visually and palpate the axilla of one side.
- Examine and palpate the posterior fetlock to the coronet of the front foot.
- Examine and palpate along the midline from the center of the chest caudally to the abdomen
- Visually examine the udder/scrotum area on one side.
- Examine visually and palpate the tail, perineum, and between the hindquarters including the inner thigh of each side.
- Examine and palpate the posterior fetlock to the coronet of the back foot
- Examine the udder/scrotum of the other side.
- Examine and palpate the posterior fetlock to the coronet of the other back foot.
- Examine and palpate the posterior fetlock to the coronet of the other front foot.
- Examine visually and palpate the axilla of the other side.

If ticks are found in the process of scratching, they should be removed carefully so as not to break off the capitulum. This is especially important in ticks with long mouthparts such as *Ixodes* and *Amblyomma* species. Forceps may be useful to grasp the tick near the head end as close to the skin of the host as possible and gently pull upward with steady, even pressure. If the mouthparts break off, remove them separately with the forceps. After removing the tick, thoroughly clean the bite area with iodine/betadine scrub and isopropyl alcohol or soap and water.

Ticks can also be collected from the environment (grass and other vegetation) by dragging a light colored flannel cloth over the area. This is termed “dragging” for ticks. The drag is made by attaching one end of the flannel cloth (30” x 60”) to a piece of wood, such as a broomstick, to which a strong cord is attached for a towline. Other more sophisticated tick traps, such as those that use CO₂ to attract

ticks to a bait station, can also be used.

Once collected, ticks can be placed in a blood collection tube or screw cap vial and preserved in 70% isopropyl alcohol. In this condition, they can be submitted to a laboratory for specific identification or confirmation of your field identification.

Associated Diseases/Conditions

Although a number of tick species present in the U.S. may be found on horses, few tick species are known at this time to transmit clinically relevant disease in the horse. It should be noted that ticks infected with relevant pathogens do not usually transmit those pathogens immediately and often must feed for a period of time before transmission of the pathogen occurs. Additionally, some ticks may transmit a pathogen, but at a volume lower than that necessary to cause clinical disease. The following table summarizes the most common tick-borne diseases in horses:

Table 1. Tick-borne diseases of horses.

| Disease | Pathogen(s) | Known Tick Vectors | Links to detailed information |
|--|--|--|---|
| Lyme Disease (Lyme Borreliosis) | <i>Borrelia burgdorferi</i> | <i>Ixodes</i> spp. | http://www.merckvetmanual.com/generalized-conditions/lyme-borreliosis/overview-of-lyme-borreliosis |
| Equine Piroplasmosis | <i>Theileria equi</i> , <i>Babesia caballi</i> | <i>Dermacentor variabilis</i> , <i>Amblyomma cajennense</i> , <i>Boophilus</i> sp. | http://www.aphis.usda.gov/wps/portal/aphis/ourfocus/animalhealth?1dmy&urle=wcm%3apath%3a%2Faphis_content_library%2Fsa_our_focus%2Fsa_animal_health%2Fsa_animal_disease_information%2Fsa_equine_health%2Fsa_piroplasmosis%2Fct_equine_piroplasmosis |
| Equine Granulocytic Anaplasmosis (formerly Equine Granulocytic Ehrlichiosis) | <i>Anaplasma phagocytophilum</i> (formerly <i>Ehrlichia equi</i>) | <i>Ixodes pacificus</i> | http://www.merckvetmanual.com/generalized-conditions/equine-granulocytic-ehrlichiosis/overview-of-equine-granulocytic-ehrlichiosis |
| Tick paralysis | | <i>D. variabilis</i> and <i>D. andersoni</i> most common causes, however <i>D. albipictus</i> , <i>I. scapularis</i> , <i>A. americanus</i> , <i>A. maculatum</i> , <i>R. sanguineus</i> , and <i>O. megnini</i> have also been implicated | http://www.merckvetmanual.com/nervous-system/tick-paralysis/overview-of-tick-paralysis |

While the diseases in the table above comprise the most commonly known tick-borne diseases encountered in horses, it should be noted that infection or co-infection with other as yet undefined or unknown tick-borne pathogens is possible. In human medicine, awareness is increasing that co-infection of people with multiple tick-borne pathogens is more common than previously thought. Given the 3-host tick patterns of most tick species, it is possible for them to be infected with multiple pathogens obtained from multiple hosts. For example, people confirmed as infected with Lyme disease have also been found to be co-infected with *Babesia microti* and *Mycoplasma* spp. It seems reasonable that these same types of co-infections, as yet undefined in horses, should be considered in clinical and diagnostic evaluation of horses suspected of harboring a tick-borne disease.

Specific Control and Treatment Measures

Treatment options for ticks on horses mostly include several choices of topical acaricide applied directly to the horse. Alternatively, orally administered ivermectin is effective against ticks on horses, however the tick must first take a blood meal from the treated horse to be affected by the drug. For tick species that may be capable of transmitting disease within a short period of time after feeding has begun, using oral ivermectin as the sole option for tick control may not mitigate tick-borne disease transmission and additional treatment modalities should be used in conjunction with this method.

It should be noted that Amitraz should NOT be used on horses as it is an alpha 2 adrenergic agonist which can cause toxic effects in the horse including a sedative effect and dose-dependent decrease in locomotor control and activity.

Table 2: Acaricides for treatment of the horse.

| Active ingredient | Formulations | Application | Important Notes |
|--|---|--|--|
| <ul style="list-style-type: none"> • Pyrethrins • Synthetic pyrethroids (permethrin, cypermethrin, resmethrin) | Ready-use-spray | Spray over body; spot treat legs, tail, mane, ears | |
| | Aerosol spray | Spray directly onto ticks, spot treat on/in ears | |
| | Emulsifiable concentrate spray | Spot treat back, legs, mane, tail, ears | |
| | Pour-on | Follow label directions | Safe to use on lactating mares |
| | Wipe-on | Use mitt to apply | Not for use on foals less than 3 months |
| | Spot-on | Follow label directions | Safe for foals older than 3 months |
| | Dip (hand soak or sponge) | Wet to skin; drip dry; avoid face | |
| | Impregnated garment (blankets, leg wraps) | Apply leg wrap/blanket to appropriate location | |
| | Back rubber | Horses will use freely | Keep applicator charged |
| Zeta-cypermethrin | Dusting powder | Follow label directions | |
| Coumaphos | Emulsifiable concentrate spray | Wet to skin, drip dry | Requires special license; organophosphate precautions for application; do not use on horses intended for slaughter |

Notes: Fipronil is effective against ticks and is available as a ready-to-use spray, but is NOT labeled for use on horses. Amitraz can have toxic effects in the horse and is contraindicated for any purpose.

Table 3. Acaricides for treatment of the environment, premises, pastures.

| Active Ingredient | Formulation | Application | Important Notes |
|--|--------------------------------|---|--|
| Pyrethrin | Dusting powder | Apply to cracks and crevices in barns and stalls | |
| | Emulsifiable concentrate spray | Apply in and around barns | |
| Permethrin | Aerosol spray | Barn floors, cracks and crevices | |
| | Emulsifiable spray concentrate | Paddocks and dry lots | |
| | Ready-to-use spray | Spot treatment of barns and stables | |
| Cypermethrin | Emulsifiable spray concentrate | Apply to perimeters of barns and outbuildings | |
| | Wettable spray powder | | |
| Commercial grade pyrethroids (for use on land/crops) | Emulsifiable spray concentrate | For use on pastures and pens; Follow label directions | Restricted use pesticide; requires personal protective clothing/measures |

Insecticide active ingredients labeled for topical application to control ticks and ear ticks*

| Active ingredients and concentrations | Application options | Precautions |
|--|---------------------------|--|
| Coumaphos 6.15% | Spray | Cholinesterase inhibitor |
| Cypermethrin 0.075% | Dust | |
| Cypermethrin 0.15% + Pyrethrins 0.20% | Spray or wipe | |
| Cypermethrin 1% | Spray or wipe | Do not use on foals under 3 weeks old |
| Permethrin 0.5% | Spray | |
| Permethrin 0.10% to 0.50% + Pyrethrins 0.05% to 0.20% | Spray, spot spray or wipe | Do not use on foals under 3 months old |
| Permethrin 0.90% + Tetramethrin 0.25% + Cypermethrin 0.10% | Spray or wipe | Do not use on foals under 3 months old |
| Permethrin 5% + 5% diflubenzuron IGR | Spray, wipe or Pour-on | Do not use pour-on application on foals |
| Permethrin 7.4% to 10%* | Pour-on, paste or wipe | Do not use on foals under 3 months old Do not ride within 24 hours of use |
| Permethrin 10% to 40%* | Spray or wipe | Dilute before use |
| Permethrin 45% | Spot-on | Do not use on foals under 3 months old |

References:

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