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Lyme Disease[1]

Thomas J. Lane, D.V.M. and Paul Nicoletti, D.V.M., M.S.[2]

Lyme disease is considered a serious health threat to both humans and animals in some parts of the United States. This disease develops due to the spirochete *Borrelia burgdorferi* and is transmitted by the bite of an infected tick, which is feeding on its host. The disease affects humans and some domestic animals, including cats, dogs, horses, and cattle. The Lyme disease organism is a somewhat recent medical discovery. Lyme disease was first documented in the United States in 1975, although the signs were first described by a Swedish physician as early as 1909. The disease is named for the town of Old Lyme, Connecticut where the first cases occurred. It has also been described in Europe, Africa, Australia, Asia and China. Approximately 8000 cases of Lyme disease in humans are reported every year in the United States. As of 1991, the medical community is required to report cases of this disease.

In 1985, Lyme disease was diagnosed in only eight states. At least 46 states have reported Lyme disease in humans but the presence of the organism has not been proven in all of these. It is estimated that the actual incidence of the disease is much greater, but the difficulty of diagnosis has prevented many cases from being reported. Its prevalence in animals may be as great or greater than in humans.

The primary vectors of the disease are the northern deer tick (*Ixodes dammini*), a series in the Northeast and upper Midwest; the black-legged tick (*I. scapularis*), a series found in the Midwest and Southeast; and the Western black-legged tick (*I. pacificus*), a series found mainly in the coastal areas of California. The American dog tick (*Dermacentor variabilis*) and Lone star tick (*Amblyomma americanum*) can also carry the disease.

The *Borrelia burgdorfi* organisms have been found in other insects, such as deer flies, horse flies, and mosquitoes but these insects have not been shown to transmit the disease.

Deer ticks are common on small rodents and are the major sources of Lyme disease infection. The larval stage of the tick generally feeds on the white footed mouse, an animal that carries the organism with no ill effects. In the subsequent nymphal stage and adult stages, the tick will usually feed on larger warm-blooded mammals. The deer tick is a small brown tick. The adult female, when fully engorged with a blood meal, is approximately the size of a pea and has an orange or yellow abdomen. At the larval and nymphal stages, the tick is approximately the size of the head of a common pin. At all stages of development, the deer tick is much smaller than the common dog tick.

These ticks are capable of infecting humans and animals during all stages of development. For an unknown reason, the disease does not cause illness in

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2. Thomas J. Lane, D.V.M. Extension Veterinarian, College of Veterinary Medicine; Paul Nicoletti, D.V.M., M.S., Professor, College of Veterinary Medicine, Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

some animals including deer and birds. Animals and humans can acquire Lyme disease at anytime during the year, but most cases occur from May through November when the ticks are the most active. The nymph stage is most common in late spring and summer, while the adults are present in the early spring and fall.

The infective organism enters the body through a tick bite, or directly through a break in the skin, and is spread through the lymphatics to regional lymph nodes. A bacteremia may be established which can infect all body tissues within a short period. Lyme disease in humans can be divided into three stages. The early stage is associated with a characteristic skin rash which occurs in about 50-70% of the cases. Usually the skin rash expands from the site of the tick bite and has a red outer margin and a pale center. The rash may occur several days to a month after a tick bite. Other symptoms which may occur with or without the skin rash are flu-like symptoms, such as headache, stiffness, body pain, fever, and loss of appetite. These early signs may disappear within 3 to 4 weeks even without treatment. The second stage usually occurs several weeks or months after the infection and is demonstrated by joint pain, headache, incoordination, weakness and irregular heartbeat. The third stage is the advanced stage and may occur months to years after the infection. This stage is characterized by arthritis with pain and swelling of the joints. Chronic neurological signs may also occur.

Lyme disease is treated with antibiotics and during the early stage treatment is rapidly effective. During later stages, the disease becomes more difficult to treat. Diagnosis is often difficult and the current available laboratory tests are relatively insensitive in early Lyme disease. Because of this, most diagnoses of people are based on the person's symptoms and a history of exposure to ticks.

Cats, dogs, horses, and cattle also become infected with the Lyme disease organism and show clinical signs of the disease. All ages, breeds and both sexes of these animals appear to be susceptible to the infection. However, animals usually do not develop the characteristic red skin rash which is observed in humans. The most common symptoms include intermittent lameness, lethargy, fever, swollen glands, and a loss of appetite. In dogs, Lyme disease infections can be categorized as either acute or chronic. The signs of an acute infection include fever, poor appetite, lethargy and a sudden onset of lameness or joint pain. These animals often do not have swollen joints, and it is frequently difficult to determine the origin of the pain. The lameness is intermittent and appears to migrate from one joint to another. Many affected dogs have recurrent episodes of lameness with two or more joints affected. In the more chronic infection, the joint lameness may occur with increasing frequency over several weeks. The carpus, elbow, and hock are the joints most commonly involved. Some dogs may experience cardiac or renal failure, or central nervous system problems. Once again, diagnosis of Lyme disease is difficult. A large number of dogs living in infected areas will test positive which indicates an exposure to the organism, but many of these animals will not develop clinical disease.

Two vaccines for dogs against Lyme disease have been licensed by the United States Department of Agriculture. The vaccines are for use in dogs which are 12 weeks or more of age. Two doses are administered initially three-weeks apart followed by annual revaccination. Animal health officials caution that vaccines may not be necessary for all dogs and their use needs to be evaluated.

Cats in some areas are frequently seen with nymphal and adult ticks, particularly around the eyelids. However, few Lyme disease-associated illnesses have been reported in cats and only one-third of a limited number of blood samples, which have been tested, have been positive. The significance of Lyme disease in cats has yet to be determined.

Many cattle may test positive for Lyme disease but they might not develop any symptoms of the disease. Cows which are clinically affected may show signs of lameness, swollen joints, fever, arthritis and laminitis. A skin lesion resembling the erythema migrams rash found in humans has been demonstrated on the udder of some infected cows.

In recent surveys, 12-20% of horses tested positive for Lyme disease, yet the animals exhibited no symptoms of the disease. Pastured horses are at risk of getting Lyme disease from the bites of infected ticks. The ticks prefer the legs and the area around the tail-head but can also be found on other areas of the

body. Many horses are bitten by infected ticks and do not develop disease symptoms. Horses which develop symptoms of the disease show a sudden onset of lameness or stiffness especially in the hind legs. Other possible signs include fever, anorexia and a depressed attitude. In addition, both horses and cattle may have chronic weight loss, abortions, and laminitis-like signs. These animals will show signs of laminitis but are not sensitive to the application of hoof testers.

Although difficult to diagnose when detected in its early stage, Lyme disease can be effectively treated. Diagnosis is based on history, clinical signs, serology, and the patient's response to treatment. It is important to be aware of the limitations of serology tests. Antibiotics used for treatment include tetracyclines and penicillins, and these are effective when administered within the early stages of the disease. Later stages of the disease may require the administration of intravenous antibiotics for an extended period. Studies are currently underway to develop an effective vaccine for horses and cattle.

The prevention of Lyme disease in both people and animals can be accomplished through the routine use of approved pesticides. It is important to remember that being bitten by a tick does not always produce Lyme disease, because not all ticks are infected. Also because infected ticks must be attached at least 24 hours before the disease organism is transmitted, it is prudent to check animals on a regular basis and treat them as necessary.

The removal of attached ticks should be done with tweezers by grasping the tick where its mouthparts attach to the skin. The tick should be saved by placing it in a jar and the date and the location should be recorded. If symptoms of Lyme disease develop, the tick can help the doctor or veterinarian make a diagnosis.

Lyme disease is seldom fatal to humans or animals, but if it is allowed to progress to advanced stages, the disease can result in severe arthritis or neurological disorders and debilitation.

There have been no confirmed cases of transmission of Lyme disease from animals directly to humans even though the organism has been found in the urine of infected animals.

Summary

Protect your animals from Lyme Disease.

a) Use tick collars, dips, baths, and sprays on your dogs and cats.

b) Examine horses and cattle frequently for ticks. Use appropriate insecticides for horses and cattle. Ask your veterinarian for recommendations.

c) Check pets for ticks before bringing them inside the home.

d) Keep the yard and lawn mowed and free of brush and debris where ticks may congregate. Spray areas of the yard where ticks may collect.

e) In infested areas, dogs may need to be vaccinated. Check with your veterinarian.