



**A SCIENTIFIC REVIEW OF LEPTOSPIROSIS
AND IMPLICATIONS FOR QUARANTINE
POLICY- PRECIS**



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SUMMARY

This precis outlines the background, aim, scope and results of AQIS's review of scientific information on leptospirosis in animals and animal products. The full report, entitled "A scientific review of leptospirosis and implications for quarantine policy", may be obtained from AQIS, or downloaded from the AQIS website: <http://www.aqis.gov.au>. Files may be downloaded in either Microsoft® Word 97 or Adobe® PDF format.

INTRODUCTION

Background to this review

Australian quarantine restrictions for leptospirosis are currently confined to the requirement that dogs give a negative result to an antibody test for *Leptospira interrogans* sv canicola. This serovar is considered exotic to Australia despite it having been isolated from a human in Australia. In contrast, several of Australia's trading partners impose import conditions for leptospirosis in livestock species, horses, dogs, cats, and their genetic material.

Leptospirosis is not a notifiable disease of animals in some Australian States and Territories. Where leptospirosis is notifiable, there is inconsistent application of regulatory action. There are no reports of quarantine being in place due to leptospirosis in animals, despite the occurrence of the disease, nor are there import health requirements for leptospirosis for livestock and horses entering Australia. Treatment and vaccination of livestock is not mandatory.

Australia provides a report of the leptospirosis status to the OIE annually. Until recently, the reports were at some variance to the actual status in Australia.

Table 1 Summary of Australia's reports to OIE for leptospirosis

Until 1996	1997, 1998	1999
<ul style="list-style-type: none">• endemic in Australia;• a quarantinable disease with movement control and other precautions at the frontier and inside the country;• controlled by vaccination, and• a notifiable disease.	<ul style="list-style-type: none">• had a low sporadic occurrence in Australia;• was a quarantinable disease with movement control and other quarantine measures inside the country, and• was controlled by vaccination.	<ul style="list-style-type: none">• had a low sporadic occurrence in Australia; and• was controlled by vaccination.

Some of Australia's trading partners impose import conditions for leptospirosis. Several countries require animals to be injected with streptomycin/dihydrostreptomycin (S/DHS) prior to export. While S/DHS is usually the most effective antibiotic for treatment of leptospirosis, it does not always

sterilise infection and thus it is not an effective quarantine measure. Several countries, including Australia, no longer use S/DHS in food-producing animals as the injection causes local irritation and pain and treatment can cause residue problems in food products. In Australia, it can only be used under National Registration Authority permit in food-producing animals. Because of the small demand for this antibiotic, pharmaceutical companies are not restocking their supplies and it has become increasingly difficult to obtain S/DHS for use in export livestock. Australia will either need to renegotiate those import conditions that require S/DHS treatment for leptospirosis or make arrangements for the importation of S/SDH specifically for use in animals for export. However, the latter option does not address the problem of managing livestock treated with S/SDH then withheld from export.

Other commonly used quarantine measures, including those recommended in the OIE *Code*, are of questionable value. These include requirements that the animals for export:

- showed no clinical sign of leptospirosis on the day of shipment;
- were kept in an establishment in which no clinical sign of leptospirosis was officially reported during the 90 days prior to shipment, and
- were subjected to a diagnostic test for leptospirosis with negative results.

Aim of the review

The aim of the review is:

- to review scientific information on leptospirosis and implications for Australia's quarantine policies, and
- to provide scientific arguments as a basis to negotiate less restrictive conditions for the export of animals and genetic material.

Scope of the review

The review covers:

- the occurrence of leptospirosis in animals in Australia, New Zealand, Europe, Africa, Asia, North America and South America;
- the epidemiology of leptospirosis, the different species of leptospires, the serogroups and their serovars;
- the risk of infection of semen, embryos and animal tissue cell cultures;
- the risk of entry, establishment and spread of leptospirosis with imported animals and their products; and
- the effectiveness of various options available to reduce the likelihood of introducing leptospirosis with imported animals and their products.

OCCURRENCE

In Australia, clinical leptospirosis occurs in cattle (serovars (svs) hardjo, pomona and zannoni) and pigs (pomona, tarassovi and bratislava). Sporadic cases occur in sheep (hardjo), horses (pomona) and dogs (copenhageni and australis). Clinical cases have been reported in humans with svs australis

and zanoni predominating in the tropics. In the temperate regions of Australia, sv hardjo predominates; sv pomona and occasionally sv tarassovi also occur.

Although many serovars are recognised globally (for example, svs hardjo (bovis) and pomona in cattle and svs pomona, bratislava and tarassovi in pigs), only a limited number are usually endemic to a particular region. Of 230 serovars identified, only 22 have been isolated in Australia.

The serovars most associated with acute or fatal leptospirosis in humans are those belonging to serogroup icterohaemorrhagiae (notably svs icterohaemorrhagiae, copenhageni, and lai), and some serovars in serogroups australis (svs australis and bratislava), autumnalis (svs autumnalis and bim), bataviae (sv bataviae) and pyrogenes (pyrogenes and zanoni).

EPIDEMIOLOGY

Leptospirosis is a contagious disease of animals and humans caused by the spirochaete *Leptospira* of which there are two groups, the pathogenic species and the non-pathogenic (benign) species. Only the pathogenic *Leptospira* species are considered in the review.

Leptospire cannot survive dry or acidic conditions, preferring moist, warm and neutral or mildly alkaline environments.

Infection usually occurs directly through mucous membranes or through abraded or water-softened skin. The leptospire may appear in the blood 4 to 10 hours after infection and may remain detectable in blood from only a few hours to 7 days. Clinical signs may not always be evident but fever often occurs with acute leptospirosis.

Transmission can occur as a result of direct or indirect contact with infected animals carrying leptospire. Direct transmission is rare in accidental hosts, especially humans. Congenital transplacental infection, including non-venereal, environmentally acquired infection of pregnant females, can occur as can venereal infection. The main sources of infection are urine, kidneys, contaminated surface waters, mud and soil. Infection does not occur as a result of ingesting food or inhaling airborne particles. However, infection can occur when leptospire enters through oral abrasions while ingesting hay contaminated with urine or by inhalation of aerosols of urine.

Infection can occur in many mammalian species and some reptiles. Infected animals often become carriers and maintain leptospire in their kidneys or genital organs. There is no relationship between the severity of the infection and the subsequent carrier status. Animals that do not develop clinical disease but become chronic carriers may be described as *maintenance hosts* whilst those that develop clinical leptospirosis and carry infection for a short term may be described as *accidental hosts*. It is not always possible to determine whether an animal is an accidental or maintenance host. Some animals may be accidental hosts for one serovar and maintenance hosts for another, eg, cattle are recognised as a maintenance host for sv hardjovis and an accidental host for sv pomona. Camelids develop very low antibody titres, are not known to excrete leptospire and do not appear to become maintenance hosts or accidental hosts.

In other countries, humans and animals may be infected with leptospira serovars considered exotic to Australia. Some serovars are highly pathogenic to animals and/or humans. Many serovars are carried by maintenance hosts not found in Australia.

Many factors affect the transmission of leptospirosis, the prevalence of this disease, and its severity in animals. The factors that can affect the distribution of leptospirosis include geographical factors, and factors relating to the distribution of host species, including rodents. These factors are considered in detail in the reference document.

RISK OF INTRODUCTION, ESTABLISHMENT, SPREAD AND CONSEQUENCE

Because the pathogenic leptospires interact with the host and the environment in complex ways, the review discussed a number of leptospira serovars individually. AQIS evaluated the risk associated with several different serovars, host species (including humans) and circumstances.

The results of this assessment are summarised in Table 1.

Table 1.

Scenario	Risk
Importing a dog from a country with a significant stray dog problem, where canicola infection occurs and dogs are not routinely vaccinated (eg, most African, Asian or South American countries).	Low
Importing a dog from a country where sv canicola has not been isolated from dogs since the 1950's (eg, USA, Canada, and New Zealand).	Low
Importing a pig clinically infected with sv canicola (eg, Republic of South Africa).	Negligible
Importing a ram infected with sv canicola (eg, Portugal).	Low
Importing a dog from a country which reports dogs with antibody titres to svs batavia, bratislava, javanica and cynopteri, none of which has been reported in Australia (eg, Southeast Asia).	Low
Importing a dog from country where infections due to sv bim occurs (eg, the Carribean).	Low
Importing a bull infected with sv hardjoprajitno from a country where this serovar is endemic (eg, Ireland).	Low
Importing a pregnant cow with sv hardjoprajitno infection from a country where this serovar is endemic (eg, Ireland).	Low
Importing a cow shedding either of svs mozdok or kennewicki in urine (eg Europe or North America).	Low
Importing a boar shedding either of svs mozdok or kennewicki in urine (eg Europe or North America).	Low
Importing a non-pregnant racehorse for a temporary stay of 2 months for competition purposes (eg, North America).	Low

Scenario	Risk
Importing a pregnant mare with foetus infected with a serovar exotic to Australia (eg, Europe - sv mozdok and North America – sv kennewicki).	Low
Importing a boar with sg australis infection (eg, Europe).	Low
An infected carrier rat escapes from a ship and enters Australia.	Low
Importing an infected pet rat (eg, Asia).	Moderate
Animal or humans infected with sv lai enter Australia (eg, Asia).	Negligible
Untreated frozen semen (or embryo) from untested donors infected with exotic pathogenic leptospires (eg, Europe, South America)	Moderate
Importing a batch of animal vaccine containing cell lines prepared from infected animal kidneys (eg, Asia).	Moderate

IMPLICATIONS FOR QUARANTINE POLICY

The implications for quarantine policy were considered for each of the scenarios in relation to which the risk could exceed Australia's acceptable level of protection, ie:

- semen and embryos,
- animal derived tissue cultures, and
- pet rodents and other small mammals.

Routine antibiotic treatment of semen, embryos and animal derived tissue cultures, is considered to adequately manage risk and would meet Australia's acceptable level of protection. However, for pet rodents and other small mammals, it may be appropriate to require that these mammals come from colonies tested free from relevant leptospiral strains that are exotic to Australia.

It may also be appropriate to delete test requirements for leptospirosis in dogs and to maintain the current quarantine policies for livestock, laboratory rodents, cats and horses.