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Ixodes ricinus

European Castor Bean Tick
Castor Bean Tick
Sheep Tick

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Overview

- Organism
- Identification
- Importance
- Geographic Distribution
- Life Cycle
- Associated Diseases
- Prevention and Control
- Recommended Actions

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In today's presentation we will cover information regarding the tick *Ixodes ricinus* and the diseases it can transmit. We will also talk about how to identify the tick, and the impact this tick has had in the past and could have in the future. Additionally, we will talk about how it is transmitted and the species it affects. Finally, we will address prevention and control measures, as well as actions to take if *Ixodes ricinus* is suspected.

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Organism

- *Ixodes ricinus*
- Hard tick
 - Family Ixodidae
- Three-host tick
- Affects mammals, birds, reptiles
- Can feed on humans
 - Zoonotic diseases transmitted



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Ixodes ricinus is a hard tick that infests livestock, deer, dogs and a wide variety of other species including humans. *I. ricinus* is a member of the family Ixodidae (hard ticks). *I. ricinus* is a three-host tick. *I. ricinus* can be found on a wide variety of hosts, particularly mammals and birds but also reptiles. All stages of *I. ricinus* will feed on humans, and their bite can be painful. This tick can also transmit several diseases that affect humans, including tick-borne encephalitis and Lyme disease.


[Photo: *Ixodes ricinus*. Source: Dr. J. Ostojic, Iowa State University/CFSPH]

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Identification

- No eyes, not ornate, no festoons
- Sexually dimorphic
- Color variations
 - Males: red brown
 - Females: light gray
- Length
 - 2.5 to 4 mm (up to 1cm engorged)
- Submit for identification



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Ixodes spp. ticks have no eyes, and the palpi are longer than wide. They are not ornate and have no festoons. The anal groove is distinct and surrounds the anus anteriorly. Ticks in this genus are sexually dimorphic: the stigmatic (spiracular) plates are oval in males, but circular in females. The ventral surface of the male has seven non-projecting, armor like plates. Adult *I. ricinus* are red-brown, but the female ticks are light gray when engorged. Before feeding, the males are approximately 2.5-3 mm long and the females 3-4 mm long. When they are engorged, the females can be as long as 1 cm. In this species, a spur is found on the posterior internal angle of the coxa of the first pair of legs; this spur overlaps the coxa of the second pair of legs. The tarsi are moderately long and tapering. Tick identification to the species level can be difficult, and ticks should be sub-mitted to an expert for identification. Although *I. ricinus* is not found in North America, other members of the *Ixodes ricinus* species complex, such as *I. pacificus* and *I. scapularis*, are endemic in this region.

[Photo: *Ixodes ricinus*. Source: James Lindsey-Ecology of Commanster/Wikimedia Creative Commons at <http://en.wikipedia.org/wiki/File:Ixodes.ricinus.searching.jpg>.]

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Importance

- Affects wide variety of hosts
 - Adults: cattle, sheep, deer
 - Nymphs: small mammals, birds, reptiles
 - Larvae: small to medium vertebrates
- Pathogens transmitted
 - *Babesia divergens*, louping ill virus
 - Tick-borne encephalitis virus
 - *Borrelia burgdorferi* (Lyme disease)
 - *Anaplasma phagocytophilum*


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I. ricinus can be found on a wide variety of hosts, particularly mammals and birds but also reptiles. The adult ticks feed mainly on large mammals such as cattle, sheep and deer, the larvae feed on small mammals (especially rodents), birds and reptiles, and the nymphs parasitize small- and medium-sized vertebrates. Feeding by large numbers of ticks may result in anemia. *I. ricinus* can also transmit a number of pathogens including *Babesia divergens* (babesiosis), louping ill virus, tick-borne encephalitis virus, *Borrelia burgdorferi* (Lyme disease) and *Anaplasma phagocytophilum* (tick-borne fever of ruminants, human granulocytic anaplasmosis). This tick has long mouthparts that can make its bites painful and annoying; the bites can also become secondarily infected by bacteria.

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Geographic Distribution

- Preferred conditions
 - Cool, humid, shrubby, woody
- Endemic
 - Europe
 - Northern Iran
 - Northern Africa



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I. ricinus occurs in cool, relatively humid, shrubby or wooded areas. In addition to deciduous and mixed forests, it can be found in more open areas when the vegetation is dense and rainfall is abundant. This tick is endemic in most of Europe (with the exception of the Mediterranean region, which has a warm, dry climate). It also occurs as far south as the Caspian Sea and northern Iran, as well as in northern Africa.

[Photo: Distribution map of *Ixodes ricinus*, 2010. Source: Wikimedia Commons at http://commons.wikimedia.org/wiki/File:Ixodes_ricinus_range_map.svg]

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Life Cycle

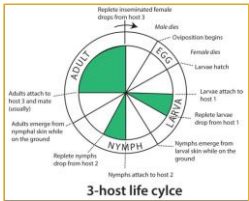
- Three-host tick
 - Larvae attach to first host
 - Nymphs attach to second host
 - Adult ticks feed on third host
- 2 to 4 years to complete
 - Peak activity in spring, summer
- Ticks found at base of vegetation when not seeking host

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I. ricinus is a three-host tick. Females lay eggs that become larvae. Larvae attach to the first host, then drop off and become nymphs. Nymphs attach to the second host. Later, the nymphs drop off and molt into adults. The larvae, nymphs and adults tend to feed on animals of different sizes. *I. ricinus* ticks are often found around the mouth, ears and eyelids of sheep, dogs and cats, and around the udder and axillary region of cattle. The ticks can be found on the host for several days while they feed, then drop to the ground to develop to the next stage. The life cycle of *I. ricinus* usually takes two to four years to complete. Its feeding generally peaks in spring and early summer, with a second active season in autumn in some areas. When it is not seeking a host, *I. ricinus* can be found at the base of vegetation, where the relative humidity is higher.

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Three Host Life Cycle



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Common life cycle of three-host hard ticks. These tick species must locate three separate hosts during their life cycle. Green represents the host attachment period. [Source: Richard Houseman. University of Missouri Extension. Guide to Ticks and Tick-Borne Diseases. August 2013 at ipm.missouri.edu/ipm_pubs/ipm1032.pdf]

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Associated Diseases

- *Babesia divergens*
 - Cattle: anemia, hemolysis
 - Humans: immunocompromised
- Louping ill
 - Sheep: neurological disease
- Tick-borne encephalitis virus
 - Humans: neurological disease


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As previously mentioned, *I. ricinus* can transmit a number of pathogens including *Babesia divergens* (babesiosis), louping ill virus, and tick-borne encephalitis virus. *Babesia divergens* is parasitic infection that causes bovine babesiosis. Disease may be mild, but clinical signs related to hemolysis and anemia may be apparent. Louping ill is a neurological disease mainly of sheep, although other species may also be affected. It is caused by a virus. Tick-borne encephalitis is an infectious viral disease of humans. Mortality is generally low.

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Associated Diseases

- *Borrelia burgdorferi* (Lyme disease)
 - Animals, humans
 - Erythema migrans
 - Chronic disease possible
- *Anaplasma phagocytophilum*
 - Ruminants: tick-borne fever
 - Humans: human granulocytic ehrlichiosis



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I. Ricinus can also transmit *Borrelia burgdorferi* (Lyme disease) and *Anaplasma phagocytophilum* (tick-borne fever of ruminants, human granulocytic anaplasmosis). Lyme disease is a tickborne illness that results from infection with members of the *Borrelia burgdorferi sensu lato* complex, in the family Spirochaetaceae. Lyme disease in people is readily cured with antibiotics during the initial stage of the illness, when an unusual rash often aids disease recognition. However, people whose infections remain untreated sometimes develop chronic arthritis, neurological signs and other syndromes. *A. phagocytophilum* belongs to a group of diseases that affect white blood cells. It causes tick-borne fever in ruminants. It also causes human granulocytic ehrlichiosis.

[Photo: This photograph depicts the pathognomonic erythematous rash in the pattern of a “bull’s-eye”, which manifested at the site of a tick bite on this Maryland woman’s posterior right upper arm, who’d subsequently contracted Lyme disease. Source: CDC Public Health Image Library.]

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Prevention and Control

- Exclude exotic ticks
 - Pre-export inspection of animals
 - Animals certified-free of ectoparasites
 - Quarantine upon entry
- Acaricide treatment
- Three-host ticks
 - Difficult to eradicate
 - Environmental control



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Measures used to exclude exotic ticks from a country include pre-export inspection and certification that the animals are free of ectoparasites, and quarantines upon entry. Acaricides can eliminate these ticks from the animal, but do not prevent reinfestation. Three-host ticks spend at least 90% of their life cycle in the environment rather than on the host animal; ticks must be controlled in the environment to prevent their spread.

[Photo: Cow walking through acaricide treatment. Source: Scott Bauer/USDA]

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Recommended Actions

- IMMEDIATELY notify authorities
- Federal
 - Area Veterinarian in Charge (AVIC)
http://www.aphis.usda.gov/animal_health/area_offices/
- State
 - State veterinarian
<http://www.usaha.org/stateanimalhealthofficials.aspx>
- Quarantine

If you suspect *I. ricinus*, state or federal authorities should be notified immediately. Animals suspected infested with *I. ricinus* should be isolated, and the farm should be quarantined until definitive diagnosis is determined.

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Additional Resources

- Center for Food Security and Public Health
– www.cfsph.iastate.edu
- USAHA Foreign Animal Diseases
("The Gray Book")
– www.aphis.usda.gov/emergency_response/downloads/nahems/fad.pdf

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Acknowledgments

Development of this presentation was made possible through grants provided to the Center for Food Security and Public Health at Iowa State University, College of Veterinary Medicine from the Centers for Disease Control and Prevention, the U.S. Department of Agriculture, the Iowa Homeland Security and Emergency Management Division, and the Multi-State Partnership for Security in Agriculture.

Authors: Kerry Leedom Larson, DVM, MPH, PhD, DACVPM; Anna Rovid Spickler, DVM, PhD
Reviewer: Cheryl L. Eis, JD, DVM, MPH; Glenda Dvorák, DVM, MPH, DACVPM

Last reviewed: August 2011