



July 2001

Note from Jim and Ralph

Recent results at the UC Diagnostics Lab indicate that anaplasmosis is present in the foothills of Tulare County and management precautions should be taken.

Anaplasmosis Protection When Buying Bulls and Heifers

What is anaplasmosis? This disease of cattle is caused by an organism called *Anaplasma marginale*. This organism is a rickettsia, half way between the viruses and the bacteria. It is susceptible to tetracyclines, unlike viruses. The disease, anaplasmosis, is caused when the infected cattle react to the agent and remove their own infected red blood cells. This reaction causes a severe anemia.

Which cattle are susceptible to infection with *A. marginale*? All cattle are susceptible to infection by *A. marginale*. Also, deer, elk, and other ruminants are susceptible to becoming infected and can act as natural reservoirs of the agent. Cattle of any age can become infected; however, **young cattle do not become ill**, as will be explained later.

How do cattle become infected with the anaplasmosis agent? A number of ruminants such as cattle, deer, and elk can be carriers of the anaplasmosis agent. These species can carry the agent all, or most of, their lives and serve as a reservoir for infection of other animals. The transfer of the agent from a carrier animal to a susceptible animal can occur by a number of routes. One of the most

common ways is via ticks. In California, we have a number of ticks that transmit the anaplasmosis agent and are extremely effective at passing the agent to new, susceptible hosts. Additionally, any transmission of a small amount of blood from a carrier animal to a susceptible animal can transmit anaplasmosis. So insects, such as horse flies, are capable of transmission. An even larger culprit in this type of transmission is man. Ear-tagging instruments, tattoo tools, needles, ear implant tools, castrating instruments, dehorning instruments, etc., can all easily transmit the agent. So humans are also important in the spread of this disease.

What happens when a susceptible animal becomes infected? If the animal is a calf under the age of 12 months, virtually nothing is noticed. The calf undergoes an incubation period of about 45 to 90 days, has a very mild illness, which is rarely noticed, and becomes a carrier for life. Cattle that become infected between one and two years of age become ill after the incubation period, with severity increasing with age. Cattle over two years of age become very ill and approximately 50% die unless treated. **The older the animal and the better shape they are in—the sicker they get!** Usually, once the cattle become infected, and if they survive, they stay infected for life. They are "immune carriers"—they do not get sick but act as a reservoir for other susceptible animals. Therefore, being an infected carrier protects the animal from becoming sick if re-infected.

What determines if a herd will have problems with anaplasmosis? The location of the herd is the main factor determining whether or not problems will occur. The cattle and deer that might be reservoirs and the ticks that naturally transmit the disease are

the primary factors. For example, herds raised in the Central Valley of California on permanent pasture, with no ticks, no deer, and no carrier cattle, have essentially no risk of anaplasmosis. These cattle are free of the disease, have no immunity (unless vaccinated), and are totally susceptible to infection and disease. If these cattle are introduced to foothill pastures, especially during a bad tick year, they will become infected, get sick, and 50% will die if not treated. When cattle are raised in the coastal foothills, Sierra foothills, and many mountain areas of California, they become infected early in life, have no clinical disease when infected (because they are young), and are immune carriers. If new, susceptible cattle come into these areas, they are at risk. If these carrier cattle go to the valley pastures, they may act as courses of infection, especially via blood transfer (dehorning instruments, ear taggers, horse fly transmission, etc.). Many cattle herds are between these two extremes, and it is common for a percentage of the adult animals to become infected and ill every year. These are herds that need to be vaccinated routinely to prevent losses. It is common for bulls that come from anaplasmosis-free areas to be very susceptible when introduced to herds where anaplasmosis is common. Remember, when bulls become infected and are successfully treated (do not die), they are often sterile for many months.

What can I do to prevent anaplasmosis in my herd? This depends on the risk of anaplasmosis in your operation. For those valley herds, the only real risk is introduction of carrier cattle and transfer of blood (dehorning instruments, castration instruments, etc.) from the new cattle to your native, susceptible animals. For foothill or mountain herds, you have to be sure incoming cattle or bulls are from anaplasmosis areas or have been vaccinated. For herds intermediate in risk, you will want to review your vaccination program with your veterinarian.

What do the cattle look like when they get sick? During the time the anaplasmosis agent is multiplying in the red blood cells of the animal, there are no outward signs of disease. The animal be-

gins to “recognize” the red cells that are parasitized by the *A. marginale* as abnormal, during this period. About the time the maximum numbers of red blood cells are parasitized, the animal’s immune system kicks into high gear and destroys these infected red cells. This rapid destruction of a large number of the animal’s red cells causes a life-threatening anemia. It is common for two-thirds of the animals’ red cells to be taken out of circulation in a short period of time. The animal becomes pale, weak, has an increased respiratory rate and a rapid heart rate, and may be constipated. If the lack of oxygen to the brain is severe, the animal will become belligerent and may attack people, horses, and pickup trucks. Exertion from the belligerent activity or from forcing the animal to move to a corral may kill the animal. If anaplasmosis is suspected, it is best to leave the animal in a quiet area and bring water and feed. Don’t excite these cattle; they can damage themselves and you.

What can I do in case of an outbreak in my herd?

First of all, make sure you work with your veterinarian to make a diagnosis. There are a number of diseases that can look like anaplasmosis. Redwater, leptospirosis, acute pneumonia, and Braken fern toxicity are a few that can mimic anaplasmosis. Your veterinarian can perform an examination of sick animals, necropsy of dead animals, or submit samples to the laboratory to confirm anaplasmosis. If you and your veterinarian are concerned that more of the herd is incubating anaplasmosis, you can give tetracycline injections to buy some time.

Giving tetracycline injections to the cattle at risk will allow time to formulate a plan to prevent further losses. Consult with your veterinarian with respect to the next step. Because anaplasmosis is such a complicated disease, there are many aspects that need to be considered to successfully contain an outbreak.

What vaccines are available? In California, we currently have two vaccine options. The first is a live vaccine available from Poultry Health Laboratories and is called **Anavac7**. **It is safe and effective when given to young cattle (4 to 11**

months of age). The cattle become infected with the vaccine strain of *Anaplasma* and are immune carriers. This method of preventing disease is basically a controlled infection. If this vaccine (Anavac7) is given to older cattle, they will become sick and could die, just as with the natural disease. Vaccination of mature bulls with Anavac7 can cause death loss or infertility.

Recently, an "investigational vaccine" has become available for use in California as a second choice. This "investigational vaccine" is a killed vaccine and when the cattle are vaccinated, they develop enough immunity to prevent illness when they become infected. ***This vaccine does not prevent infection by the anaplasma organism.*** When the vaccinated cattle are infected by the *Anaplasma marginale* organism under field conditions, they go through a normal incubation period of about 45-90 days, have a slight drop in their red blood cell count, and remain normal in appearance. These vaccinated cattle do not become ill, but they do carry the field strain *Anaplasma* organism after they become infected. Most infected cattle then carry the organism for their entire life. They are immune carriers. That is to say, they are immune to becoming sick from the agent but are carriers of the agent. If you were to take a small amount of blood from one of these immune carriers and put it into a susceptible cow, that cow would become infected and sick.

These two vaccines are very important. If you purchase bulls or heifers for replacements this fall, be sure these cattle are protected. If the cattle were vaccinated with the live vaccine (Anavac7) as calves **and not fed tetracyclines** in the feedlot, they will be immune carriers and safe from getting sick. If they **were fed tetracyclines** (a common procedure for bulls being grown in a feedlot), they will lose their immunity after one to two years if they do not become re-infected. If the cattle are over a year of age, be sure they were vaccinated with two doses of the killed "investigational vaccine." They should be protected against becoming ill when naturally infected on your ranch.

Where can I get these vaccines? The live vaccine, Anavac7, is available through Poultry Health Laboratories, in Davis, California. It must be shipped on dry ice or in liquid nitrogen and costs about \$3.00 per dose plus shipping. Often, there are advertisements in the CCA magazine for this product. Their phone number is (530)753-5881. The killed, "investigational vaccine" is available through California Woolgrowers Association, at (916) 444-8122. This vaccine costs about \$6.50 per dose and is shipped via normal refrigeration.

As you can see from this brief discussion, anaplasmosis is a very complicated disease and the need to vaccinate will vary from herd to herd. Particularly important is the protection of susceptible cattle coming into an anaplasmosis area. Make sure that when you buy bulls or replacement heifers they are protected. Either they are raised in anaplasmosis areas or they have been vaccinated and are protected. This is doubly important for bulls, because if they get sick and don't die, they can be sterile. Talk this problem over with your veterinarian in detail. You won't make any **small** mistakes when dealing with anaplasmosis in California!

Source: John Maas, DVM, MS, Extension Veterinarian, University of California Davis

Treatment of Calf Scours

What causes calf scours? As new calves arrive, so does the threat of the common condition known as "calf scours" or neonatal calf diarrhea. Infectious agents such as viruses and bacteria cause this condition. These agents have the common property of causing a **net loss** of water and electrolyte imbalances that can result in death. The main infectious organisms that can cause diarrhea in beef calves are:

1. Rota virus
2. Corona virus
3. *Cryptosporidium parvum*
4. *E. coli* (K99 enterotoxigenic form)

The first three on the list usually cause diarrhea at 7 to 21 days of age, while the common *E. coli*

strains cause diarrhea within the first few days of life. The diarrhea is the result of a combination of factors including: (1) dose (number) or organisms the calf is exposed to, (2) calf immunity (colostrum), and (3) stress on the calf. The number of organisms in the calf's environment is a result of sanitation or the lack of sanitation, i.e., mud, manure, and other cattle. The immunity of the calf is dependent on the quality and quantity of colostrum received from the cow. Calves that do not receive adequate colostrum are much more susceptible to disease and are at much greater risk of dying from the resulting diarrhea that occurs. Stressful conditions (low milk production by underfed cows, bad weather, crowding) further increase the risk of diarrhea in young calves. The balance of all these factors determines if disease occurs and the severity of disease.

When should I treat the calf? Calves running around the pasture with their tails in the air, bucking and kicking with yellow or white diarrhea may not need treatment. The main indications for treatment are (1) general disposition, (2) appetite, (3) dehydration, and (4) body temperature. If the calf is weak, depressed, or reluctant to move, these are all indications that something is wrong. If the calf is not eating, the cow's udder will be distended and this is a sign of trouble also. Dehydration can be evaluated easily by pulling up the skin on the side of the neck or shoulder. In a normal calf, the skin snaps back into position quickly. In a dehydrated calf, the skin remains "tented" for a period of time—the longer it remains "tented" the worse the dehydration. Also, as dehydration worsens, the eyeballs sink back away from the eyelids—this is a bad sign and fluids are indicated immediately. Normal body temperature (measured with a rectal thermometer) is 100.5° F to 102.5° F. Body temperatures less than 100° F and greater than 102.5° F are a sign of problems and treatment should be started.

What are the recommended treatments? The main treatment is fluid therapy. Secondary treatments are antibiotics and nursing care. Because the main problem in scouring calves is loss of body fluid

and electrolytes, the primary treatment must be aimed at restoring the water balance. The calves are thirsty, but they are too sick to drink. Therefore, the first line of treatment is ***oral electrolyte solutions***. There are a number of excellent commercial products on the market for treatment of calf scours. All of these products contain glucose or a similar material, sodium chloride (table salt), and other electrolytes. The glucose and sodium allow the animals to absorb the water they need from their digestive tract. **Giving straight water does not work.** Usually two liters (just over two quarts) of the oral fluid solution are given one to three times per day to the sick calf. Consult with your veterinarian regarding the appropriate oral electrolyte product for your operation. **Always follow the label mixing instructions**—do not add too much powder to the solution as this may kill the calf and unnecessarily adds to the cost of treatment. Antibiotics are often given to scouring calves even though antibiotics do not kill most of the calf scouring agents. Due to damage in the gut of scouring calves, bacteria will "leak" into the blood stream of these calves and cause further problems. Antibiotics are of value for this reason. Again, consult with your veterinarian regarding the correct choice of antibiotics to give. Many of the antibiotics are not labeled for calf scours and thus require a prescription from your veterinarian and an extended withdrawal time. Avoid the use of injectable gentamicin or kanamycin. Tissue residues from these drugs can persist for up to one year and this can cause problems in the packing plant. Long acting tetracyclines can cause some kidney damage in dehydrated calves and should be avoided. Baytril® is not labeled for scouring calves and should not be used. In addition to fluids and antibiotics, nursing care may be essential for the calves to recover. Shelter from the wind, heat lamps, etc. can be very helpful. However, this requires some type of facility and may result in a contaminated environment and increased spread of the germs that cause calf scours. Additionally, the problem of separating the cow and calf has to be solved. **When treating sick calves, always treat them after you have attended to all the normal calves.** This will decrease the spread of germs from

the sick calves to the younger healthy calves. Also, keep all your treatment equipment clean—including your hands and clothes, as you can easily transmit these agents.

When do I need additional help? If your treatment methods are not working, contact your veterinarian immediately for additional help. If more than 5% of your calves are scouring and require treatment, you need help. If death loss is greater than 2% due to calf scours, contact your veterinarian. Many advances have been made in the diagnosis of these conditions. Your veterinarian can submit refrigerated (not frozen) stool samples to the University of California's Veterinary Diagnostic Laboratory and receive answers in as little as a few days. Freshly dead calves can also be examined to determine the cause of the diarrhea and to aid in determining those factors needed for prevention and treatment in your herd.

Prevention of Foothill Abortion

While the search for the agent goes on, there are a number of steps that can be taken to help minimize losses. The only known way that cattle develop immunity to the disease is by exposure to the agent through the bite of the Pajaroello tick. Also, cattle do not seem to develop an immune response to the agent until they are sexually mature, which for English breeds is 10 to 12 months of age and for Zebu breeds is about 12 to 14 months of age. The length of time cows and heifers are immune after exposure is not known. It is probable that the cows' immune response is boosted from time to time by re-exposure to feeding ticks. So that once the cattle become immune, the periodic re-exposure aids in maintaining immunity. Some observations indicate that cattle may need to be re-exposed on an annual or every other year basis to provide the best protection.

At least three groups of cattle seem to have immunity to EBA and can be classified as follows:

Open heifers, that are sexually mature (10 months of age or older, depending on breed,

feed, and individual maturity), and mature open cows which have been bitten by EBA carrier ticks prior to the breeding season.

- # Cows which have either aborted due to EBA or given birth to weak EBA calves.
- # Cattle bitten by EBA infected ticks after six months of pregnancy. In this case, it seems that the fetus can respond to the EBA agent and is born normal and healthy.

Pregnant cows and heifers without pre-exposure to EBA are most susceptible, and abortion storms can cause losses of 50%, or more, of the expected calf crop. Susceptible cattle are common in the following circumstances:

- # Pregnant heifers in a tick infested area. In areas with low tick exposure, some females may not be bitten until they are four or five years of age.
- # Pregnant females brought into a high risk area from a tick free area or from outside the state.
- # EBA immune cows from tick infested areas may lose their protection if removed from tick re-exposure for two or more years.

Possible circumstance for EBA abortion outbreaks include the following:

- # A warm period of weather (instead of the usual cold or wet period) during the second trimester of pregnancy, causing pregnant animals to be exposed to the ticks.
- # Brush burned over areas (within the last few years) may have opened up tick areas in pastures and ranges where cattle have not usually been grazing exposing them to increased tick activity.
- # Drought conditions may force cattle to graze higher, more remote pastures, where the tick density may be greater.
- # When increasing herd size, the grazing pasture may open up new areas that may have more ticks. Also, when repopulating cow herds or adding pregnant cows or heifers from other areas, it is important to consider the risk of EBA to these animals.

Based on our understanding of EBA, there are a number of management strategies that can help control, or minimize, the losses due to EBA. One of the important items is to learn which pasture and/or range areas have the greatest number of ticks and, therefore, the greatest risk of exposure to EBA. Your University of California livestock advisor and/or your veterinarian can be very helpful in this respect. Those pastures that most likely have Pajaroello ticks are those where dry bedding areas are frequented by both deer and cattle. These areas include oaks, pine or juniper tree areas and high brush or rock outcroppings where cattle and deer prefer to bed. Wet areas or irrigated pastures are usually free of the Pajaroello ticks. Bedding areas can be examined for the presence of these ticks by using dry ice (carbon dioxide) traps to attract the ticks so they can be identified. The ticks are attracted to the carbon dioxide from the dry ice as they would be attracted to a large mammal. These areas can easily be identified with a little help. Once these areas are identified, they can be included in the management plan.

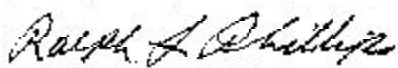
- # Expose heifers that have reached puberty to active tick areas before breeding. Heifers born in the spring can be bred as fall calving replacements and heifers born in the fall can be bred for spring calving replacements. This will allow for pre-breeding exposure.
- # Breed susceptible heifers as yearlings and turn them into tick areas after six months of preg-

nancy.

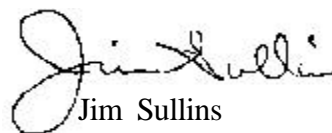
- # Alter the breeding season to prevent tick exposure of pregnant cattle before they are six months in gestation. Examples of this would be to place pregnant cattle on irrigated pastures until after they are pregnant at least six months. Another example would be to change from spring calving to fall calving.
- # Run stocker cattle or bulls in EBA areas.
- # Keep cows or heifers that have had EBA abortions. They should be immune for the next season or two at least.
- # Buy replacements from areas known to have high tick exposure or EBA.
- # Manage tick infested pastures to more efficiently expose cows or heifer or to prevent exposure. Place pregnant females on irrigated pastures or open valleys where tick exposure is minimal.

Unfortunately, periods of drought and heavy rainfall years can both modify the tick activity patterns greatly. While these management methods are far from perfect, knowledge of tick exposure and subsequent risk of EBA should help to minimize losses. Until a more predictable means of prevention is developed, we will have to use the above concepts to try and control this costly condition.

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