Anaplasmosis in Beef Cattle: A Practitioner's Approach to Diagnosis and Control

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Introduction

Anaplasmosis, an infectious anemia of cattle and certain other ruminants, is caused in the United States by the hemotropic parasite, *Anaplasma marginale.* This disease continues to cause significant economic loss to the cattle industry. Methods for controlling anaplasmosis include identification and elimination of affected animals, segregation and/or treatment of carrier animals, prophylactic feeding of drugs, vector control and immunization.

The purpose of this communication is to present an overview of anaplasmosis with emphasis on methods of diagnosis and control.

Transmission

Anaplasmosis is spread primarily by mechanical means by the transfer of blood from an infected animal to a susceptible animal. Any insect or instrument capable of transferring a small amount of fresh blood may serve as a vector. Instruments commonly incriminated in spreading anaplasmosis are vaccinating needles, dehorning equipment, tattoo pliers and surgical instruments. A quick rinse of equipment in water or dilute disinfectant will prevent transmission by mechanical means.

In general, east of the Rocky Mountains, tabanids are primary vectors of anaplasmosis. Tabanids and ticks (Dermacentor) are important vectors west of the Rocky Mountains. It is generally accepted that infected blood must be transferred to a susceptible animal within minutes for transmission to occur. It is noteworthy that recent studies have shown that tabanids may transmit anaplasmosis for up to two hours after feeding on an infected animal. Transstadial transfer of *A. marginale* has been shown in ticks.

Diagnosis

Anaplasmosis outbreaks usually occur in late summer or early fall, therefore, time of year may aid in diagnosing anaplasmosis. A history of sudden death in one or more adult animals may indicate an impending anaplasmosis outbreak.

Cattle of all ages may become infected with anaplasmosis, but clinical disease increases in severity with age. Clinical anaplasmosis is rarely observed in cattle less than a year of age.

Clinical signs of anaplasmosis are associated with the resulting anemia. Signs of anaplasmosis include pallor of mucous membranes, rapid respiration, lethargy, aggressive behavior, and occasionally icterus. Cattle that become clinically ill during the last trimester of pregnancy often abort.

Watery appearing blood, a low packed cell volume (PCV) and stained blood smears from suspected cases may all be helpful in diagnosis of anaplasmosis. Clinical signs of anaplasmosis become apparent when PCV drops below 20%. A favorable response to treatment is usual if therapy is initiated before PCV falls below 15%. If PCV reaches 10%, often the best treatment is no treatment. In this instance, the benefits of therapy may be more than offset by the hazards of restraint and handling.

Stained blood smears may be used to confirm suspected cases of acute anaplasmosis. The anaplasma bodies may be seen as spherical blue dots on the periphery of red blood cells.

Serologic tests are helpful for management decisions for controlling anaplasmosis but are of little value in diagnosis of the acute disease. *A. marginale* bodies appear in red blood cells near the time, or shortly before, serology becomes positive.

Treatment of Individual Animals

Perhaps the most important aspect of treating animals with clinical disease is to minimize stress. If the animal is belligerent and/or difficult to handle, the best treatment may be no treatment. The stress of treatment, combined with the anemia and impending cardiac insufficiency associated with anaplasmosis, may be fatal to the animal.

Efficacy of tetracyclines in treatment of anaplasmosis has long been recognized. A single injection of long-acting oxytetracycline* at the rate of 9 mg/lb body weight is sufficient to suppress multiplication of *A. marginale.* If administered early during clinical disease, oxytetracyclines may decrease severity of clinical signs.

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**LA-200, Pfizer*

Hematinics may be helpful in convalescence but will not decrease severity of the infectious anemia. Blood transfusions are often administered in treating clinical anaplasmosis. However, transfused blood cells are rapidly removed from the circulatory system. Blood transfusions may do more harm than good when one considers the potential for additional stress to the animal, and the added burden to an already over-burdened cardiovascular system.

General supportive care such as providing shade, feed and fresh water are helpful. Isolation of the clinically ill animal is recommended since blood from clinically ill animals is several times more infective than carrier blood. Such animals are less able to discourage the fly population about them. If practical, isolation by moving healthy animals away from sick animals is desirable.

Treatment During an Outbreak

The cattleman and veterinarian should make some basic management decisions before choosing a treatment regime during an outbreak. For example, you would not want to vaccinate if you plan to test and clear carriers.

Choices for treatment during an outbreak are:

(1) treat animals as they become sick,

(2) oxytetracycline injection and vaccination,

(3) oxytetracycline injection and oral chlortetracycline,

(4) oxytetracyline injection every 28 days until vector season is over.

If option number one is selected, it is imperative the cattle be observed closely and treatment initiated early during clinical disease.

If an immunization program is desired, gather all susceptible animals (those 12 months and older) and inject oxytetracycline (3 to 5 mg/lb body weight, IM). In addition, give the first dose of anaplasmosis bacterin. Repeat oxytetracycline injections and immunizations in 28 days. The following year, repeat immunizations, then reimmunize every second year.

It should be remembered that vaccination prevents clinical disease, but does not prevent animals from becoming carriers. Only open cows should be vaccinated to minimize the potential of neonatal isoerythrolysis.

If option number 3 is selected, administer oxytetracyline (3 to 5 mg/lb body weight) and offer chlortetracycline in salt/mineral mix, feed or blocks. Intake of chlortetracycline should be 0.5 mg/lb body weight. Check to assure adequate amounts are consumed throughout the vector season. Routine immunization is recommended for bulls since they may not consume adequate amounts of chlortetracycline.

A fourth method for handling an outbreak is to inject oxytetracycline (3 to 5 mg/lb body weight) to susceptible animals every 28 days until the vector season has ended.

Anaplasmosis Control

Several methods have proven successful for control of anaplasmosis.

Test and Clear Carrier State—A complement fixation (CF) test should be conducted on all susceptible animals in the herd. All serologic testing should be done at least 6 weeks after the end of the vector season to preclude the possibility of incubating animals testing negative. Carrier animals may be cleared by one of the following methods:

A. Four (4) injections of long-acting tetracycline (9 mg/lb) at 3 day intervals,
B. Oxytetracycline injections (5 mg/lb) each day for 10 days,
C. Oxytetracycline injections (10 mg/lb) each day for 5 days,
D. Oral feeding of chlortetracycline (2.5 to 5.0 mg/lb per day) for 60 days,
E. Oral feeding of chlortetracycline (0.5 mg/lb per day) for 120 days.

It should be remembered that animals cleared of anaplasmosis may again become infected although some resistance persists for 6 months or more. Cleared animals will usually seroconvert to negative status in approximately 6 months, although resistance to reinfection and consequent clinical disease may last longer than 6 months. A series of serologic tests should be conducted to confirm clearing of the carrier state.

Test and Segregate—Serologic testing for identifying anaplasmosis carriers should be conducted after the vector season has ended. Carrier animals should be individually identified and assigned to the "positive herd". As seropositive animals, are culled, they should be replaced with seronegative animals which go into the "clean herd". Eventually the seropositive animals will be eliminated by the culling process.

The "positive herd" should not be in close proximity to the "clean herd." If it is necessary to maintain the two herds in adjacent pastures double fencing with a buffer zone between pastures is desirable.

Oral Feeding of Chlortetracycline—Another method for controlling anaplasmosis is feeding of chlortetracycline throughout the vector season, beginning 30 days prior to the start of vector season. Sufficient chlortetracycline should be added to feed or salt/mineral mix so that consumption will be 0.5 mg/lb body weight per day. Feeding areas should be checked on a regular basis to assure adequate consumption of chlortetracycline.

Vaccination—Protective resistance to anaplasmosis is not attained until 2 weeks after the second vaccination. Therefore, one should begin vaccinating at least 6 weeks prior to onset of vector season.

The first year all susceptible cattle should receive 2 vaccinations, 4 weeks apart. Boosters should be given the following year and every second year thereafter.

References

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Proceedings of the 7th National Anaplasmosis Conference, October 21-23, 1981, 453-462. 2. Hidalgo, Richard J., Control of Anaplasmosis in Endemic Areas, *The Southwestern Veterinarian,* 1974, 222-224. 3. Magonigle, R.A., Newby, T.J., Elimination of Naturally Acquired Chronic *Anaplasma marginale* Infections with a Long-Acting Oxytetracycline Injectable, *American Journal of Veterinary Research,* Vol. 43, No. 12, December, 1982, 2170-2172. 4. McCallon, B.R., Anaplasmosis, *Journal of Dairy Science,* Vol. 59, No. 6, 1975, 1171-1174. 5. Richey, E.J., Bovine Anaplasmosis, In *Current Veterinary Therapy, Food Animal Practice,* Edited by Jimmy L. Howard, W.B. Saunders Company, Philadelphia, 1981, 767-772.

For Your Library —

Calf Management and Disease Notes.
A. H. Andrews, 284 pages. Approx $8.48.
II, Aran Close, Harpenden, England

This text should appeal especially to students and new graduates. It deals with diseases in a logical sequence. Differential diagnosis is well covered in the summary tables. A very useful stand-by reference.

Prevention and Control of Infectious Abortion in Cattle

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A veterinarian investigating an abortion problem needs to determine the cause before he can make a prognosis and advise on treatment and control. Unfortunately this is not simple and attempts to arrive at a diagnosis are frequently frustrating and unproductive. An outbreak is generally almost over by the time a veterinarian is consulted and diagnosis made.

Perinatal mortality figures have not improved significantly over the past fifty years in spite of the advances in nutrition, husbandry, infectious diseases, preventive medicine, and therapeutic agents. However, this broad knowledge has helped to keep losses down as husbandry methods have become more intensive.

In dealing with abortions and infertility in cattle, the veterinarian has two tasks to perform. First, he may be asked to investigate and determine the cause of abortions in individual animals in the herd, and the second, he may be required to assist in the prevention and control of any outbreak.

A proposed immunization schedule for control of infectious abortion is given:

TABLE 1. Proposed Immunization Schedule.

Disease	Vaccine	Recommendation	Comments
Brucellosis	Strain 19	Calves - Vaccinate at 4-12 months of age	60-70% attain adequate immunity.
Leptospirosis	Bacterins	Adults - Annual vaccination in low-risk herds. Vaccinate every 6 months in high-risk herds. Calves - Vaccinate after 6 months of age because of interference from maternal antibody.	Protection for 6-12 months
Campylobacteriosis (Vibriosis)	Bacterin	Vaccinate 30-120 days before breeding: annual revaccination	Vaccinated females exposed to infected bulls may transmit to others. Bull vaccination needs additional research.
Infectious bovine rhinotracheitis (IBR)	MLV Intramuscular[a]	Calves - Vaccinate at 4-6 months and revaccinate at 8-10 months. Adults - Vaccinate non-pregnant replacements 30 days before breeding.	Protection is life-long although some have recommended annual revaccination.
	MLV Intranasal	Calves - Vaccinate at 4-6 months and revaccinate at 10-12 months. Adults - Vaccinate any susceptable adults.	Lifelong protection.
	Inactivated Intramuscular	Vaccinate at any age; two injections initially, annual revaccination.	Vaccine is safe for use in pregnant animals.
Bovine viral diarrhea (BVD)	MLV Intramuscular[a]	Calves - Vaccinate at 6-8 months and revaccinate at 10-12 months.	Lifelong protection.

[a] Do not vaccinate if animal is pregnant, during an outbreak, or during periods of stress.