

Rhipicephalus (Boophilus) microplus and R. australis

Cattle Tick,
Southern Cattle Tick,
Southern Cattle Fever Tick,
Asian Blue Tick

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Importance

Rhipicephalus (Boophilus) microplus (formerly *Boophilus microplus*) is an important livestock tick in tropical and subtropical regions. Although cattle and other bovids are its primary hosts, it can be found on other domestic animals and wildlife, and goats might be a maintenance host in some locations. Heavy tick burdens can cause anemia, decrease livestock productivity and damage hides. *R. microplus* can also transmit several pathogens including *Babesia bigemina* and *Babesia bovis* (bovine babesiosis), *Anaplasma marginale* (anaplasmosis) and the severe fever with thrombocytopenia syndrome virus. Increasing resistance to acaricides, including multi-acaricide resistance, complicates its control. *R. microplus* is closely related to *R. australis*, which was once considered to be the same species but has some small anatomical differences and occurs in different regions. Both ticks are members of the *R. microplus* complex, which also contains another related tick, *R. annulatus* (described in a separate factsheet).

Like *R. microplus*, *R. annulatus* is an important biological vector for *B. bigemina* and *B. bovis*. Control programs for these two ticks, conducted between 1906 and 1943, were key to eliminating babesiosis (also called “cattle fever”) from the United States. Before its eradication, this disease cost the U.S. an estimated \$130.5 million in direct and indirect annual economic losses; in current dollars, the equivalent would be \$3 billion. *R. microplus* and *R. annulatus* still exist in Mexico and South America, and a permanent quarantine zone, with continued surveillance and special regulations for livestock, is maintained along the Mexican border to prevent their reintroduction into the U.S. However, wildlife hosts of *R. microplus*, as well as both legal and illegal importation of cattle, complicate this control program. Similarly, Australia maintains a quarantine zone to contain *R. australis* in the northeastern locations where it is currently endemic.

Species Affected

R. microplus mainly infests cattle and related bovids such as banteng (*Bos javanicus*), gaur (*B. frontalis*), kouprey (*B. sauveli*), and water buffalo (*Bubalus bubalis*), but it can also be found on horses, donkeys, goats, sheep, camels, pigs, dogs and some free-living or captive wild mammals including cervids (e.g., white-tailed deer, *Odocoileus virginianus*; red deer, *Cervus elaphus*) and nilgai (*Bosephalus tragocamelus*). Although it was thought that other species are infested only when cattle or other bovids are present, laboratory experiments suggest that ticks can sometimes mature on some other animals (e.g., goats, rabbits, sheep) with varying efficiency; and white-tailed deer in North America and goats in Africa appear to act as maintenance hosts in the absence of cattle.

Geographic Distribution

R. microplus is widespread in subtropical and tropical regions. This tick is endemic in Mexico, parts of Asia, Africa and South and Central America, and various islands (e.g., Madagascar, Comoro Islands, Mascarene Islands, French Polynesia, Guam, Solomon Islands, the Caribbean). It has been eradicated from most of the U.S., but still occurs in a buffer quarantine zone in California and Texas, along the Mexican border, with occasional incursions beyond this zone.

R. australis is endemic in northeastern Australia, New Caledonia and Indonesia, and might also occur in other locations. In Australia, these ticks are contained within a limited geographic area by a quarantine zone on the border between Queensland and New South Wales.

Life Cycle

Ticks in the subgenus *Boophilus* can complete their life cycle in 3-4 weeks, which can result in a heavy tick burden. *R. microplus* is a one-host tick: once the larva hatches and finds a host, all of its life stages are usually spent on that animal.

Female *R. microplus* typically deposit their eggs in crevices or debris, or under stones. Once the larvae hatch, they crawl up grass or other plants to find a host. They may also be blown by the wind. The larvae can survive for as long as 3 to 4 months

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without feeding in summer, and up to 6 months in cooler temperatures. Thus, a tick may spend up to 80% of its life as a questing larva. Ticks that do not find a host eventually die of starvation.

Newly attached larvae (also called 'seed ticks') are usually found on the softer skin inside the thigh, flanks, and forelegs. They may also occur on the abdomen and brisket. Each developmental stage (larva, nymph and adult) feeds only once, over a period of several days. Larvae and nymphs molt to the next stage after feeding, while remaining on the same animal. Adult male ticks become sexually mature after feeding and mate with feeding females. An adult female tick that has fed and mated detaches from the host and deposits a single batch of many eggs in the environment, then dies after ovipositing.

Identification

R. microplus complex ticks belong to the family Ixodidae (hard ticks). Hard ticks have a dorsal shield (scutum) and their mouthparts (capitulum) protrude forward when they are seen from above. Members of the subgenus *Boophilus* have a hexagonal basis capitulum. The spiracular plate is rounded or oval and the palps are very short, compressed, and ridged dorsally and laterally. Males have adanal shields and accessory shields. The anal groove is absent or indistinct in females, and faint in males. There are no festoons or ornamentation.

R. microplus adults have a short, straight capitulum. The legs are pale cream and there is a wide space between first pair of legs and the snout. The body is oval to rectangular and the shield is oval and wider at the front. The snout is short and straight. Nymphs of this species have a body that is oval and wider at front, brown to blue-gray, with white at the front and sides, and an orange-brown scutum. The larvae have a short, straight capitulum, a brown to cream body and six legs.

R. australis differs from *R. microplus* in some features including smaller larvae with a narrow dorsal scutum, the presence of ventro-medial spurs in palpal segments in adult males, and abundant, plumose, pale white setae on the dorsum of adult females (compared to smaller, slim dorsal setae in *M. microplus* females). The median alloscutal setae are arranged in clusters of 4-6 rows in *R. australis* and clusters of 2-3 rows in *B. microplus*; however, this difference may not be visible in engorged female ticks.

Control

Disease reporting

Veterinarians who encounter or suspect the presence of an exotic tick should follow their national and/or local guidelines for disease reporting. In the U.S., state or federal authorities must be notified immediately.

Prevention

Measures used to exclude exotic ticks from a country include pre-export inspections to certify that animals are free

of ectoparasites, quarantines upon entry, and treatment with acaricides. During the first half of the 20th century, *R. microplus* and the closely related tick *R. annulatus* were eradicated from most of the U.S. in order to eliminate bovine babesiosis. This program, which included acaricide treatment of both cattle and equids, was facilitated by these ticks' one-host life cycle and preference for feeding on cattle. It required considerable resources and time, and was complicated in Florida by the presence of white-tailed deer as alternate tick hosts.

Currently, tick incursions from Mexico are controlled by USDA APHIS Fever Tick Eradication Program personnel, including mounted inspectors called "tick riders." Tick riders patrol the Rio Grande River, inspect ranches in the quarantine zone, and apprehend stray and smuggled livestock from Mexico. If a ranch in this zone becomes infested, it is placed under a 6-9 month quarantine and the animals are treated with acaricides. Before being moved from the quarantine zone, all cattle and horses must be inspected and given a precautionary acaricide treatment. Due to the occurrence of ticks on white-tailed deer and possibly feral nilgai, control programs also incorporate ivermectin-based feed and acaricide treatments for wildlife. Similarly, a quarantine zone in Australia helps confine *R. australis* to the northeastern parts of the country.

Acaricides are used in endemic regions to eliminate *R. microplus* from an animal, but, without additional measures, they do not prevent reinfestation. Use of these agents can lead to the development of acaricide resistance in ticks, and may also have other adverse environmental effects, including incidental effects on other arthropods. Acaricide resistance is common in *R. microplus*, and resistance to multiple acaricides has been seen in some populations of this tick. Resistance to amitraz was reported to persist on one property where it had not been used for 15 years.

Other control measures in endemic regions include pasture rotation, environmental modification to make sites less attractive to ticks, physical removal of ticks from an animal, the use of relatively tick-resistant breeds of animals, and other strategies. Under the climatic conditions in the U.S. tick quarantine zone, an infested pasture must remain free of all livestock for 6 to 9 months or longer to break the tick life cycle. Different periods may be required in other areas. For example, a study in Argentina found that 12-17 weeks was required to reduce tick numbers in spring or early summer, and 20-28 weeks in summer, fall or winter.

European (*Bos taurus*) breeds of cattle usually remain fairly susceptible to ixodid ticks, even after multiple exposures. However, some cattle breeds such as Zebu (*Bos indicus*) and some Zebu crosses generally become resistant to *B. microplus* after exposure. This resistance is most prominent against larvae, which are unsuccessful in their attempts to feed and soon die. Vaccines based on this observation have been developed, but the first two approved vaccines had variable efficacy against different tick populations and required frequent boosters, and were

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commercially unsuccessful. One is no longer made and the other has limited availability. Other vaccines are under investigation.

Public Health

R. microplus can feed on people and is a vector for the severe fever with thrombocytopenia syndrome virus, which affects humans in Asia.

Internet Resources

[Hard Ticks from the University of Edinburgh](#) (photographs)

[Queensland Government. Cattle Tick](#)

[United States Department of Agriculture \(USDA\) Animal and Plant Health Inspection Service \(APHIS\)](#)

[USDA APHIS. Vector-borne diseases](#) (includes information on cattle ticks)

[University of Bristol. Tick Identification Key](#) (for ticks of veterinary importance).

[World Organization for Animal Health \(WOAH\)](#)

[WOAH Terrestrial Animal Health Code](#)

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