Dealing with Anaplasmosis

Understanding transmission of this blood borne illness helps prevent outbreaks.

by ***Heather Smith Thomas***

Anaplasmosis is a blood-borne cattle disease caused by a very tiny parasitic, intracellular bacterium (*Anaplasma marginale*), which infects red blood cells. The infected animal's immune system then recognizes the infected red blood cells as abnormal and destroys them, causing anemia. If the anemia becomes severe, the animal shows signs of illness and can even die.

The average incubation stage ranges from three to eight weeks — until 1% of the animal's red blood cells are infected — but the incubation length can vary widely. Most of the variation is related to the number of organisms introduced into the animal at transmission.

After entering a susceptible animal, the anaplasma parasite slowly reproduces in the animal's blood. During this incubation period the animal remains healthy and shows no signs of being infected. But, after the parasite has reproduced many times and established itself in the red blood cells, the body attempts to destroy the parasite by attacking the red blood cells.

Cattle producers often first notice the anemic, anaplasmosis-infected animal when it becomes lethargic and weak, and starts lagging behind the herd. The infected animal may refuse to eat or drink, and its skin becomes pale around the eyes and on the muzzle, lips and teats. As the anemia worsens, the animal may show constipation, excitement, rapid weight loss and yellow-tinged skin. It may fall or lie down and be unable to get up. Affected cattle either die or begin a slow recovery one to four days after the first signs of the disease. Antibiotic treatments are ineffective when given during the late developmental or convalescent stage of the illness.

Death normally occurs during the late developmental stage or early convalescent stage. Surviving cattle lose weight and abort calves before beginning to recover slowly over a two- or three-month period as their body starts producing more red blood cells, with an increase in hemoglobin levels and high white blood cell counts.

Transmission vectors

The organism responsible for anaplasmosis can be transmitted from infected animals to uninfected ones via several pathways, according to Craig Payne, DVM, University of Missouri associate Extension professor of veterinary medicine. He explains the parasite can be transmitted biologically, transplacentally or mechanically.

Biological transmission comes from ticks infected with the organism. Researchers have shown that the Pacific Coast tick and the Rocky Mountain wood tick (*Dermacentor occidentalis* and *Dermacentor andersoni*) can transmit the disease. The anaplasma parasite may be passed through several developmental stages of ticks and then be transmitted to susceptible cattle.

Transplacental transmission occurs when an infected pregnant cow passes the organism to her fetus, apparently during the second or third trimester.

Mechanical transmission occurs when the organism is transferred by blood-contaminated mouthparts of biting flies or by blood-infected equipment.

"This includes dehorning equipment, tagging tools, needles, etc.," Payne says. "A study conducted at Kansas State University demonstrated that transmission from an infected animal to a non-infected animal with a needle can occur about 60% of the time when a needle is used on multiple animals. There is always a risk when using the same needle if you are vaccinating/injecting multiple animals, if there are carrier animals in the herd."

Cattle producers often associate anaplasmosis transmission with horse flies and deer flies biting an infected animal and then spreading the disease to uninfected ones via their bloody mouth parts.

"Some producers refer to anaplasmosis as the 'horse fly disease,' but we've found in recent years that ticks are actually more efficient at transmitting it than horse flies and are the most likely method of natural transmission," Payne says.

Chronic carriers

An infected animal that survives anaplasmosis becomes a chronic carrier. While chronic carriers are unlikely to show any clinical signs of anaplasmosis, unless they're stressed or immune suppressed, due to their immunity, carriers can serve as a source for the parasitic organism within the herd.

Considering the risk associated with chronic carriers, producers often wonder what they should do with those animals. According to Payne, producers once thought these chronic carriers should be culled, but now many cattlemen lean toward leaving them in the herd if anaplasmosis is common in their region.

"For instance, we don't know the percentage of herds in Missouri that have chronic carriers or the average percentage of animals within those herds that may be carriers. However, in one herd where we tested all the cows, 75% of them were positive. Whether or not that number is abnormally high, I don't know, but I suspect that the percentage varies quite a bit within Missouri herds," he says.

Additionally, a carrier-free herd might not stay that way for long because the disease will likely be reintroduced into the herd at some future time. When that occurs, all the animals would be at risk for disease rather than just a small percentage due to the herd's lack of immunity, and losses could be more devastating.

"Seedstock producers who market genetics, with cattle going to locations where the disease is rare or where a negative test is required, may adopt different strategies to manage chronic carriers than a commercial cow-calf operation," Payne says.

Treatment and prevention

Anaplasmosis treatment includes antibiotics — most commonly the antimicrobial medication oxytetracycline, which is sold under trade names LA-200 and Noromycin 300. All treatments should be administered after proper veterinary consultation to determine dosage and duration. As Payne points out, oxytetracycline does not kill the organism, it only inhibits its growth. So, early treatment is key, and efforts to control the transmission of the anaplasma parasite are important.

"Control strategies include feeding chlortetracycline to cattle throughout the vector season. Some operations feed it year-round; because their veterinarian has determined that this is the best strategy due to certain risk factors," Payne says. "Other control measures are based on minimizing transmission by changing needles and cleaning blood-contaminated equipment between animals. It also helps to control horseflies and ticks with insecticides or other management practices aimed at these pests."

Unfortunately, horse flies are not easy to control, since they can come from breeding sites several miles away.

"They simply act as mechanical vectors since the organism can only survive on their mouthparts for part of an hour," Payne says.

But if horse flies come into the herd, they tend to take a blood meal from multiple animals (they don't stay on the same animal very long, unlike horn flies). They may easily transmit the organism from a carrier to an uninfected animal.

Ticks are a little more problematic, because the organism lives within the tick itself, using the tick as part of its life cycle. The organism multiplies within the tick, making them an important biological vector.

As for transplacental transmission from dam to offspring, research suggests 10-16% of calves born to chronic carriers will be positive for anaplasmosis at birth. Younger animals often show fewer signs of the disease, because they regenerate red blood cells quicker than older cattle.

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"Having a calf born as a chronic carrier is not necessarily a bad thing because it will probably be less likely to have problems with the disease. Yet these calves (being carriers themselves) represent another potential source of infection for animals that have not yet become infected," Payne explains.

People often ask about anaplasmosis vaccines for prevention. There is a conditionally licensed vaccine available, and some producers use it. The conditional license means that it has been shown to be safe, but it is not fully licensed because the manufacturer hasn't conducted all the studies required by the USDA to show that it is effective.

A conditionally licensed vaccine must be approved by the state veterinarian before it can be used within a state, and it is only available through a veterinarian.

"The vaccine has received some use in Missouri. Some people feel it is helpful and others not so much. A while back it was reported that Kansas State University, in conjunction with Iowa State University, was developing a vaccine implant but there is no indication when it will become available," Payne says.

Complicated and challenging

Frustratingly, producers may still have a few cases or even major outbreaks occur when they have gone through all these efforts for control.

"One of the reasons may be due to variability in consumption of medicated feed; some animals may not consume enough of it, increasing risk of disease, or some animals may consume too much over a long period of time and clear the carrier state and no longer have immunity," Payne explains.

Another possible reason the disease is hard to control is that some strains may be resistant to chlortetracycline.

"We can't identify resistance in *Anaplasma marginale*, like we can with common bacteria, but it does have resistance mechanisms. Other factors, such as changes in herd level immunity, introduction of new strains and increased tick populations have been implicated as possible contributors to outbreaks within herds and regions," Payne says.

Anaplasmosis is a very complicated disease, and there is still a lot that we don't know about it. The important thing is for producers to know the various ways this disease is transmitted and implement strategies that will minimize transmission. Each operation is different; develop strategies with input from the herd veterinarian. **BA**

Editor's Note: Heather Smith authored, "The Cattle Health Handbook."