

Livestock Health Series

Anaplasmosis

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Introduction

Anaplasmosis is a tick-borne disease caused by the intracellular microorganism *Anaplasma marginale*. This pathogen infects red blood cells of cattle and is transmitted in blood from animal to animal by ticks, biting flies, and contaminated needles or surgical instruments. Transmission can also occur across the placenta from the dam to fetus. The disease mainly affects older cattle due to the requirement of a mature immune system. Calves less than one year of age usually show no clinical symptoms of disease. Outbreaks generally occur in late summer and early fall. Anaplasmosis causes important economic loss, primarily due to the high morbidity and mortality in susceptible cattle herds. The losses are measured through several factors including low weight gain, reduction in milk production, abortion, the cost of treatment and death.

Anaplasma marginale has an incubation period (prepatent period) that depends on the number of organisms in the infective dose and ranges from 15-36 days (although it may be as long as 100 days). Once transmission occurs and red blood cells become infected, the organism rapidly replicates and infects more red blood cells. The infected animal shows little or no sign of illness during this rapid replication phase. At some point, the infected animal's immune system begins to respond to the invading organism. The infected red blood cells are subsequently marked for destruc-

tion by special immune cells in the spleen and liver. As a result, the animal becomes anemic. The severity of the anemia is based on the ability of the animal to produce new red blood cells from the bone marrow.

Symptoms associated with disease include a rectal temperature of 104°F to 107°F, a decrease in appetite, pale mucous membranes, lethargy, a decrease in milk production and weakness. As the disease progresses, other signs may include rapid weight loss, yellowed mucous membranes, constipation, excitation, abortion and death. Death is due to a large number of red blood cells being destroyed, which inhibits the animal's ability to provide adequate oxygen to the tissues. The animal essentially dies from suffocation at a cellular level.

Influence of Age in the Disease Process

All cattle are susceptible to *Anaplasma marginale* infection, but the age of the animal determines the severity of clinical disease. Anaplasmosis is mild in calves less than one year of age. Cattle 12 to 24 months of age can show acute signs of the disease, but it is rarely fatal. However, animals that are two years and older will show acute signs of the disease with mortality rates as great as 50 percent if animals are left untreated. Cattle that survive with treatment are unthrifty and usually culled. Furthermore, surviving cattle become carrier animals for this

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disease and serve as an underlying source of infection for other cattle in the herd. Animals in the carrier phase usually show no clinical signs and rarely become ill a second time with the disease unless their immune system is compromised (e.g., by corticosteroids).

Diagnosis of Disease

Anaplasmosis can be diagnosed by a veterinarian through recognition of clinical signs and the use of blood staining techniques. As shown in Figure 1, the parasite can be seen attached to red blood cells after staining the blood. However, blood from a carrier animal will usually not have a high enough concentration of the parasite to make staining a good identification technique. Instead, the persistent carrier state can be detected in blood using nucleic acid-based detection methods at a diagnostic laboratory. For animals showing clinical signs, the veterinarian will often run a packed cell volume (PCV) test on a blood sample to determine the percentage of red blood cells. This test will further define the severity of disease.

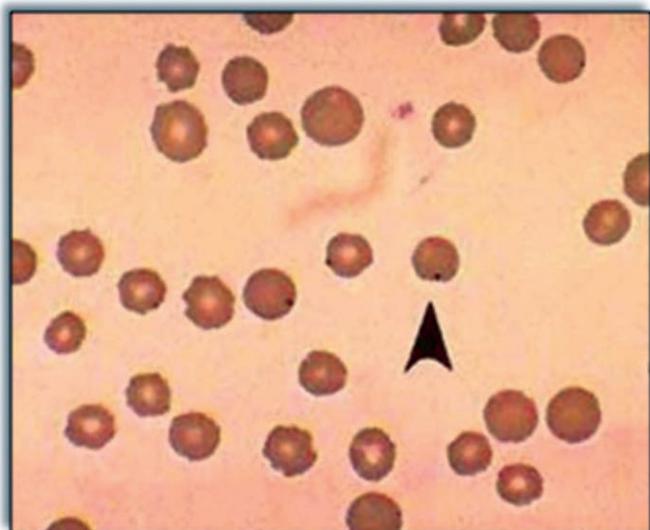


Figure 1: Giemsa-stained blood shows *Anaplasma marginale* (arrow). Photo provided by Oklahoma State University Center for Veterinary Health Sciences.

Treatment of Disease

It is important to consider the amount of stress that is placed on an animal with anaplasmosis. The health of cattle with the disease can suddenly decline because of their reduced ability for sufficient oxygenation. For this reason, stressors such as handling, transport and exposure to harsh weather should be kept to a minimum. Prolonged handling or rough handling of an animal while attempting to treat may result in cardiovascular collapse and death. High-valued animals may be treated by a veterinarian with

a blood transfusion to help decrease this risk. With that in mind, the following protocols have been used to treat cattle with clinical signs.

Administration of a tetracycline drug in the early stages of anaplasmosis usually ensures survival. A commonly used treatment consists of an intramuscular (IM) injection of long-acting oxytetracycline (200 mg/ml) at a dose of 20 mg/kg every seven days for two treatments. Another treatment consists of an IM injection of oxytetracycline (100 mg/ml) at 11 mg/kg daily for five consecutive days. Due to the large volume of solution, each injection may have to be administered at two different injection sites to avoid muscle damage. The use of injectable antibiotics to treat anaplasmosis must be under the supervision of a veterinarian to be compliant with federal law as it is considered extra-label use. Furthermore, a veterinary-client-patient relationship (VCPR) must be established between the producer and veterinarian before a veterinarian can give medical advice. The legal definition of a VCPR is written in the Arkansas Veterinary Practice Act and can be viewed at www.arkvetboard.com.

Many producers and veterinarians choose to treat anaplasmosis with chlortetracycline (CTC) in medicated feed to avoid handling sick and fragile cattle. The general control dose is 0.5 to 2.0 mg of CTC per pound of body weight (BW) daily during vector season. The use of antibiotics in feed now requires veterinary oversight due to recent changes to the Food and Drug Administration (FDA) Veterinary Feed Directive. Antibiotics in medicated feed can only be administered as indicated by the FDA label. There is absolutely no allowance of extra-label use, even by a veterinarian. The continuous administration of antibiotics in medicated feed to healthy animals is also prohibited by the FDA.

Elimination of the Carrier State

Treating cattle to eliminate the carrier state should only be conducted once the vector season has ended and only after cattle have been tested as proven carriers. The most popular method is the administration of a long-acting oxytetracycline (200 mg/ml) at a dose of 20 mg/kg every three days for four treatments. Again, this treatment is considered extra-label and will require a valid VCPR from a veterinarian.

Prevention of Disease

As with all livestock diseases, prevention of anaplasmosis is undoubtedly the best way to approach the disease. An effective vaccine created at Louisiana State University is currently available

to producers through veterinarians and is slated to be available for commercial use. Two doses of the vaccine (four weeks apart) are administered prior to vector season initially. After that, the vaccine is given annually at least two weeks prior to vector season to ensure immunity. The vaccine keeps *Anaplasma* in a suppressed state that will not cause clinical disease and has been deemed safe to give to pregnant animals. However, the vaccinated cattle will still serve as a source of infection. In herds where anaplasmosis has been a problem, it may be economically practical to test all the animals in the herd and vaccinate only those with a negative test as vaccination of anaplasmosis-infected cattle is unnecessary.

Insect control with pesticides is always important to limit the number of potential vectors. Follow the advice of a veterinarian for the best

choice of pesticide and monitor cattle regularly for their insect and tick burden to determine if the chosen pesticide is effective. Pasture management by regularly dragging the pasture to break up manure can also limit some insect vectors. In areas where biting flies such as stable flies are highly resistant to pesticides, biological control with fly predators can also be employed.

It also is important to be mindful of contaminated needles or instruments. When performing herd work, change needles often (at least every 10 animals) and keep castration knives, dehorning and tattoo instruments in disinfectant between uses.

For more information on anaplasmosis and other diseases affecting cattle, contact your local county Extension office.

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