



LEPTOSPIRA SPP

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elika

Fundación Vasca para la
Seguridad Agroalimentaria

Nekazaritzako Elikagaien
Segurtasunarako
Euskal Fundazioa

1.- INTRODUCCIÓN

The ***Leptospira*** genus is a member of the *Leptospiraceae* family, *Spirochaetales* order. The classification of the leptospiaras is very complex and often confusing as there are several systems based on different criteria: phenotypical, antigenic and genetic. The *Leptospira* genus has been defined based on a primarily morphological description and cultural characteristics. The species of this genus are defined by equivalences in its DNA. Recently the concept of genospecies as serovarieties with interrelating DNAs has been recognised. The first level of grouping under the species is the serovariety, which is defined based on agglutination-absorption patterns. For practical purposes, antigenically-related serovarieties are organised in serogroups. The different strains under the serovariety level are called types, which are determined by means of molecular techniques (1).

The most recent research has identified 7 different species of pathogenic leptospiaras, with more than 250 serological variants (2).

Leptospiaras are spirochetes, which were first isolated and identified in 1915 by the Japanese doctors Inada and Indo. They are helical micro organisms of about 3 to 20 µm in length and 0.1 to 0.15 µm in width. They have a pair of flagella that cross the periplasmic space under the external membrane and extend from their insertion in the ends in the form of a hook to the central area of the cell. They are aerobies and microaerophiles, positive oxidase and negative catalase. Under laboratory conditions, their culturing is optimum at temperatures of between 28°C and 30°C and pH ranges of between 7.2 and 7.6 (1).

2.- LEPTOSPIROSIS

Infection by *Leptospira* is called **leptospirosis**. It is an infectious disease distributed all over the world, that affects both domestic and wild animals and is also transmittable to man.

The **reservoir** of *Leptospira* consists of several species of wild and domestic animals. the most important of which, as sources of transmission to human beings, are listed below (3):

- Mice, rats, shrews, hedgehogs, etc.
- Domestic animals: Cows, pigs, dogs and on rare occasions sheep, goats and horses.

Leptospiaras are maintained in populations of animals by means of natural reservoirs (maintenance hosts) that are infected horizontally and vertically (2). Leptospirosis is maintained by the colonisation of proximal renal tubules of the host animal. An infected animal may not show any symptoms and excrete infecting organisms throughout its life (4).

It is considered that human beings are not, from the epidemiological point of view, major sources of transmission, although certain individuals may excrete leptospiaras for lengthy periods (4).

The different serovarieties of leptospiaras are adapted to specific hosts (maintenance) in areas endemic to these serovarieties (2). The prevalence of the disease varies notably between different countries and even between different regions of the same country (5).

Table 1 (Annex) sets out the characteristics that differentiate the maintenance host from the accidental host, according to the factor under study.

Table 1: Differential characteristics between the maintenance host and the definitive host (9)

Factor studied	Maintenance host	Accidental host
Transmission of the disease	Frequent intraspecies	Sporadic intraspecies
Signs of the disease	Benign	Serious
Presentation of the chronic disease	Infertility	None
Duration of the leptospiuria	Variable Normally prolonged	Days to weeks
Percentage of seropositive population	High. Increases in the age of the animals	Low. Not affected by the age of the animals
Samples for diagnosis	Flock	Affected animal

In Spain there are high **infection rates** in grey rats (*Epymis morvergicus*) and moderate infection rates in dogs, pigs, horses and bovines (6). **Table 2** (Annex) shows the main leptospires that produce significant illnesses in domestic animals and their estimated prevalence in bovine livestock in Spain.

Table 2: Serovarieties of *Leptospira* and their seroprevalence in cattle in Spain

Serovariety	Maintenance host	Distribution	Significant disease in:	Seroprevalence in bovines in Spain
<i>autumnalis</i>	Rodents, hedgehog	Worldwide	Perro +	+
<i>ballum</i>	House mouse	Worldwide	Bovino ++	++
<i>bratislava</i>	Pigs, horses	Worldwide	Pigs ++++ Horses, dogs +	+++
<i>canicola</i>	Dogs, canines	Worldwide	Dogs ++++ All species +	+
<i>copenhagheni</i>	Rodents	Worldwide	Bovines ++	+
<i>grippotyphosa</i>	Racoons, small rodents, moles	Worldwide	All species +	++
<i>Hardjo</i>				
Hardjobovis	Bovines, ovines	Worldwide	Bovines ++++ Ovines ++	++
Hardjoparajitno	Bovines	Europe	Bovines +++	¿?
<i>Pomona</i>	Pigs	Worldwide	Pigs +++	++
	Wild animals	Worldwide	All species +++	
<i>tarassovi</i>	Pigs, wild boars	Europe, Australia, Asia	Pigs +++ Dogs +	+

Most **outbreaks of leptospirosis among humans** are associated with exposure to water contaminated with the urine of infected animals (stagnant water, canals and rice fields) and to a lesser extent, by direct contact with the infected animal, placentas, beds of animals, infected earth, etc. Human beings become infected through wounds or mucus, such as the conjunctiva or digestive tract. Occasionally, the organism can enter through the epidermis (intact) (2). Transmission through maternal, animal milk, as well as from person-to-person is exceptional (6).

Leptospirosis is a disease associated with farm workers or those who work with animals, such as livestock breeders, veterinary surgeons, farmers, etc (7). The importance of this risk associated to certain working practices has diminished since there was an increase in hygienic measures. In developed countries, this disease is associated with an increase in outdoor recreational activities such as canoeing, rafting and swimming competitions in reservoirs (triathlon) (4) and with natural disasters such as floods, etc. In general, this

disease manifests itself as sporadic cases in humans, although it may occur endemically and even epidemically (6).

Most cases occur in the hot season and in rural areas as leptospiras can survive in water for many months. Leptospiras remain viable in freshwater, in wet alkaline soil, in vegetation or in mud with temperatures of over 22° C (2).

In endemic areas (tropical areas) infections in humans are common and develop asymptotically or subclinically. The most common **clinical form** is the classical triad of fever, myalgias and icterus. Other clinical forms are renal insufficiency, migraines, haemorrhaging, cardiac disturbances, nausea and vomiting, hepatomegaly, abdominal pain, coughing, dyspnea and rash (6).

The prevalence of different serovarieties in the human population depends on the different host animal's presence in the area and on the type of serovarieties that these carry, as well as local weather conditions and the different systems of agricultural production used in this area (4).

Table 3 sets out data on the incidence of human leptospirosis in Spain between the years 1996 and 2003 (8). As it is not obligatory to declare this disease, it is difficult to know exactly the number of cases in humans.

Table 3: Cases of Leptospirosis declared to the Microbiological Information System (8).

Year	1996	1997	1998	1999	2000	2001	2002	2003
Identifications Declared	4	2	6	12	11	8	6	1

Table 4 sets out data on the incidence of human leptospirosis in the Autonomous Community of the Basque Country, obtained from the Epidemiological Surveillance Service of the Public Health Section of the Health Apartment of the Basque Government (9).

Table 4: Number of declarations of Leptospira per hospital and year in the Basque Autonomous Community (9).

	1996	1997	1998	1999	2000	2001	2002	2003
H. Basurto	1		1					2
H. Cruces			4	7	3			
H. Galdakao	3	1	3					
H. Donostia					3			
TOTAL	4	1	8	7	6	0	0	2

Table 5 indicates the number of declarations of Leptospira per age group, sex and year in the Basque Autonomous Community.

Table 5: Cases of *Leptospira* declared in the Basque Autonomous Community according to age group (9).

Age group	1996		1997		1998		1999		2000		2001		2002		2003	
	H	M	H	M	H	M	H	M	H	M	H	M	H	M	H	M
10-19									1	1						
20-29					1		1	1								
30-39							1	1	1						1	1
40-49	1															
50-59	2				2		1		1							
60-69	1		1		5		1									
70-79								1	1	1						
TOTAL	4		1		8		4	3	4	2					1	1

Table IV. Source: Epidemiological Surveillance Service. Public Health Section. Health Apartment.-Basque Government

According to the data set out in Table 5, leptospirosis affects mainly men, although over recent years there has been an increasing tendency for its appearance in women.

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