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G78-417 Leptospirosis of Domestic Animals

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Leptospirosis of Domestic Animals

Leptospirosis of domestic animals is a very complex disease. This NebGuide examines its diagnosis, treatment, and prevention.

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Introduction

Leptospirosis is an infectious disease of animals and man caused by a spiral-shaped organism (spirochete) of the genus *Leptospira*. The important serotypes recognized in livestock in the United States include *Leptospira pomona*, *L. canicola*, *L. icterohaemorrhagiae*, *L. grippityphosa* and *L. hardjo*. These organisms have a wide host range, including man. Among domestic animals, swine, cattle, dogs, and horses are most frequently affected. Known wildlife hosts include many of the small rodents, raccoons, foxes, opossums, skunks, deer, and moose.

Because of the nature of the disease, it should not be considered a problem of the individual animal but a problem of a population, either a herd or a species within the area. The disease can be controlled by proper management and the correct use of available vaccines.

Method of Spread

Leptospirosis is generally contracted by the direct splashing of urine from infected or carrier animals into the eyes of susceptible animals. It can also be spread through the skin and mucous membranes from contact with water contaminated with leptospire. Transmission may also occur during breeding through residual urine in the genital tract or through infectious semen.

The major sources of contamination are swine, cattle, dogs, and wildlife that have recovered from the disease and have become carriers. Cattle and swine are major sources because of the volume of urine and the extent and duration of leptospire in the urine.

Leptospirosis is an important zoonotic disease (a disease acquired by man from animals). A significant percentage of human cases are acquired through direct contact with the urine of infected livestock or with contaminated soil or water. Many epidemics of *L. pomona* have occurred among persons swimming in water contaminated with the urine of infected livestock. The organism may survive up to six months in alkaline water.

Leptospirosis in Domestic Animals

Signs in cattle. Leptospirosis in cattle may vary in severity from a mild, inapparent infection to an acute infection that may cause death.

Acute clinical disease occurs more often in young calves, but all ages may be affected. Cattle may develop a high fever of 104° to 107°F, depression, loss of appetite, decreased milk production, and weakness. Hemoglobinuria (coffee-colored urine), anemia, icterus (jaundice), and bloody milk are also seen. In lactating cows, the udder becomes flaccid and milk flow nearly ceases. The milk is usually abnormal and may contain thick yellow or reddish clots. Reddish milk may develop with the onset of hemoglobinuria.

Abortion, frequently the only clinical sign reported, usually occurs two to five weeks after initial infection. Although abortions may occur earlier, most occur in the last three months of pregnancy.

The clinical disease may occur with mild signs, and inapparent infections can occur. Many cattle in a herd may develop serologic titers without apparent clinical signs.

Signs in swine. The disease in swine is largely subclinical (no apparent signs of illness) except for abortions, which usually occur during the last two to three weeks of pregnancy. The sow aborts pigs rapidly with no apparent signs of illness. Some aborted fetuses may have been dead a short time. Piglets may be born weak and die shortly after birth.

Signs in horses. The acute phase of the disease in horses following exposure is frequently subclinical. The infected animal may have a slight temperature rise and mild loss of appetite. Leptospirosis caused by *L. pomona* is widespread among susceptible horse populations.

Within 12 to 14 months after the initial infection, the eyes of many horses show evidence of uveitis (inflammation of the internal structures of the eye), a disease commonly known as periodic ophthalmia or "moon blindness." The amount of eye involvement is variable, and the disease may be arrested after one or two acute attacks, or may proceed through several acute episodes to total blindness.

Cause of abortion. Researchers believe that the fetus dies from actual leptospiral infection and is expelled as a foreign body. During leptospiremia (*Leptospira* in the blood) of the dam, some of the leptospire penetrate the placental barrier and, having escaped antibody from the mother, continue to multiply in the fetus. In cattle, abortion occurs two to five weeks after the onset of the disease, and the

fetus has usually been dead for several days before it is expelled. Abortion is not delayed as long in swine; therefore, many infected fetuses contain viable leptospire when aborted. Leptospirosis is not a common cause of abortion in horses.

Leptospirosis in Other Animals

Sheep and goats. Leptospirosis occurs in sheep and goats with less frequency than in cattle and swine. The signs reported are similar to those described for cattle. A variety of serotypes have been identified, but only *L. pomona* has been isolated in the United States.

Dogs. Canine leptospirosis is widespread in the United States. However, the incidence varies with the environment and is less common in confined dogs. *Leptospira canicola* is the most common serotype; *L. icterohaemorrhagiae*, *L. pomona*, and *L. grippityphosa* are also responsible for some infections.

The acute disease in dogs is recognized as a bacterial disease causing elevated body temperature, vomiting, muscular stiffness, weakness, and nephritis (inflammation of the kidney). In severe cases, jaundice and death may occur. Central nervous system signs may occur with or without other clinical signs, and organisms may be present in the brain tissue for extended periods. Chronic leptospirosis is primarily associated with chronic kidney degeneration. Shedding of leptospire in the urine may continue for over a year.

Rodents. Wild rat (*Rattus norvegicus*) populations in urban and rural areas are frequently infected with *L. icterohaemorrhagiae*. *Leptospira ballum* is found primarily in wild mice (*Mus musculus*), but is also present in some rat populations and has been present in commercially raised laboratory mice. Other serotypes occur with less frequency in rodent populations.

Diagnosis

Leptospirosis diagnosis in all animals, including livestock, companion, and wild animals, must be confirmed by laboratory tests. There are no clinical signs distinctive to this disease but certain signs are suggestive. When *L. pomona* is introduced into dairy cattle, the first signs are a sudden drop in milk production, thickened and blood-tinged milk, anemia, and hemoglobinuria. Affected cows usually have a fever at this stage. Many cows infected during the last three months of pregnancy will abort two to five weeks after infection. Abortions and particularly low conception rates are frequently seen in herds of beef and dairy cattle infected with *L. hardjo*.

The most practical means of confirming a diagnosis of leptospirosis is the demonstration of significant levels of antibodies to leptospire in the serums of recovered animals. Currently, most veterinary diagnostic laboratories use either the plate agglutination test with killed antigens or the microscopic agglutination (MA) test, in which living organisms are used as antigens. Titers greater than 1:100 by MA test or 1:40 or greater by plate test against one or more serotypes are generally considered significant.

Antibodies can be detected seven to ten days after the onset of the acute phase; they reach peak levels 30 to 60 days later. In most cases, aborting cattle and swine have reached peak antibody titers at the time of abortion. The most significant serologic evidence is a four-fold change in titer between two or more sequential serum samples taken from individual animals over 10 to 14 days.

Serums taken from cattle during the acute febrile phase should be negative; those taken from animals that aborted or had been sick at least two weeks previously should be positive. Because leptospirosis is a herd problem, serum samples must be obtained from at least 10 animals or 10 percent of the herd, whichever is

greater.

Diagnosis of a leptospirosis outbreak is justified when most of the sero-positive animals have MA titers of 1:1000 or greater, or plate test titers of 1:160 or greater (Stoenner antigen), or when paired samples show a four-fold change in titer. If the infecting serotype is *L. hardjo*, lower titers are expected.

Leptospirosis in animals may also be diagnosed by demonstrating the organism microscopically in tissues by fluorescent antibody (FA) techniques and by isolating leptospire in a culture or in laboratory animals following the injection of infected material.

Leptospire are most readily isolated from blood or milk taken from animals during the acute phase, or from the urine, kidneys, spinal fluid, and brains of recovered animals.

Proper management of infected herds is important. When leptospirosis is diagnosed in swine or cattle during the early phase, further abortion losses may be reduced or prevented by promptly vaccinating the entire herd.

Breeding swine and cattle should be vaccinated against serotypes prevalent in the area. Swine should be vaccinated at 6-month intervals and cattle annually.

Additions to the herd should originate from herds that are free of leptospirosis and antibodies on the basis of a complete herd test.

Control

Livestock herds can be protected against leptospirosis by a combination of proper management and vaccination procedures. Because of the widespread distribution of *L. pomona* in the United States, all cattle used for breeding purposes should be vaccinated during early pregnancy to provide the greatest degree of protection during the last two-thirds of gestation. In western states, vaccination is often done in the fall when cows are examined for pregnancy. In areas where *L. hardjo* or *L. grippotyphosa* are also prevalent, a trivalent vaccine is recommended for annual vaccination. Vaccination with *L. hardjo* should be done before breeding due to the infertility caused by this serotype. Yearling calves destined for feedlots should be vaccinated with *L. pomona* vaccine.

The vaccine used in infected herds should be identical with the serotype causing the diseases, as there is little or no cross-protection between vaccine serotypes. The vaccine should be given to all susceptible livestock on the premises where infection has been identified.

The future breeding efficiency of herds that have experienced leptospirosis is usually unaltered. Animals should not be culled because they have had the disease. In fact, their value may be enhanced because they are solidly immune against re-infection with the same serotype.

Annual vaccination is recommended for dogs with a booster given if an outbreak occurs in the area.

Treatment

Antibiotic therapy--Streptomycin, chlortetracycline, or oxytetracycline--is often successful if it can be given early. Dihydrostreptomycin, 10 mg per pound or 10 g per 1,000 pound cow, has been reported to be effective for termination of the carrier or shedder state.

In the face of an acute outbreak of leptospirosis in swine, it is recommended that chlortetracycline or oxytetracycline be added to complete rations for two to three weeks at the highest levels for which it is cleared. Vaccination of the entire herd can be accomplished at the same time. By following this procedure, immunity can be established in the herd before the antibiotic is removed.

Dihydrostreptomycin can also be given to new additions, such as boars, to clear them of the *Leptospira* carrier state. Use a single injection of 10 mg per pound.

Leptospirosis of domestic animals is a very complex disease. Therefore, it is important to work with your local veterinarian in its diagnosis, treatment, and prevention.

File G417 under: ANIMAL DISEASES

F-2, General Livestock

Issued September 1978; 15,000 printed.

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Elbert C. Dickey, Director of Cooperative Extension, University of Nebraska, Institute of Agriculture and Natural Resources.

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