

Heartwater

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A Disease Fact Sheet for Livestock Specialists

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Importance

Heartwater is one of the most important diseases of livestock in Africa. This bacterial disease is a tick-borne illness characterized by fever, breathing difficulties, and weight loss, followed by neurologic symptoms. Infection often leads to death. Experimentally it has been demonstrated that white-tailed deer can be infected, and also act to carry the tick that transmits the disease; thus, heartwater has the potential to become prevalent in the United States.

Etiology

Heartwater results from infection by the bacteria *Ehrlichia ruminantium* (air-lick-EE-ah ROO-mi-NAN-tium) formerly known as *Cowdria ruminantium* (COW-dree-ah). Strains of *E. ruminantium* vary in their ability to cause disease. At least one strain seems to not affect cattle; however, all strains appear to affect sheep and goats.

Species affected

Cattle, sheep, goats, and wild buffalo are severely affected by heartwater, although in some native African breeds of sheep and goats, the symptoms are mild. Antelope, wildebeest, guinea fowl, leopard tortoises, and scrub hare can carry the bacteria with no signs of disease. *E. ruminantium* can also infect eland, springbok, white-tailed deer, ferrets, the striped mouse, the albino mouse, and the multimammate mouse.

Geographic distribution

Heartwater is common in most of Africa south of the Sahara Desert, as well as in Madagascar, and in a few islands on the Caribbean. The disease has also been reported in Tunisia and the former country of Yugoslavia.

Transmission

Heartwater can be transmitted by at least twelve species of *Amblyomma* (am-blee-OHM-ah) ticks. Ticks become infected early in their life, and can transmit the disease as nymphs (young adults) or adults. Female ticks can produce eggs which are already infected with the bacteria.

Amblyomma variegatum (the tropical bont tick) is the major vector (carriers and transmitters of the disease) in Africa and some parts of the Caribbean. Other vectors include the bont tick *A. hebraeum* (in southern Africa), *A. lepidum* (in East Africa and the Sudan), *A. astrion*, and *A. pomposum*. *Amblyomma sparsum*, *A. gemma*, *A. cohaerans*, *A. marmoreum* and *A. tholloni* (the elephant tick) are capable of transmitting experimental infections. Two North American species, *A. maculatum* (the Gulf Coast tick) and *A. cajennense*, can also transmit *E. ruminantium* in the laboratory, but neither has yet been implicated in natural infections.

The Caribbean *Amblyomma* Program, established in 1995, focuses on a regional approach to eradicating the Tropical Bont tick on the 16 Caribbean islands where it is currently established. This will help to prevent the introduction of heartwater into the U.S.

E. ruminantium is very fragile and does not survive outside a host for more than a few hours at room temperature. However, cows may transmit the bacteria to their calves through colostrum.

Incubation period

The period from infection until clinical signs appear is usually two weeks, but can be as long as a month.

Clinical signs

Peracute (very sudden) disease is usually seen in Africa in non–native breeds of sheep, cattle, and goats. Heavily pregnant cows are particularly susceptible to this form. The clinical signs may include a fever, severe breathing difficulties, increased sensitivity to stimuli, tearing, convulsions, and sudden death. Some dairy breeds of cattle, including Jerseys and Guernseys, may develop severe diarrhea as well. The peracute form of heartwater is relatively rare.

The most common form of heartwater is acute disease. This syndrome is seen in both non–native and native cattle, sheep, and goats. The signs begin with a sudden fever (up to 42° C or 107° F), weight loss, listlessness, and rapid breathing. Occasionally, animals also have diarrhea. These symptoms are followed by nervous signs, particularly chewing movements, sticking out of the tongue, twitching of the eyelids, and circling, often with a high–stepping gait. Affected animals sometimes stand with their heads lowered and legs spread apart. Some animals may become aggressive or anxious. As the disease progresses, the neurologic signs become more severe, and the animal goes into convulsions. In the terminal stages, galloping movements, backward arching of the head, neck, or back with stiffness of the entire body, and frothing at the mouth are common. Animals with the acute form of heartwater usually die within a week after the onset of the disease.

Mild or subclinical (no clinical signs) infections are seen in calves less than three weeks old, partially immune cattle or sheep, antelope, and some native breeds of sheep and cattle. The only sign is a transient fever. This form of the disease is known as “heartwater fever.”

Post mortem lesions

The characteristic post–mortem lesion of heartwater is a straw–colored to reddish fluid in the heart sac. It is more consistently found in sheep and goats than in cattle. Other common lesions include abdominal fluid accumulation, fluid in the chest cavity, and fluid filled lungs. Animals may also have an enlarged spleen, damage to heart muscle, liver, and kidneys, and swelling and bleeding stomach and intestines.

Morbidity and mortality

Infections are often fatal. In cattle, a death rate (mortality) of 60% is common and, in merino sheep, the death rate may be 80%. Angora goats are also extremely susceptible to this disease. Native animals are often

more resistant to the infection; mortality in Persian or Afrikaner (afri-KAN-der) sheep is only 6%.

Treatment with antibiotics is very effective, particularly when treatment is started soon after signs appear.

Diagnosis

Clinical

Heartwater should be suspected in animals with the typical clinical signs including fever, breathing difficulties, characteristic nervous symptoms, and sudden death. The presence of *Amblyomma* ticks and typical post–mortem findings support the diagnosis of heartwater.

Differential diagnosis

The peracute form of heartwater can be confused with anthrax. The acute form may resemble rabies, tetanus, bacterial brain infection, chlamydiosis, piroplasmosis, cerebral trypanosomiasis, or theileriosis. It must also be differentiated from poisoning with strychnine, lead, organophosphates, arsenic, chlorinated hydrocarbons, or some poisonous plants (*Cestrum laevigatum*, *Pavetta* species, and *Pachystigma* species). Accumulations of fluid similar to heartwater are also sometimes seen in heavy worm infestations.

Laboratory tests

Heartwater can be confirmed using specialized tests performed at a diagnostic laboratory.

Samples to collect

Before collecting or sending any samples from animals with a suspected foreign animal disease, the proper authorities should be contacted. Samples should only be sent under secure conditions and to authorized laboratories to prevent the spread of the disease.

Recommended actions if heartwater is suspected

Notification of authorities

A quick response is important in containing an outbreak of heartwater. If you suspect a case of heartwater consult a veterinarian, who will decide whether state and federal veterinarians should be alerted.

Quarantine and disinfection

E. ruminantium cannot survive outside a living host for more than a few hours at room temperature. Control of this disease relies mainly on control of the tick vector with acaricides (chemicals that kill mites and ticks), and prevention of tick infection from infected animals. Transfer of blood between animals must also be avoided.

Public health

Heartwater has not been reported to affect humans.

For More Information

World Organization for Animal Health (OIE)

<http://www.oie.int>

OIE Manual of Standards

http://www.oie.int/eng/normes/mmanual/a_summry.htm

OIE International Animal Health Code

http://www.oie.int/eng/normes/mcode/A_summry.htm

USAHA Foreign Animal Diseases book

http://www.vet.uga.edu/vpp/gray_book/FAD

The Caribbean Amblyomma Programme (CAP)

<http://forest.bio.ic.ac.uk/stvm/caribamb.htm>

References

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“Heartwater.” In *The Merck Veterinary Manual*, 8th ed. Edited by S.E. Aiello and A. Mays. Whitehouse Station, NJ: Merck and Co., 1998, pp. 531–2.

Mare, C.J. “Heartwater.” In *Foreign Animal Diseases*. Richmond, VA: United States Animal Health Association, 1998, pp. 253–264.

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