

# Leptospirosis

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Leptospirosis is caused by the bacteria *Leptospira interrogans*. *Leptospira* 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. This means these species are the primary source or reservoir of these serovars. Incidental infections from other serovars may occur, depending on the management and environmental factors allowing contact and transmission of *Leptospira* between different species of animals.

The serovar adapted to the maintenance-host species tends to cause less severe disease in that species, whereas a serovar that is not adapted to a species tends to cause a more severe disease.

## Infection Source

The source of infection to animals and humans is most often urine containing leptospires that comes in direct contact with mucous membranes (eyes, mouth) of an animal or contaminates pastures, drinking water or feed. Fetal membranes from an animal that aborted due to *Leptospira* are infectious to animals and humans.

Lepto may be transmitted to domestic animals and humans by pests and wildlife such as rats and other rodents, raccoons, skunks, foxes, opossums, dogs and white-tailed deer.

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.

## Symptoms

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. Infected cows, ewes and sows show intermittent fever, with abortion usually following in one to four weeks. Subclinical cases may show only abortion.

The clinical signs of leptospirosis 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 but not show signs of the disease. Herds with little or no immunity may show signs of reproductive disease in adult animals and systemic disease in immature animals.

## Effects

The leptospira 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. Recovered animals are often carriers for life and will shed leptospire in their urine when they are stressed. This is because the bacteria reside in the kidney tubules of recovered animals.

If a cow is infected in the first half of pregnancy, the placenta is more resistant to penetration by *Leptospira* 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.

## Making a Diagnosis

To make a diagnosis, a veterinarian should collect the needed samples as quickly as possible after an abortion or the death of the animal. 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 is 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 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 leptospire.

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, because *hardjo* is host-adapted in cattle, a cow herd with leptospiral disease caused by *hardjo* actually may have very low to nonexistent titers to *hardjo*.

## Treatment

Lepto is sensitive to tetracyclines; however, acute infection is relatively rare. The first sign of *Leptospira* infection is often an abortion. Treatment after an abortion will not work. Infected bulls should not be used because recovered animals run the risk of shedding when stressed.

Animals can be protected against leptospirosis by a combination of an effective vaccination program and sound 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 leptospirosis 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 *Leptospira* vaccines in the United States include *hardjo*, *ponoma*, *icterohaemorrhagiae*, *canicola* and *grippityphosa* serovars. A vaccine with these five serovars commonly is called a "five-way lepto vaccine."

## Management Practices

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

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

## Serious Problem for Humans

As a zoonotic disease, leptospirosis affects humans and animals. *Leptospira* can be a very serious problem for a pregnant woman and fatal to her fetus.

People can become infected a number of ways, including:

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

Leptospirosis 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 leptospire, 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 *Leptospira*, contact your medical care provider.

**For more information on this and other topics, see [www.ag.ndsu.edu](http://www.ag.ndsu.edu)**

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