

Leptospirosis



Wetlands with
stagnant water
and animal ponds

Wildlife ✓

Livestock ✓

Human ✓



Synonyms: Autumn fever (*akiyami*), cane-cutter's fever, canicola fever, haemorrhagic jaundice, mud fever, redwater of calves, rice-field fever, sewerman's flu, Stuttgart disease, swamp fever, swineherd's disease, Weil's disease or syndrome

KEY FACTS

What is leptospirosis?

A bacterial infection that affects humans and animals following exposure to species of *Leptospira spp.* bacteria. Bacteria are excreted into the environment in the urine of infected animals and can survive for up to several months in contaminated soil and for several weeks in contaminated mud slurries, although they do not survive well in river water. The primary reservoir hosts for most *Leptospira* species are wild mammals, particularly rodents, in which they cause little or no clinical disease.

Leptospirosis is most commonly transmitted indirectly through contact with contaminated water or soil but can also be transmitted directly between mammalian hosts. It is mainly endemic in countries with humid subtropical or tropical climates and is a notable cause of morbidity and mortality in humans and animals in the western hemisphere. It occurs most commonly during the rainy season in the tropics and in the summer and autumn in temperate regions. Conditions leading to an increase of contaminated surface water or soil, such as rain, floods and disasters increase the risk of leptospirosis and may result in epidemics. In addition, during periods of drought, risks of infection may increase in association with the attraction of both humans and animals to water bodies.

In humans, the range of symptoms is very wide and variable, from mild non-specific signs to lethal infection.

Causal agent

Species of bacteria from the genus *Leptospira*, including *L. grippityphosa*, *L. canicola*, *L. hardjo*, *L. pomona*, *L. bratislava*, *L. icterohaemorrhagiae*, *L. interrogans*, *L. noguchii*, *L. santarosai*, *L. meyeri*, *L. borgpetersenii*, *L. kirschneri*, *L. weilii*, *L. inadat*, *L. fainei* and *L. alexanderi*. Taxonomy is complex, but strains are commonly described as serovars. There are over 200 pathogenic serovars with many being host adapted to wildlife species in which they cause little clinical disease.

Species affected

All terrestrial and marine mammals appear to be susceptible. Most commonly found in many species of wild and domestic animals including rodents, cattle, sheep, goats, pigs, horses and dogs. Humans, particularly those working in or close to water, are very susceptible to illness caused by certain strains. Infection in reptiles, amphibians and birds is rare.

Geographic distribution

Occurs worldwide but most commonly in temperate or tropical climates with high rainfall. The highest concentrations of cases are often in developing countries where wet farming and rodent populations combine and where freshwater floods may occur.

Environment Any environment supporting species of *Leptospira spp.* and their animal hosts. Leptospirosis is particularly prevalent in warm and humid climates, marshy or wet areas, and in regions with an alkaline soil pH. The importance of each species differs between geographical regions.

TRANSMISSION AND SPREAD

Vector(s) Infected terrestrial and marine mammals.

How is the disease transmitted to animals? Infection is acquired through direct contact with infected urine or indirect contact with urine-contaminated water/soil/vegetation or food. Bacteria gain entry across intact mucous membranes or broken skin. Occasionally, infection can spread through the inhalation/ingestion of aerosolised urine or water. Transmission may also occur through contact with infected normal, aborted or stillborn foetuses, or vaginal discharge and placental fluids.

How does the disease spread between groups of animals? Infection is spread from one animal group to another by an infected animal which will shed the bacteria into the environment, most commonly in urine. Infection is maintained through survival of bacteria in the kidney of a reservoir host, where they are protected from the host's immune response.

How is the disease transmitted to humans? Infection is acquired through contact with water, food or soil contaminated with urine from infected animals, especially rats. Bacteria may be ingested or may gain entry across intact mucous membranes or broken skin. Direct person to person transmission is rare but possible. Transmission occurs less commonly through the bite of a rodent.

IDENTIFICATION AND RESPONSE

Field signs In reservoir wildlife hosts infection is likely to be asymptomatic, with little clinical disease. In accidental hosts symptoms may be very variable, and depend, in part, on the bacterial strain involved. Initial clinical signs are generally non-specific and include lethargy and anorexia, associated with fever. In dairy cattle, reduced milk production may be observed. Disease may progress to septicaemia and in some cases may result in death of the host. Infection during pregnancy may result in abortion, still-birth, weak offspring or infected but healthy offspring. In horses, many infections are subclinical and eye disease is the most common symptom. Seals and sea lions may suffer from fever, abortions and neonatal deaths.

In humans, the disease picture is also highly variable. During the initial incubation period of roughly seven days (range 2-19), signs are non-specific and include fever, headache, chills, a rash and muscular pain. The kidneys and liver are common target organs and symptoms might include vomiting, anaemia and jaundice. Meningitis, eye pathology and haemorrhage in the lungs have also been reported.

Recommended action if suspected Contact and seek assistance from human and animal health professionals immediately if there is any illness in people and/or livestock. The disease is notifiable and suspected cases must be reported to local and national authorities and the OIE.

Diagnosis Clinical diagnosis is not straightforward due to the non-specific nature and wide variability in symptoms observed. Demonstration of the presence of the organism or an antibody response to the organism are required. Bacteria may

be isolated from blood and cerebrospinal fluid in the first seven days, and from urine during the second and third week of illness. An antibody response may be detected in the blood from 5-7 days after infection. A rising antibody level confirms current infection. In dead animals, the liver, lung, brain, kidney, genital tract and the body fluid of foetuses can be used for detecting bacteria.

PREVENTION AND CONTROL IN WETLANDS

Overall

Monitoring and surveillance - recording the incidence of outbreaks can identify trends in *Leptospira* spp. infections and assist in evaluating the feasibility of control programmes. Monitoring of outbreaks in animals and humans can also help assess the contribution of animals to human illness.

Selective rodent control can prevent infections in livestock and humans, particularly in urban areas.

Minimise contact with reservoir host species, rodents in particular, and minimise contact with potentially contaminated food/water/bedding.

Livestock

- **Good sanitation** and the **prevention of contact** with contaminated environments or infected wildlife, particularly rodents, can decrease the risk of infection.
- Prevention of contamination of food and bedding by rodents.
- **Fence stream banks and watering holes**, to limit access by livestock to water bodies contaminated by urine from infected animals, and to reduce contamination of water courses. Provide clean drinking water in separate watering tanks located away from potentially contaminated water sources.
- **Chlorinate** contained drinking water sources and prevent urine contamination of food and water where possible. Do not chlorinate natural water bodies as this will have an adverse effect on the wetland ecosystem.
- Keep **livestock wastes** away from pastures, animal housing and feeding sites and **away from water courses** in so far as possible.
- **Isolate** infected animals.
- **Separate** young animals from older animals where practical.
- **Replacement stock** should be selected from herds that have tested negative for leptospirosis. Animals not known to be *Leptospira*-free should be quarantined for four weeks and tested before being added to the herd.
- **Vaccination** of pigs, cattle and dogs may prevent infection caused by certain bacterial strains and prevent abortions in cattle. Note that vaccination of animals may not completely prevent infection and the animals may remain carriers of the bacteria.
- **Antibiotics** may be used to treat infections caused by certain bacterial strains and may prevent disease and abortion in cattle.
- Fluid therapy, blood transfusion and other supportive care may also be necessary.

Wildlife

Sporadic cases occur in free-ranging wildlife, but are likely to go unnoticed. Wildlife species are more important as asymptomatic carriers of infection. Rodent control from a pest perspective may be important in this context, although prevention of contamination of feed, bedding and water, and water treatment, as discussed, may be more appropriate.

Humans

Prevent or minimise contact with contaminated or potentially contaminated freshwater bodies and infected animals where possible:

- Do not let animals urinate in water that humans contact.
- **Protect food** from sources of infection, particularly rodents, and always cook food thoroughly. Do not eat fish taken from contaminated water.
- **Wash fruit and vegetables** thoroughly, particularly if they are eaten raw. Ideally, vegetables and fruit should be peeled.
- **Avoid consuming untreated surface water.** All drinking water should be boiled unless it is known to be absolutely safe.
- **Good personal hygiene**, especially if working in or near water and with animals. Have disinfection facilities for hands, footwear, clothing, equipment and vehicles/trailers on entering or leaving areas with livestock and after contact with animals.
- **Wash hands** thoroughly with soap and warm water:
 - before preparing and eating food
 - after contact with potentially contaminated water sources
 - after contact with animals
 - after working outside.
- **Wear protective clothing** especially if working in or near water or with animals:
 - wear protective clothing and footwear, either disposable or easily disinfected re-usable clothes (*e.g.* gloves, face shields, waterproof clothing and boots)
 - have separate clothing and utensils for each person using areas with livestock
 - use waterproof dressings to cover broken skin.
- Do not allow water to enter the mouth (*via* the hands, or *via* food or clothing).
- **Avoid swimming** and other water-based activities in contaminated water. Look out for symptoms following such activities and seek early treatment if needed.
- **Mark areas** that have an increased risk of exposure (*e.g.* water bodies used by animals, open sewage works, areas flooded with fresh water) with warning signs.
- **Vaccination:** annual vaccination may provide protection against some bacterial strains, particularly for those working in or close to water and with animals.

Antibiotic treatment: preventative use can be considered for short periods, particularly for those in high risk groups, and is most effective if given early in the infection. Supportive care may also be necessary.

Be aware of symptoms and seek early treatment.

IMPORTANCE

Effect on wildlife

Infections are usually asymptomatic in wild animals, including rodents, although outbreaks on the west coast of the USA are not uncommon in marine mammals, with depression, fever, abortions and neonatal deaths in seals and sea lions.

Effect on livestock

Mortality may be high in calves and young or weak piglets but low in adults, many of which will have mild symptoms or show no signs of infection at all. Some infections may cause infertility and spontaneous abortion in cattle.

Effect on humans

Whilst most cases in humans are asymptomatic or relatively mild, a small proportion may develop more severe life-threatening illness, also known as Weil's disease. Death is uncommon, although it is more likely to occur in the elderly. Those working in or close to contaminated water are most likely to develop infection.

Economic importance

There is potential for significant economic losses to the livestock industry due to illness, abortions and reduced milk yield of infected animals and likely trade restrictions imposed during and after an outbreak.

Illness in humans can result in significant economic losses due to the time lost from normal activities.

FURTHER INFORMATION

Useful publications and websites

- 📄 World Organisation for Animal Health (OIE). **Chapter 2.01.09: Leptospirosis.** Manual of diagnostic tests and vaccines for terrestrial animals. http://www.oie.int/fileadmin/Home/eng/Health_standards/tahm/2.01.09_LEPTO.pdf. [Accessed March 2012].
- 📄 World Health Organization (WHO). Excerpt from: **WHO recommended standards and strategies for surveillance, prevention and control of communicable diseases.** www.who.int/zoonoses/diseases/Leptospirosissurveillance.pdf [Accessed March 2012].
- 📄 World Health Organization/International Leptospirosis Society. **Human leptospirosis: guidance for diagnosis, surveillance and control.** (2003) whqlibdoc.who.int/hq/2003/WHO_CDS_CSR_EPH_2002.23.pdf [Accessed March 2012].
- 📄 Wetlands International. **Wetlands & water, sanitation and hygiene (WASH) - understanding the linkages (2010).** <http://www.wetlands.org/WatchRead/Currentpublications/tabid/56/mod/1570/articleType/downloadinfo/articleId/2467/Default.aspx> [Accessed March 2012].
- 📄 Centers for Disease Control and Prevention (CDC). **Leptospirosis.** <http://www.cdc.gov/leptospirosis/> [Accessed March 2012].
- 📄 **The Leptospirosis Information Center.** www.leptospirosis.org. [Accessed March 2012].
- 📄 World Health Organisation (WHO). **Leptospirosis.** www.who.int/zoonoses/diseases/leptospirosis/en. [Accessed March 2012].
- ✉ **WHO Communicable Diseases Surveillance and Response (CSR).** zoonotic_alert@who.int, fmeslin@who.int and outbreak@who.int
- 📄 **FAO Animal Production and Health Division.** www.fao.org/ag/againfo/home/en/who.htm

Contacts