Management of Anaplasmosis in Beef Cattle

E. J. Richey, *D.V.M.*
Oklahoma State University
Pawhuska Veterinary Research Station
Pawhuska, Oklahoma 74056

Introduction

Anaplasmosis is an infectious disease of cattle causing destruction of the red blood cells.

Anaplasmosis is caused by a minute parasite, *Anaplasma marginale*, found in the red blood cells of infected cattle. It may be transmitted from infected animals to healthy animals by insects or by surgical instruments.

After infected red blood cells enter a healthy animal, the anaplasma parasite slowly establishes itself in the animal's blood during an incubation period of 4 to 6 weeks. During this period the animal remains healthy and shows no signs of being infected.

Cattlemen first notice the anaplasmosis infected animal when it becomes weak and lags behind the herd. It goes off feed and refuses to drink water. The skin becomes pale around its eyes and there is palor of the muzzle, lips, and teats. These signs are caused by the rapid destruction of red blood cells. Later the animal may show constipation, excitement, rapid weight loss, and a yellow-tinged skin. The animal may fall or lie down and be unable to rise. In most cases, infected cattle either die or gradually begin to recover one to four days after the first signs of the disease.

The cattle that live through the disease lose weight, abort calves, and slowly recover over two or three months.

All ages of cattle may become infected with anaplasmosis. The severity of illness and the percentage of deaths, however, increase with age. Calves under six months of age seldom show enough symptoms to detect that they are infected. Cattle six months to three years of age become increasingly ill and more deaths occur with advancing age. After three years of age, 30 to 50 percent of the cattle ill with anaplasmosis die.

Cattle that recover from anaplasmosis are carriers of the disease for the rest of their lives because their blood contains the *Anaplasma marginale* parasite. The blood from these recovered animals will cause anaplasmosis in uninfected cattle. Carriers very rarely become ill from anaplasmosis a second time. The unknown carriers in a herd of cattle are the most important source of infection for future outbreaks of the disease.

Anaplasmosis outbreaks are related to lack of a control program, the percent of the herd which are anaplasmosis carriers and the amount of vector transmission. (NO CONTROLS + CARRIERS + VECTORS = OUTBREAKS.) Either an increase in percent of carriers or amount of vector transmission can influence the severity of an outbreak. With this in mind, we need to consider control programs to prevent outbreaks, clearing up the carrier state, reducing vector transmission and treatment or management options available during an outbreak.

Control Programs for Anaplasmosis

A. *Test the herd and separate carriers from non-carriers.* This program will necessitate bleeding and identifying each animal. The Oklahoma Animal Disease Diagnostic Laboratory has the capabilities to run the test. It will also require that you maintain two separate herds during the vector season or get rid of which ever group (carriers or non-carriers) you do not want to handle. There are no susceptible animals in a 100% carrier herd. However, new additions must be protected and there are regulations governing the interstate movement of carrier animals.

B. *Test the herd and clear up the carriers with tetracycline antibiotic.* (See CLEARING OF CARRIER STATE)

C. *Anaplasmosis vaccine for a control program.* For an effective vaccination program the herd owner should follow these recommendations (1) *The initial vaccination (1st year)* consists of 2 doses given 4 weeks apart, scheduled so that the 2nd dose is given at least 2 weeks before horsefly season. The final dose of the initial vaccination should be administered in the spring of the year rather than in the fall so that protection is at its peak during the vector season. (2) A *booster* should be administered 2 weeks or more before the next vector season. After the 1st booster, additional boosters should be administered every other year to provide adequate protection. A vaccinated animal is still capable of becoming infected with anaplasmosis and subsequently can become a carrier. The vaccine does not prevent infection, but aids in the prevention of clinical symptoms of bovine anaplasmosis.

D. *Continuous oxytetracycline medication during the vector season.* Give an injection of oxytetracycline every 30 days beginning July 1 and ending October 1, Dose: 3-5 mg/lb B.W.

E. *Continuous chlortetracycline medication DURING THE VECTOR SEASON.* (1) medicated feed (0.5 mg/lb BW daily). (2) Medicated salt-mineral mixes offered free choice, prepared to approximate 0.5 mg CTC/1lb BW consumption daily. (3) Medicated feed blocks. (Consumption data should be available from the feed block or salt-mineral manufacturer.)

F. *Continuous chlortetracycline medication the YEAR*

AROUND. Medicated salt-mineral mixes with approximately 1500 grams CTC/Ton (35-50% NaCl). Oral dose of 0.1 to 0.25 mg/lb BW daily -- CTC administered continuously through the vector season, may prevent clinical anaplasmosis, but will allow carrier infections to develop or prolong the incubation period allowing clinical anaplasmosis to appear sometime after medication has ceased.

It is essential that you get ADEQUATE UPTAKE OF THE MEDICATED MIXES & BLOCKS. This requires placing the mix or blocks near water holes, providing sufficient protection from sun and rain and replenishing the mix at frequent intervals. Cattle often prefer salt licks associated with salt water spills around oil wells over the salt mixes. Therefore, it is advisable to routinely check to insure that the cattle are consuming the medicated mix.

Bulls apparently do not consume adequate chlortetracycline and will require additional protection such as vaccination.

Reducing Vector Transmission

Anaplasmosis is spread by a transfer of blood from an infected animal to a susceptible one. Primarily, the transmission is a mechanical transfer, that is, it is transmitted by biting insects or by instruments used by man. However, there are biological vectors such as certain species of ticks.

Three biting insects are known to transmit anaplasmosis mechanically by carrying infected red blood cells from diseased cattle to healthy cattle. They are horse flies, stable flies and mosquitoes. Horse flies are thought to be the most common vector in Oklahoma, while mosquitoes may seldom carry anaplasmosis.

If more than five minutes pass between biting a diseased animal and biting the healthy animal, the insect cannot mechanically transmit the disease.

Man commonly carries anaplasmosis organisms from one animal to another on dehorning saws, castrating knives, vaccinating and bleeding needles, tattoo instruments, and ear notchers. A quick rinse of the contaminated instruments in clean water or disinfectant immediately after use will usually prevent transmission. When this type of transmission occurs, a large number of cattle in the herd show signs of anaplasmosis at nearly the same time without a few earlier cases having appeared.

Ticks carry anaplasmosis differently from other insects. The parasites can live in ticks and may be passed through several generations of ticks. Although ticks may transmit the disease months perhaps years after biting an infected animal, they probably are one of the less important vectors in Oklahoma.

Control of biting insects quite often can be frustrating and generally is not considered to be a practical, reliable method to totally prevent anaplasmosis transmission. However, applications of insecticides which reduce the biting insect population will substantially reduce the number of clinical anaplasmosis cases occurring in a herd. Periodic spraying and dipping as well as forced use of dust bags and back rugs are the common methods of insecticide applications used.

Clearing the Carrier State

Anaplasmosis carrier cattle may be cured of the infection by treatment with tetracycline antibiotics. Carrier state elimination programs must include both pre- and post-medication serologic testing. The CF test may remain positive for months after treatment but the reactor's blood may not be infective for susceptible animals. Animals cleared of the carrier state are susceptible to reinfection, but exhibit considerable resistance as long as 30 months.

A. *OXYTETRACYCLINE: 5 DAY TREATMENT*
Administer 10 mg/lb body weight daily under the supervision of a veterinarian.

B. *OXYTETRACYCLINE: 10 DAY TREATMENT*
Administer 5 mg/lb body weight daily under the supervision of a veterinarian.

C. *CHLORTETRACYCLINE: 60 DAY TREATMENT*
It is recommended that chlortetracycline be fed at a level of 5 milligrams per pound of body weight daily for 60 days. This level of chlortetracycline in feed will aid in the elimination of the carrier state of anaplasmosis in beef cattle. Oral administration of chlortetracycline permits treatment on a herd basis and the use of economical antibiotic premixes.

D. *CHLORTETRACYCLINE: 120 DAY TREATMENT*
In 1976 the O.S.U. Veterinary Research Station tested the effectiveness of 1/10 the approved dosage of chloratetracycline against the carrier state of anaplasmosis. It was found that chlortetracycline fed at the rate of 0.5 mg/lb body weight per day for 120 days eliminated the carrier infection. The medicated animals did not transmit anaplasmosis on subinoculation into susceptible animals at 28 days and 180 days after treatment ended. These cattle were subsequently highly resistant to characteristic acute anaplasmosis when rechallenged with *Anaplasma marginale.*

Methods of Handling an Anaplasmosis Outbreak

Regardless of the availability of adequate control programs, many producers either choose not to use one or have had no reason to do so. In either event we feel that it is necessary to cover the methods available to a producer for controlling an anaplasmosis outbreak in his herd.

A. *Treatment of sick animals:* By the time you usually see an animal with clinical anaplasmosis it is almost over the acute infection and is suffering from **Anemia.** Any excitement or exertion could cause the animal to collapse resulting in death. A veterinarian should be notified immediately for the confirmation of

anaplasmosis and subsequent treatment of the sick.

If treatment is initiated it is recommended that a single treatment with a 200 mg/ml oxytetracycline at at the rate of 9.9 mg/lb BW be administered rather than repeated treatments of a lower concentration (50 mg/ml). Efficacy tests show that a single treatment of the 200 mg/ml oxytetracycline is equivalent to two days treatment with the 50 mg/ml oxytetracycline. Blood transfusions may be indicated and administered by and on the advice of a veterinarian.

Remember, the blood of an animal with clinical anaplasmosis is at least 20 times more infective than a healthy carrier's blood. The best thing to do is to move the healthy animals away from the sick ones (exertion could kill the sick ones) and provide adequate protection for the healthy ones. (Carriers are still in the herd.)

IN ADDITION TO TREATING THE SICK ANIMALS, ONE OF THE FOLLOWING METHODS SHOULD BE FOLLOWED TO PROVIDE PROTECTION FOR THE REMAINDER OF THE HERD.

B. *Use of injectable oxytetracycline repeated at 28 day intervals* through the vector season: At the first indication of anaplasmosis gather all susceptible animals and administer 3-5 mg oxytetracycline per pound of body weight. This treatment must be continued at 28 day intervals throughout the vector season. After withdraw from the medication, close observation should continue for symptoms of anaplasmosis which may have been only delayed - not aborted in some cattle.

C. *Use of vaccine and oxytetracycline together.* At the first indication of anaplasmosis gather all susceptible animals and (1) give each animal the 1st dose of vaccine and 3-5 mg. oxytetracycline per pound of body weight. (2) 4 weeks later - give the 2nd dose of vaccine and another dose of oxytetracycline.

If anaplasmosis occurs because you have **SKIPPED A BOOSTER:** Administer a booster vaccination and 3-5 mg. oxytetracycline per pound of body weight to all animals previously vaccinated and a second dose of each repeated in 4 weeks **for** non-vaccinated animals in the herd.

D. *Use of injectable oxytetracycline and oral chlortetracycline.* At the first indication of anaplasmosis gather all susceptible animals and (1) administer a single dose of oxytetracycline at rate of 3 mg/lb BW, and (2) immediately offer chlortetracycline free choice in a medicated salt-mineral mix or feed block, (0.5 mg/lb BW). CTC medicated mixes or blocks should be offered for at least 60 days after the cattle are on it. Check for adequate consumption of the medicated mixes or feed block.

References

1. Bedell, D.M., and Slater, M.: The Use of a Combination of the Therapeutic and Immunological Regiment in an Anaplasmosis Epizootic. *Biochemic Review*, Vol. 33-2. - 2. Brock, W.E., Pearson, C.C., and Kliewer, I.O.: Anaplasmosis Control by Test and Subsequent Treatment with Chlortetracycline. In Proceedings, 62 Ann. Meeting U.S. Livestock San A: 66-70, 1958 (1959). - 3. Brock, W. E., Kliewer, I.O., and Pearson, C.C.: A Vaccine for Anaplasmosis. JAVMA, 147:948-951, 1965 - 4. Pearson, C.C.: Preventive Therapy of Anaplasmosis by Feeding Chlortetracycline. Proc. 3rd National Anaplasmosis Conf., Manhattan, Kansas. 64-66, 1957. - 5. Pearson, C.C., Brock, W.E., and Kliewer, I.O.: A Study of Tetracycline Dosage in Cattle Which Are Anaplasmosis Carriers, JAVMA 130: 290-292, 1957. - 6. Magonile, R.A., Renshaw, H.W., Vaughn, H.W., et al: Effect of Five Daily Intravenous Treatments with Oxytetracycline Hydrochloride on the Carrier Status of Bovine Anaplasmosis. JAVMA 167: 1080-1083, 1975. - 7. Magonile, R. A., Simpson, J.E. and Frank, W. Floyd: Efficacy of a New Oxytetracycline Formulation Against Clinical Anaplasmosis. *Am. J. Vet Research* 39-9: 1407-1410, 1978. - 8. Renshaw, H. W., Magonile, R. A., Eckbald, W. P., et al: Immunity to Bovine Anaplasmosis After Elimination of the Carrier Status with Oxytetracycline Hydrochlorise. *Proc.* Annual Meeting U. S. Animal Health Assoc. 80: 79-88, 1976. - 9. Richey, E. J., Brock, W. E., Kliewer, I.O., Jones, E.W.: Low Levels of Chlortetracycline for Anaplasmosis: *American Journal Vet. Research* 38-2: 171-172, 1977. - 10. Richey, E.J., and Kliewer, I.O.: Controlling An Acute Outbreak of Bovine Anaplasmosis with Oxytetracycline and Chlortetracycline. Proc. Okla. Beef Symposium Oct. 20-22, 1980.