

Case Histories of *Clostridium Hemolyticum* Infection

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My topic today is case histories of clostridium hemolyticum infection. We call this disease "red water" down in our part of the country. It is also known as *bacillary hemoglobinuria*.

In Florida, red water is a relatively new disease. So far as I can find out, it was first suspected as the cause of several deaths in a Brahman herd in the Kissimmee River Valley area around 1957 or 1958. Five years later, in 1962, it was positively diagnosed by laboratory confirmation some 75 to 80 miles to the south in a herd located on the northwest shore of Lake Okeechobee, where the Kissimmee River runs into the lake. Since then, it has spread to just about every area in southern Florida.

I mention where the disease was first found because I feel that it has something to do with the spread of the disease in our area. But first, let me say something about the causitive organism, how it affects cattle, and its diagnosis.

Red water is caused by one of the clostridial organisms, *clostridium hemolyticum*. *Bovine Medicine and Surgery* describes the organism as a noncapsulated, sluggishly motile spore forming, obligate anaerobic rod. They also state that culture requirements are most exacting and that it closely resembles *C1 novyi* and *C1 sardellie* in culture features, but is an immunologically distinct species. On cultural media, a toxin is produced that has a twofold affect on body tissue. One causes hemolysis of erythrocytes and the other, tissue necrosis. Hemolysis and liver necrosis is also found in natural infection. It is gram positive for the first 24 hours of growth on culture, then becomes gram negative.

The organism, under favorable conditions, can remain viable for long periods of time. The spores are thought to be quite resistant to the elements: heat, cold, light and chemicals. Cultures have been isolated from bones of animals that have been dead for two years that died from the disease.

It has been well established that the organism can be present in animals and not cause illness. It has been isolated from a normal animal on premises where the disease had not been found for over five years.

The liver seems to be the focal point of infection. However, the organism can be isolated from the blood, spleen, and other organs of the body of animals that have died from red water.

Three forms of the disease have been described in literature, icteric, anemia and hemorrhagic. In my

limited experience, all the animals I have autopsied have had some degree of yellow jaundice, anemia, and hemorrhagic lesions.

The onset and duration of the disease is very fast. I have only seen one live infected animal and it died within one hour after I first saw it. I have had clients that called and said they had a sick animal, but, by the time I got there, they were dead. Thrity-six (36) hours has been reported as the average time of death from first symptoms. I have seen animals that were apparently normal when worked in the cow pens one day and found dead the next morning. I saw one animal that ate its breakfast and seemed normal early in the morning and was dead at 7 o'clock that afternoon.

It's rather difficult to describe symptoms when I have only seen one live infected animal. As I remember the case, its temperature was around 104.0. It was standing with its head lowered and its back arched. When made to move, it did so reluctantly, grunting as it walked. It only walked a short distance then refused to move. The animal was an Angus bull and objected to examination around the head, and we were not able to examine the mucous membranes. A fast jugular pulse was observed. Respiration was fast and shallow. The urine was port wine colored. The animal died in about an hour. A complete autopsy was not done on this animal, but we opened him up enough to see the liver, found the infarct, and let it go an another case of red water.

In addition to these symptoms, textbooks also mention loss of appetite, rumination, and bowel movements. The temperatures may go below normal just before death and mucous membranes may be pale or jaundiced, especially in those cases that linger longer than normal. If there is a bowel movement, it is scanty and blood tinged. Some animals may become dehydrated and loose weight rapidly. Owners have reported grinding of teeth, with foam collecting around the muzzle.

The two symptoms that would make me suspect red water would be the blood colored urine and sudden onset of the illness.

Any disease that can cause anemia, jaundice, hemolysis and putrefaction is bound to cause a multitude of changes in the tissues. However, in my limited experience, there have been several lesions that have been rather constant: bloody froth around nostrils and anus, the infarct on the liver, or a very necrotic liver if the animal has been dead very long;

the port wine colored urine, a straw colored fluid in the abdominal cavity, and a very sweetish smelling odor when the animal is first opened that I cannot adequately describe. The infarct on the liver and the port wine colored urine, in combination with any of the other symptoms, is red water in my opinion in my part of the country until proven otherwise.

The liver infarct is probably the most diagnostic lesion. The only diseases as far as I know that have a similar lesion in the liver is *clostridium novyi*. In *novyi*, the liver has a lesion that looks like an infarct, but it is not as circumscribed or pronounced as in red water. As I mentioned before, the longer an animal has been dead, the less pronounced is the infarct. In *novyi*, I don't think the urine is discolored.

Other diseases that may have blood colored urine are cystic hematuria, bracken fern poisoning, anaplasmosis and leptospirosis. But, most of these diseases will have erythrocytes in the discolored urine. There are no red cells in the urine of a cow infected with red water.

Senicio, or coffee weed poisoning, can also cause urine to be port wine colored like that found in red water.

We mentioned earlier that the liver appeared to be the focal point of infection, and it was thought that the organism may lay dormant in the liver until something comes along to cause damage or insult to the liver. In our area, liver fluke infection seems to be the primary cause. High nitrate feeds have been reported in conjunction with red water outbreaks, and I am sure there can be other things.

So far as I have been able to determine, red water has not appeared in Florida outside those areas considered fluke infested.

SLIDES:

I don't think there is much need to talk about treatment because the animal is generally dead before you have time to treat it. But, we do have a very effective prevention tool. Red water bacterin does a very good job. The only problem is that it is only effective for about six (6) months. However, we have some ranchers that only vaccinate once yearly and seem to get protection. Others have to vaccinate every nine to ten months; others can only go the six months that the label recommends. I can't explain this scientifically, but I do know that the liver fluke problem differs on each ranch. Weather conditions, rain and draught, affect liver fluke population. Also, amount of pasture, rate of stocking, and many other factors can influence rate and time of fluke infestation. My policy has been to inform ranchers on what the manufacturer recommends, then tell him that if he wants to go for a few more months he will just have to try it and then establish how long he can go under his set of circumstances.

We were supposed to talk about case histories. I can't think of any good it would do for me to tell you about individual animals that I have autopsied. Maybe it would be better if I told you about some

problems ranchers are having with red water in their herds.

With some of the management practices we have in our area, it is difficult sometimes to pin the problem on red water. Under some of our range conditions, it is almost impossible for the owner to see all of his cows every day.

I have had a number of ranchers that would complain about finding a dead animal every ten days or two weeks, or maybe, only one a month. By the time he had found it, it was too late to do an autopsy. In fact, I have had ranchers that have lost 25 or 30 head over a one- or two-year period before we were ever able to say definitely that the deaths were caused by red water. I had one rancher that did not want to vaccinate until he was sure he had the disease. Consequently, he kept losing animals until we did find a positive case. Another rancher close by had lost a few cows and we were not able to get an autopsy. But, he did go ahead and vaccinate and stopped his deaths.

The ranch that owned the bull that ate breakfast and died that night was heavily stocked and even though they vaccinate fairly regularly, they were not able to get all their cattle vaccinated every six months. If they let one of the herds go for nine months without vaccinating and then worked that herd in the pen, it was not uncommon for one of the animals to die during the night. The bull that ate its breakfast and died in the afternoon was kept in the barn at all times and was only used to collect semen. What killed him so quickly was a massive hematoma, a hemorrhage in the liver. He had port wine colored urine. I did not find an infarct, but believe the hemorrhage destroyed the infarct. The *hemolyticum* organism was isolated from this animal. This animal was never allowed to graze but did eat hay that was grown on the ranch. Liver fluke can be transmitted on hay.

Another observation that I have made is that I have never seen a poor or sickly animal die from red water. It is always an animal that is in good condition. Neither have I seen an animal die that was under nine or ten months of age.

Red water is like blackleg in our country. Once it becomes established on a ranch, vaccination will be necessary for many years to come. I think this is going to be true in any area that has a liver fluke problem. Nitrate poisoning has been incriminated as a source of insult to the liver, resulting in death from red water. I am sure there are many other things that can damage the liver, but we have to remember that unless the *clostridium hemolyticum* organism is present, there can be no infection. Once the organism has been introduced and established on the premises, it is possible that any number of things can trigger the infection.

The infection can be transmitted from one ranch to another by movement of seemingly normal healthy animals from an infected ranch to a noninfected area; unless something triggers the infection in the carrier animal, the chances of its dying from red water is

rather remote. And, if you do not have any deaths from red water, there is little chance that the soil can become seeded with the red water organism.

This is the reason I do not believe that red water need ever become a problem in an area that does not have a constant source of something that can insult the liver, like the liver fluke we have in our part of Florida.

The only area I know of in Florida where there have been multiple deaths from red water has been in the known fluke-infected areas. An occasional death may occur outside of these areas, but the disease does not seem to become endemic.

As I said at the start, the first suspected red water deaths in Florida were in the upper Kissimmee River valley area. It was next found downriver on the edge of Lake Okeechobee, and from there it has spread to all areas of southern Florida where flukes are a problem. In this part of the state, most river and water flow is to the south, spreading out to the east and west.

We are told that many organisms multiply in the

sick and dead animal and that the organism can live for many years. I am sure the organism can be carried in great numbers by flood water to adjacent areas.

The spread of blackleg through southern Florida followed this same pattern 30-35 years ago. It was first found around Lake Okeechobee then spread south, east, and west from the lake. Animal carriers can spread the disease in any direction, but, flood waters, as a carrier, is just as important in my opinion.

Questions

1. The toxin produced by the clostridium hemolyticum organism on culture media and in natural infection can cause erythrocyte hemolysis and tissue necroses. True or False.
2. If red water bacterin is administered according to the label, will it protect an animal for: (a.) one year, (b.) nine months, or, (c.) six months.
3. What internal organ is thought to be the focal point of infection in red water?
4. What are the two post mortem lesions that are the most helpful when diagnosing red water?
5. What parasite is thought to be the primary source of insult to the liver in red water infection?

