

Transmission of Anaplasmosis Disease and its Symptoms

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DESCRIPTION

Anaplasmosis is a disease caused by the bacterium *Anaplasma phagocytophilum*. Anaplasmosis is a tick-borne disease that affects ruminants, dogs and horses and is caused by the bacterium *Anaplasma*. Anaplasmosis is an infectious but not contagious disease. Anaplasmosis can be transmitted by mechanical and biological vector processes. Anaplasmosis may also be referred to as "yellow pouch" or "yellow fever" because an infected animal may develop jaundice. Other symptoms of infection include weight loss, diarrhea, pale skin, aggressive behavior, and high fever.

Many different species of ticks can carry the bacteria that cause anaplasmosis. The two main bacterial pathogens are *Anaplasma marginale* and *Anaplasma phagocytophilum*. These microorganisms are gram-negative and infect red blood cells. Once a host is infected with anaplasmosis, the immune system will try to fight back and kill the infected red blood cells, but it will also kill healthy red blood cells. The species *Anaplasma sparouinense* is responsible for a rare zoonosis, Sparouine anaplasmosis, detected only in French Guiana, South America. This disease was described in an underground gold miner working deep in the rainforest [1]. An infection of his red blood cells led to a serious deterioration in his health and required his hospitalization. Molecular typing showed that *Anaplasma sparouinense* is distinct from all known species and more genetically related to recently described *Anaplasma* species causing infections in wild fauna of rainforests in Brazil [2].

Transmission

Mechanical and biological vector transmission work in different ways, but both lead to infection of red blood cells. Mechanical transmission occurs in two ways, one where red blood cells are inoculated with the blood parasite using surgical equipment including needles, dehorning, ear tags, castration knives and tattooing instruments [3]. Another method of mechanical transmission is through the mouthparts of biting flies, which carry the blood parasite *Anaplasma*.

Transmission of the biological vector occurs through ticks, which carry a blood parasite capable of causing anaplasmosis. The most common tick that causes anaplasmosis is *Ixodes scapularis*, also

known as the black-legged tick or deer tick. Ticks, which contain species of many different species of *Anaplasma*, can transmit the disease through their bite [4]. The blood parasite survives and can reproduce in the tick and can sit dormant for months without being transmitted to an animal. When bitten by a tick carrying a blood parasite, the blood parasite can enter a new host and cause infection.

Once infected with the *Anaplasma* species, the parasite multiplies in the bloodstream and binds to red blood cells. The immune system will try to kill infected blood cells, but it will also kill uninfected red blood cells [5]. The number of red blood cells destroyed is greater than the number of new red blood cells that are formed, causing the host to become anemic and leading to many other symptoms. Once infected with anaplasmosis, cattle will always be carriers of the infectious disease and calves born from carriers will also carry the disease [6].

Symptoms

Classic signs and symptoms of anaplasmosis do not appear until 3-6 weeks after infection. The most common symptoms of anaplasmosis include fever, low white blood cell counts, platelets in the bloodstream, and abnormally elevated liver enzyme levels [7]. Erythema chronicum migrans rash may be seen with anaplasmosis, as it is transmitted in 10% of Lyme disease cases.

Anemia can be severe and lead to cardiovascular changes such as increased heart rate. Blood in the urine can appear due to the breakdown of red blood cells. Common systemic symptoms include diarrhea, anorexia, and weight loss. Infected animals may develop jaundice, which then turns pale around the eyes, mouth, lips and teats of the cattle [8].

All cattle are susceptible to infection with *Anaplasma marginale*, but the severity worsens with age. Older cattle tend to show the most severe clinical signs; cattle aged 1-3 may also show severe symptoms but are able to recover easily.

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