

## Leptospirosis Summary

### Introduction

1. This note provides a brief summary of an analysis undertaken by a DISCONTTOOLS group of experts on Leptospirosis. They reviewed the current knowledge on the disease, considered the existing disease control tools, identified current gaps in the availability and quality of the control tools and finally determined the research necessary to develop new or improved tools. Full details can be downloaded from the web site at <http://www.discontools.eu/> by selecting Disease Database, then the specific disease and highlighting the variables of interest.

### Disease profile

2. *Leptospira* are antigenically complex. 17 named species of pathogenic *Leptospira* and 21 intermediate species are now identified. More than 260 distinct pathogenic leptospiral serovars are recognised. *Leptospira* have been found in a variety of both wild and domestic animals and all mammals appear to be susceptible to at least one serovar of *Leptospira*.
3. Leptospirosis is a common disease of livestock, pet animals and wildlife. Animals can become chronically infected and remain carriers for life and reservoirs of infection for animals and humans. Animals can be divided into maintenance hosts and incidental hosts. The disease is maintained in nature by chronic infection of maintenance hosts.
4. In humans, the most common clinical presentation is acute undifferentiated fever. Further symptoms include headache, chills, muscle aches, vomiting, jaundice and anaemia. If not treated, kidney damage, meningitis, liver failure, and respiratory distress can develop. In rare cases, death occurs.
5. In animals, presenting signs for acute leptospirosis can include agalactia, jaundice, haemoglobinuria, meningitis and acute renal failure. Stillbirth, birth of weak offspring and infertility can all be associated with chronic leptospirosis. In chronic cases, leptospirae may localise and persist in the kidney or the reproductive tracts with the consequence that diagnosis can be difficult. Introduction of the organism into a herd or flock can result in abortion storms. In newly infected cattle herds up to 30% of the cows may abort and overall calf production can decrease by up to 40%. In endemically infected herds, abortions are usually sporadic and occur mainly in younger animals.
6. Pathogenic *Leptospira* can survive in moist conditions outside the host for many days or even weeks especially in fresh water, soil, and mud. They are readily killed by drying, exposure to detergents, disinfectants and heating to 50°C for five minutes. Disease is often seasonal, being most common during the rainy season in the tropics and in the summer and autumn in temperate regions.
7. *Leptospira* are shed in the urine of acutely infected animals and for long periods from chronically infected animals. They may also be found in aborted fetuses and vaginal discharges after calving. Animals can be silent carriers shedding *Leptospira*.

### Risk

8. Leptospirosis in humans occurs worldwide but it is a neglected zoonosis that is poorly diagnosed in many parts of the world. The incidence probably ranges from 0.1 to 1 per 100,000 per year in temperate climates to 10 or more per 100,000 per year in the humid tropics. The disease is under-reported for many reasons, including difficulty in distinguishing clinical signs from those of other endemic diseases and a lack of appropriate diagnostic laboratory services.
9. Infection in man occurs by direct contact with body fluids or tissue of infected animals or indirectly by the contaminated environment. Less frequently, animal bites or handling infected animal tissues can cause infection. Rodents are implicated frequently in human cases. People who work outdoors or with animals, such as farmers, sewer workers, veterinarians and dairy workers face leptospirosis as an occupational hazard. Swimming or wading in contaminated waters can pose a potential risk.

### **Diagnostics**

10. Commercial kits, comprising lateral flow and latex agglutination methodologies, are available for diagnosis of human disease. However regular validation and evaluation is essential due to batch-to-batch variation, sensitivity for new emerging serovars, and cross reacting diseases.
11. Detection of *Leptospira* is by culture or by the use of tests such as Immunofluorescence for leptospiral antigens. PCR based assays are now used by reference and diagnostic laboratories in particular to detect leptospiral nucleic acid in tissues or body fluids.
12. Tests designed to detect leptospiral antibodies include ELISAs and the microscopic agglutination test (MAT) which is the standard serological test. Other serologic tests include immunofluorescence, counter immunoelectrophoresis and thin-layer immunoassay. There are species specific commercial ELISA kits for *Leptospira* serovars Hardjo infection in cattle and *Leptospira interrogans* serovar Bratislava infection in pigs. Commercial ELISA kits are available for *Leptospira* serovars Icterohaemorrhagiae and Canicola in dogs. Genus specific tests for infection in dogs are also available. A milk ELISA can detect antibodies in samples from individual cows or in bulk milk. The MAT and other serological assays are problematic in detecting renal carriers.

### **Vaccines**

13. The majority of commercial vaccines used in animals are inactivated whole cell cultures of one or more serovars of *Leptospira* spp. Live attenuated vaccines have been developed. Effective Leptospirosis vaccines are available for use in pigs, cattle and dogs. Vaccines are serovar-specific and may not provide coverage against other (non-related) serovars.
14. There is a requirement for a *Leptospira* serovar Hardjo vaccine for sheep and improved vaccines for new serovars in dogs. Vaccines for dogs including serovar Pomona are available outside the EU, but are not registered in the EU. It is recommended to evaluate these vaccines for use in the EU.

### **Pharmaceuticals**

15. Antibiotics may be used in beef herds if there is an abortion storm but in dairy herds antibiotics may be restricted to non-milking animals due to withholding periods for milk. Antibiotics are also used as feed additives for the control of leptospirosis in pigs. Antibiotics used to treat leptospirosis include the tetracyclines, penicillin/ampicillin, dihydrostreptomycin, streptomycin and the fluoroquinolones. The efficacy of treatment may depend on the serovar. If vaccines are widely used there will not be a major demand for pharmaceuticals.

### **Knowledge**

16. Not all of the animal reservoirs responsible for the maintenance of the many different *Leptospira* strains and serovars have been identified. There is a need for improved understanding of risk factors for transmission. Rodents are well-established reservoirs of several serovars and water bodies are considered a major source of transmission, but there remain many knowledge gaps, particularly in tropical endemic areas where multiple serovars may circulate. Although leptospirosis is endemic in many rural and urban slum communities and can also cause sporadic epidemics, little is actually known about the true global disease burden.
17. Little information is available on the productivity losses in livestock, socio-economic impact of disease on affected communities and on the costs and benefits of prevention and control measures.
18. Improved vaccines and tests which discriminate between vaccinates and natural infection are needed.

### **Conclusions**

19. There are gaps in knowledge concerning epidemiology, routes of transmission and risk factors that hinder the development of effective intervention methods.
20. There is a need for improved and rapid diagnosis of leptospirosis, notably in tropical endemic areas lacking sophisticated equipment, and an increasing awareness of leptospirosis worldwide.