V-1315

Leptospirosis

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Leptospirosis is a zoonotic disease (affects both animals and people) that can cause significant economic losses in a number of domestic species. Vaccination is the key to preventing leptospirosis infections.

What causes leptospirosis?

Leptospirosis (lepto) refers to a spectrum of diseases caused by the bacteria *Leptospira interrogans*. Lepto has more than 180 different serovars (subclassifications). Each serovar is adapted to a particular species or maintenance-host. The primary serovar is *hardjo* in cattle, *grippotyphosa* in goats and *pomona* in sheep, horses and pigs.

Incidental infections from other serovars may occur, depending on the management and environmental factors allowing contact and transmission of lepto between different species of animals.

The serovar adapted to the maintenance-host species tends to cause less severe disease in that species. A serovar that is not adapted to a species tends to cause a more severe disease. This is why *pomona* causes a more severe disease in cattle than in swine.

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What is the source of infection?

The source of infection is most often urine containing lepto that comes in direct contact with mucous membranes (such as eyes) of an animal or contaminates pastures, drinking water or feed. Aborted fetal membranes are infectious to animals and humans.

Lepto may be transmitted to domestic livestock by rats and other rodents, raccoons, skunks, foxes, opossums, dogs and white-tailed deer.

What happens when an animal becomes infected?

The incubation period is usually three to seven days in an animal. Clinical signs usually last from three to five days. The clinical signs of the disease can vary greatly, depending on the infecting serovar.

The disease may be acute, with clinical signs such as high fever; anemia; jaundice; labored breathing; mastitis; reduced milk flow; yellow, thickened and sometimes blood-tinged milk; and abortion. The acute form often affects calves. In a subacute infection, the symptoms are milder. Intermittent fever with abortion usually will follow in one to four weeks. Subclinical cases have no apparent clinical signs except abortion.

The clinical signs of lepto depend on the herd's degree of resistance or immunity. In herds with adequate immunity developed through a good vaccination program, some cattle can become infected with the organism but not show signs of the disease. Herds with little or no immunity often show a number of clinical signs.

The lepto organism enters via broken skin or mucous membranes. It multiplies in the liver and resides primarily in the kidneys. The acutely ill animal may die from septicemia, hemolytic anemia or malfunction of the liver and kidneys, or a combination of all of these causes. Lepto can be shed in urine for up to four months in recovered animals.

If a cow is infected in the first half of pregnancy, the placenta is more resistant to penetration by lepto and abortion seldom occurs. If a cow is infected in the second half of pregnancy, the fetus is more likely to be invaded by the organism, become infected and die.

What are the ways to make a diagnosis?

A veterinarian should collect the samples needed to correctly diagnose a case of lepto as quickly as possible after an abortion or an animal dies. In some cases, the veterinarian should euthanize an affected animal to collect the required samples.

Lepto targets the kidney, so fresh and formalin-fixed kidney from the fetus are ideal to use for the immunohistochemical (IHC) stain for *Leptospira*. Positive staining shows up in kidney tubules. If it can be obtained, placenta is another good tissue for IHC.

Fetal pericardial fluid, urine from the dam and serum from the dam all can be used as samples for the polymerase chain reaction (PCR). The PCR assay detects leptospiral DNA.

Darkfield microscopy and fluorescent antibody (FA) assays can be performed

on these samples as well. Darkfield microscopy looks for the actual bacterium in fluid. Fluorescent antibody uses special antibodies and fluorescent markers to identify the lepto organism.

Serum from the dam can be used for serology. Serology gives information about the serovar involved. This is helpful because IHC, PCR, darkfield and FA tests only identify the organism as *Leptospira*, while serology usually will give information on the specific serovar of *Leptospira* involved.

Finally, antibody titers in host-adapted serovars may be low to absent in herds that are experiencing reproductive problems. For instance, since *hardjo* is host-adapted in cattle, a cow herd with leptospiral disease caused by *hardjo* actually may have very low to nonexistant titers to *hardjo*.

Can the disease be treated?

Lepto is sensitive to tetracyclines. However, acute infection is relatively rare. The first sign of lepto infection is often an abortion. Treatment after an abortion is too late. Infected bulls should not be used until they have been treated to eliminate shedding and are subsequently tested, examined and found free of lepto.

How can the disease be prevented?

Animals can be protected against lepto by a combination of an effective leptospirosis vaccination program and enhanced management.

If a herd has not been vaccinated, all animals should receive two doses of vaccine, with the second dose given about four to six weeks after the first. Each year thereafter, all previously vaccinated animals should receive an annual booster dose.

Breeding cattle should be vaccinated about a month before breeding season. Be sure to vaccinate bulls and replacement heifers, as well as brood cows. In areas with a high incidence of lepto or commingling of animals with an unknown health status, all animals should be vaccinated twice a year every year.

Young calves should be vaccinated before they become infected. If calves are born to cows vaccinated late in pregnancy, vaccination of the calves should begin at about 3 months of age. If calves are born to cows that were vaccinated when open or in the first half of gestation, these calves can be vaccinated at 1 month of age.

Most lepto vaccines in the United States include *hardjo, ponoma, icterohaemorrhagiae, canicol* and *grippotyphosa* serovars. A vaccine with these five serovars commonly is called a "five-way lepto vaccine."

Management practices that can help reduce the risk of lepto infection include:

1. Prevent cattle from having access to surface water or streams that other livestock and wildlife use.
2. Remove habitats that harbor rats and rodents.
3. Limit access of rodents and wildlife to livestock feed.
4. Eliminate urine drainage into water sources.
5. Reduce contact with potentially infected cattle, livestock and wildlife.
6. Clean, disinfect and dry barns and pens where cattle are confined. Lepto likes wet environments.
7. Drain or fence off swampy areas where lepto is likely to reside.
8. Vaccinate susceptible animals.

Are people at risk for getting this disease?

A zoonotic disease, lepto affects both humans and animals. Lepto can be a very serious problem for a pregnant woman and fatal to her fetus.

People can become infected a number of ways, including:

1. Direct contact with an infected animal
2. Indirect contact via water, food or soil contaminated with lepto
3. Bacteria penetrating a cut in the skin or intact mucous membranes in the mouth, nose or eyes
4. Drinking unpasteurized milk from cows with lepto
5. Handling aborted fetal membranes and assisting calving without proper personal protection

Lepto is a debilitating disease in people. The disease starts as a severe attack of flulike illness with a high fever, severe headache, sore throat, muscle pain and chills. Occasionally, the disease may result in nervous symptoms, limb tremors and difficulty with simple tasks, such as balancing and walking. The illness may last for weeks or longer. Relapses are common with a "washed out" feeling that may persist for months.

To decrease the chances of becoming infected with lepto, wash your hands and change out of soiled clothing after working with animals. Use protective gloves when assisting animals in the birthing process. Depending on the circumstances, protective eyewear and face masks may be advisable.

If you suspect you have been exposed to lepto, contact your medical care provider.

For more information on this and other topics, see: www.ag.ndsu.edu

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