

What's Eating You? *Rhipicephalus* Ticks

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The genus *Rhipicephalus* includes 2 ticks of major importance. The first tick is *Rhipicephalus sanguineus* (the brown dog tick); it is common worldwide and acts as an important disease vector for both dogs and humans. It carries Rocky Mountain spotted fever and canine babesiosis. The second important tick in this group is *Rhipicephalus* (formerly *Boophilus*) *microplus* (the cattle tick); it generally is considered to be the most important livestock tick worldwide. Tick infestation causes cattle to lose weight and damages their hides. Cattle ticks also serve as important disease vectors, particularly for *Babesia* species and *Anaplasma marginale*. Cattle ticks have been estimated to cost countries such as Brazil as much as \$2 billion annually due to tick damage and control costs.¹ They are still prevalent in Mexico and a quarantine zone was established to prevent transmission in the United States. However, they are occasionally found in Texas and remain a threat to livestock in the United States. Although *R. microplus* is most commonly associated with cattle, it also may be found attached to bison and horses as well as a variety of other domestic and wild animals.

All *Rhipicephalus* ticks are teardrop-shaped hard ticks with an inornate scutum (Figure). They are various shades of brown and have a hexagonal basis capitulum (attachment at the base of the mouthpart), which is the most valuable identifying feature. The palps distal to the basis capitulum are very short. *Rhipicephalus microplus* lacks posterior festoons and the anal groove is absent or indistinct. To complete development, the tick requires 3 blood meals, once each as a larva, nymph, and adult.



Rhipicephalus ticks are teardrop shaped and brown with an inornate scutum and hexagonal basis capitulum.

Patients who present with a tick bite may report severe itching at the location of the tick attachment. The area will appear as erythematous papules because of antigens in the tick's saliva that cause a type IV hypersensitivity reaction. Patients who have been bitten by a tick infected with *Rickettsia* species present with eschar or tache noire, an ulcer covered with a black crust, in 32% of cases.² *Rhipicephalus sanguineus* transmits 2 forms of *Rickettsia*: *Rickettsia rickettsii* (causative agent in Rocky Mountain spotted fever) and more commonly *Rickettsia conorii* (causative agent in Mediterranean spotted fever [MSF][boutonneuse fever]). In the United States, the primary vector of *Rickettsia rickettsii* is *Dermacentor andersoni*, but brown dog ticks have been shown to harbor the organism in various regions including Arizona, California, and Georgia.³ Primary symptoms of Rocky Mountain spotted fever are nonspecific and include fever, headache, and myalgia. After 3 to 5 days of illness, a morbilliform rash may appear on the palms and soles and then spread to the trunk, but spotted fever is common and treatment should never be withheld because of absence of a rash.⁴

Mediterranean spotted fever is widespread in the Mediterranean area and is heavily endemic

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in Sicily. The disease usually occurs during the summer.⁵ As with other rickettsial disease, MSF affects endothelial cells, which results in vascular damage. Recovery is associated with complete regeneration of the endothelium.^{6,7} Four to 5 days following the onset of symptoms, 85% to 98% of patients will develop a morbilliform rash, which generally involves the palms and soles but spares the face.² Ocular manifestations also are common, with 83% of patients demonstrating unilateral or bilateral posterior segment involvement.⁸ Petechial lesions on the conjunctiva due to vasculitis also are frequent.⁹

Complications are more likely to occur in adults who have predisposing conditions, such as diabetes mellitus, cardiovascular illness, or renal failure. However, complications, such as atrial fibrillation, have been reported in the absence of these conditions.¹⁰ It is recommended that patients be placed on continual cardiac monitors when MSF is suspected.¹¹ Mild to moderate MSF is associated with a dominant type 1 immunity with a strong anti-inflammatory response.¹² *Rickettsia conorii* has been shown to induce a marked increase in IL-8 and adhesion molecules in endothelial cells involving activation of toll-like receptor 4.¹³ The tick's saliva induces regulatory dendritic cells that secrete IL-10, down-regulating the host's immune response and possibly allowing the tick to remain attached longer.¹⁴

The brown dog tick is of concern to public health because of its ability to thrive within human homes and kennels due to its relationship with domestic animals, especially dogs.¹⁵ A veterinarian should be consulted regarding tick control in animals. Agents such as fipronil can be applied prophylactically to dogs and work on the tick by promoting salivary gland degeneration and decreasing egg laying.¹⁶ Humans can prevent tick-borne disease by wearing protective clothing treated with permethrin, inspecting skin, and removing ticks promptly. If a tick is discovered, it can most easily be removed with tweezers, being especially careful not to squeeze the body of the tick.¹⁷ Several inexpensive plastic tick removal devices also are marketed and all work reasonably well. If a rickettsial disease is suspected, doxycycline should be promptly prescribed.²

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