

# Laboratorial Diagnosis Human-Animal-Environment One Health

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# The National Reference Center and WHO Collaborating Center for Leptospirosis

## **Mission**

To provide laboratorial support to the National Surveillance System;  
To collaborate with the PAHO/WHO programs in the specific fields of laboratorial diagnosis and research.

## **Available Tests for Leptospirosis Diagnosis**

ELISA IgM

MAT

Blood Culture

Identification of Clinical Isolates and a Culture Collection of *Leptospira* with reference strains and new isolates.



# Laboratory Network for Leptospirosis Diagnosis

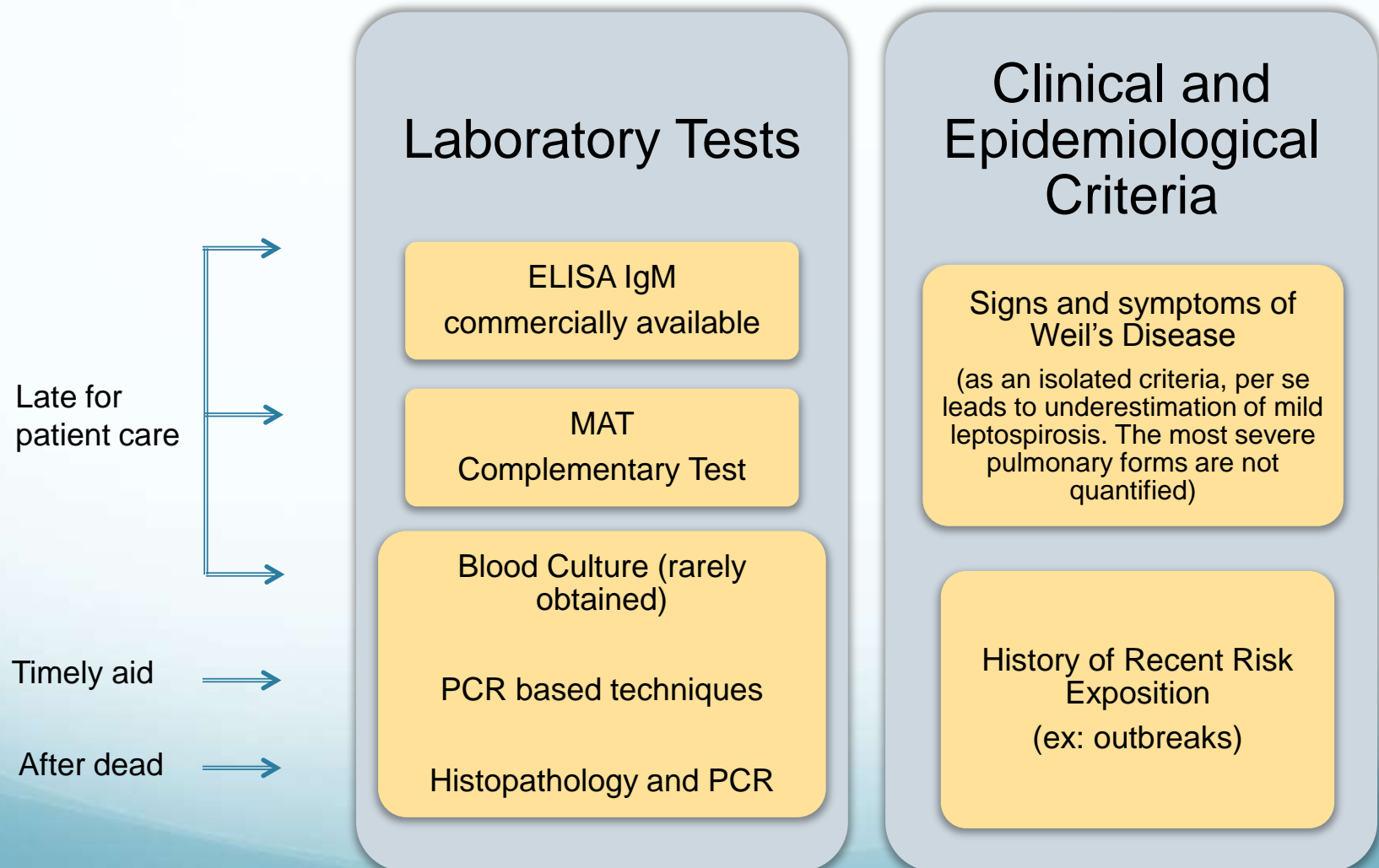
## Support for Epidemiological Surveillance, Brazil

27 Public Health Laboratories – ELISA IgM  
3 Regional Laboratories – MAT  
1 Central Laboratory – MAT, Blood Culture,  
Identification of Clinical Isolates

27 federate units  
5,570 municipalities  
8.515.767,049 km<sup>2</sup>  
Population = 205.022.313  
Source: IBGE

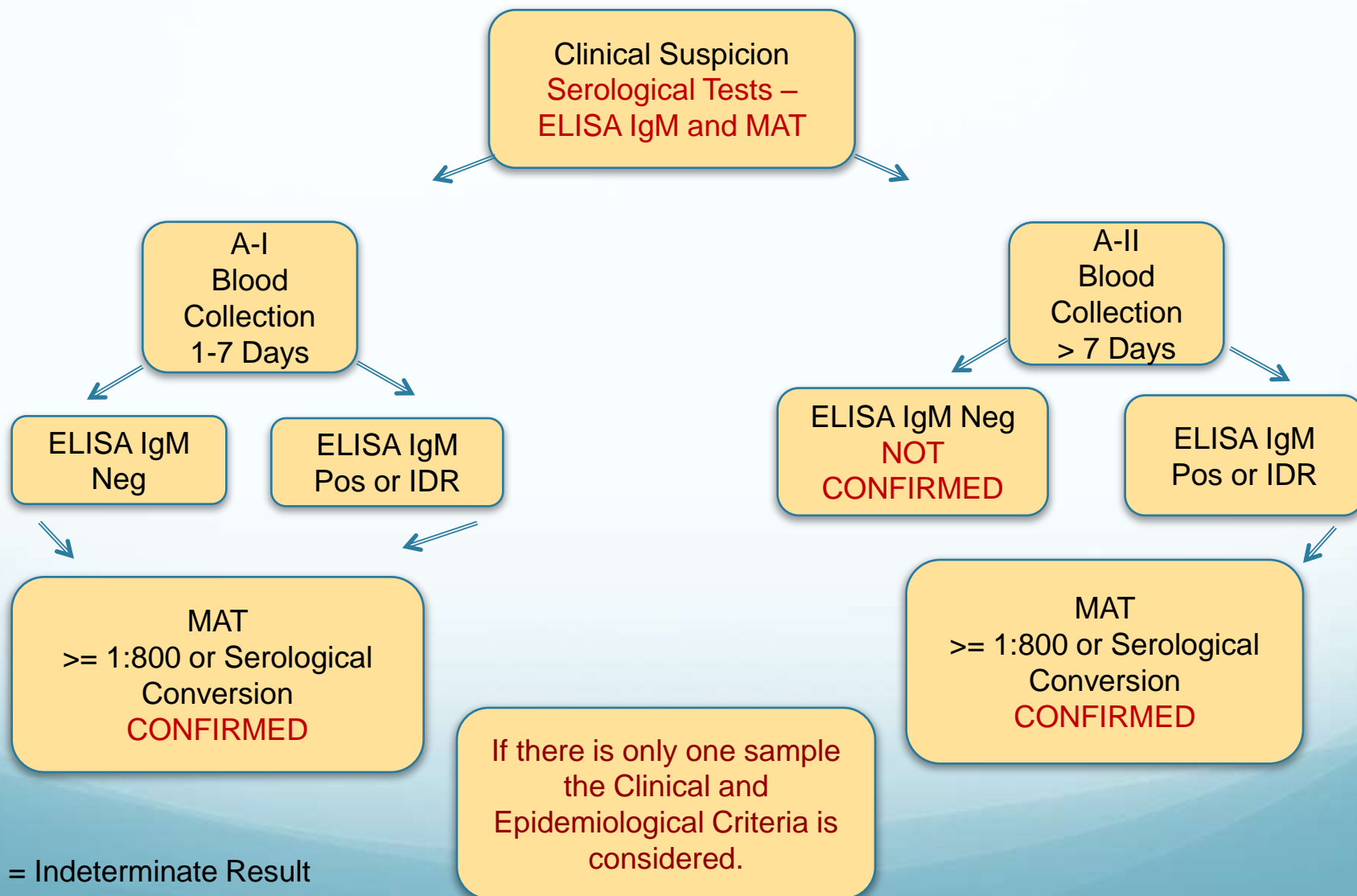


# What is considered to be a confirmed case of leptospirosis? (For the Surveillance in Brazil)



# Laboratorial Diagnosis

## Algorithms for Epidemiological Surveillance, Brazil



# Leptospirosis Confirmed Cases and Deaths 2010-2015, Brazil

Region	2010	2011	2012	2103	2014	2015	Total
<b>North - Cases</b>	264	496	536	946	1687	1131	5060
Deaths	28	32	24	30	35	26	175
<b>Northeast - Cases</b>	717	927	412	528	558	307	3449
Deaths	76	118	66	63	67	42	432
<b>Southeast - Cases</b>	1548	1814	1339	1488	1265	637	8091
Deaths	175	181	135	175	145	82	893
<b>South - Cases</b>	1243	1702	928	1103	1052	1124	7152
Deaths	109	104	50	81	62	74	480
<b>Midwest - Cases</b>	47	28	51	69	57	53	305
Deaths	2	7	5	9	13	7	43
<b>Total - Cases</b>	3819	4967	3266	4134	4619	3252	<b>24,057<sup>1</sup></b>
<b>Total - Deaths</b>	390	442	280	358	322	231	<b>2,023</b>

<sup>1</sup>Clinical and Laboratorial Criteria – 89%

**Clinical and Epidemiological Criteria – 11%**

# Differential Diagnosis with Other Infectious Diseases

## What should be pointed out?

- Signs and symptoms easily confused with other diseases in the first clinical presentation. Misdiagnosis with several acute diseases and febrile hemorrhagic syndromes.
  - Early diagnosis very important for monitoring epidemic outbreaks and for clinical management of cases;
- Clusters of cases and deaths of febrile hemorrhagic diseases in mainly rural settings.
  - Often go undiagnosed
- Epidemic outbreaks in urban and rural settings sometimes concomitant with diseases that should be considered in the differential diagnosis.
  - Misdiagnosis and non recognition of Leptospirosis.
  - Examples:
    - Dengue and Dengue Hemorrhagic Fever
    - Yellow Fever
    - Hantaviruses and Hantavirus Pulmonary Syndrome



# Inter-American Network for Leptospirosis Diagnosis and Research

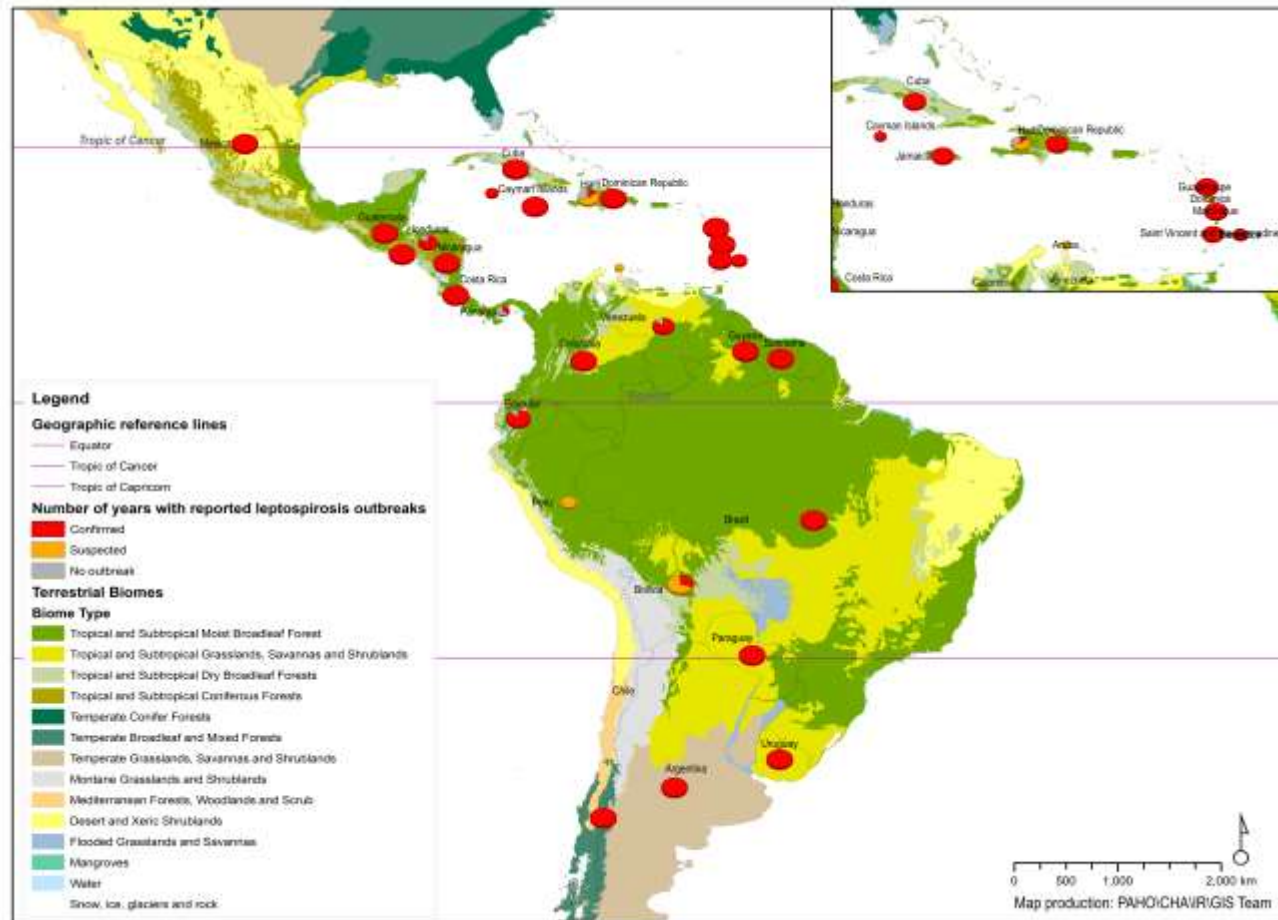


32 Laboratories\*, 23 countries  
Laboratorial Diagnosis – Global Standards  
And Conventional Tests  
Capacity Building (very important activity)

\*Previously identified by PAHO. A survey was carried out (2008). These laboratories are listed on ILS/WHO Guidelines that was translated to Spanish being available the ILS and PAHO/WHO websites.



# Geographic distribution of animal leptospirosis outbreaks reported to the World Organization for Animal Health (OIE) from 2005-2011.



Petrakovsky JB, Fisun A, Najera-Aguila P, Pereira MM. Animal Leptospirosis in Latin America and Caribbean Countries. Reported outbreaks and Literature Review. *Int J Environ Res Public Health*, 2014, 10(11): 10770-10789.

# *Leptospira* species, serovars and genotypes isolated from infected animals in LAC, 2012-2014

Country	Animal	<i>Leptospira</i> spp.
Argentina	Squirrels	<i>L. interrogans</i> serovars Icterohaemorrhagiae and Canicola
	Cows and Pigs	<i>L. interrogans</i> serovar Pomona
	South American gray fox ( <i>Lycalopex griseus</i> )	<i>L. interrogans</i> , a new genotype
	Dog fetus	<i>L. interrogans</i> , a new serovar designated Baires
Brazil	Marsupials	<i>L. borgpetersenii</i> serovar Castellonis
	Capybara ( <i>Hydrochoerus hydrochaeris</i> )	<i>L. interrogans</i> serogroup Icterohaemorrhagiae
	Cattle	<i>L. interrogans</i> serovar Canicola and Copenhageni, <i>L. kirshneri</i> serovar Grippytyhosa
	Swine	<i>L. interrogans</i> serovar Canicola
	Sheep	<i>L. noguchi</i> serogroup Autumnalis
	Dogs	<i>L. noguchi</i> [35], <i>L. interrogans</i> serovar Canicola
Mexico	Cattle	<i>L. kirshneri</i> serovar Hardjo
Peru	<i>Rattus norvegicus</i> and <i>Rattus rattus</i>	<i>L. licerasiae</i> serovar Varillal
	Bats	<i>L. interrogans</i> , <i>L. kirshneri</i> , <i>L. borgpetersenii</i> and <i>L. fainei</i>
Trinidad and Tobago	Dogs	<i>L. interrogans</i> serovar Copenhageni

# Wild Animals with Evidences of Infection (Serological or Isolation of *Leptospira*), 2002-2014.

Country	Wild Animals
Argentina	Arboreal squirrels ( <i>Callosciurus erythraeus</i> ), south American gray foxes ( <i>Lycalopex griseus</i> ), wild and domestic carnivores ( <i>Leopardus geoffroyi</i> ), pampas deer ( <i>Ozotoceros bezoarticus celer</i> ).
Brazil	Non-human primates ( <i>Cebus paella</i> , <i>Alouatta caraya</i> , <i>Nasua nasua</i> ), gray foxes ( <i>Cerdocyon thous</i> ), rodents ( <i>Dasyprocta</i> sp.), capybaras ( <i>Hydrochoerus hydrochaeris</i> ), anteaters ( <i>Tamandua tetradactyla</i> ), armadillos ( <i>Euphractus sexcintus</i> ), wild canids ( <i>Cerdocyon thous</i> , <i>Crysocyon brachyurus</i> , <i>Speothos venaticus</i> , <i>Pseudalopex vetulus</i> ), raccoons ( <i>Procyon cancrivorous</i> ), white-lipped peccaries ( <i>Tayassu pecari</i> ), collared anteaters ( <i>Tamandua tetradactyla</i> ), ocelots ( <i>Leopardus pardalis</i> ), marsupials ( <i>Didelphis albiventris</i> ) and pumas ( <i>Puma concolor</i> ).
Colombia	<i>Rattus rattus</i> , <i>Mus musculus</i> , neotropical primates ( <i>Ateles fusciceps</i> , <i>Ateles geoffroyi</i> , <i>Cebus albifrons</i> , <i>Cebus paella</i> , <i>Cebus capuccinos</i> and <i>Saguinus leucopus</i> ), felines ( <i>Panthera onca</i> , <i>Puma concolor</i> , <i>Leopardus tigrinus</i> , <i>Leopardus pardales</i> ).
Peru	Captive collared peccaries ( <i>Tayassu tajacu</i> ), capybaras ( <i>Hydrochoerus hydrochaeris</i> ), <i>Rattus rattus</i> , <i>Proechymis</i> , marsupials ( <i>Phylander spp.</i> , <i>Metachirus nudicaudatus</i> , <i>Caluromis lanatus</i> ) and bat populations.

# **Laboratorial Diagnosis in the Perspective of One Health**

## **Animal- Human-Environment**

### **1- Available Tools and Limitations**

#### **Conventional Techniques**

### **2- Needs of Technological Development**

- a-Simple tests mainly for early diagnosis for human and animal leptospirosis;
- b-Tests to detect leptospires or DNA in water and mud;
- c- Improvement on procedures and systems for identification of clinical and environmental isolates

# A Project Conceived in the One Health Perspective

## Leptospirosis in the state of Rio Grande Do Sul, Brazil - An Ecosystem Approach in the Human-Animal Interface

- **Geographic coverage and context in the political and institutional organization of the country;**
  - 1- Health Network - FIOCRUZ and State of Rio Grande do Sul (coordination a a group of institutions for health, science and technology and universities in a collaborative effort)
  - 2- Pan American Health Organization (PAHO/WHO)
  - 3- State Secretariat of Health of Rio Grande do Sul (SES) (a team)
  - 4- Secretariat of Agriculture, Livestock and Agribusiness of Rio Grande do Sul (SEAPA) (a team)
  - 5- Secretariat of Science and Technology
  6. Secretariat for Environment in the State of Rio Grande do Sul.
- **Interface animal-human-environment**
  - Diagnostic Tools??? Available today and new ones to be developed

# First results

- Retrospective evaluation to evaluate hotspots and other epidemiological aspects (Accept for publication PLoS Neglected Tropical Diseases);
- A prospective study based on a serological survey covering the whole state and based on an ecological view.



# PREVALÊNCIA E FATORES ASSOCIADOS PARA LEPTOSPIROSE BOVINA NO ESTADO DO RIO GRANDE DO SUL

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## RESUMO

A leptospirose é uma zoonose causada por bactérias gram-negativas do gênero *Leptospira*, a qual se manifesta clinicamente de diversas formas, podendo ser assintomática ou causar graves problemas à saúde pública, principalmente devido às diversas manifestações clínicas. A zoonose é causada pela ingestão de alimentos contaminados ou pelo contato direto com a urina ou fezes de animais infectados. No Brasil, a leptospirose é considerada uma das principais causas de zoonoses. Este trabalho tem como objetivo avaliar a prevalência de leptospirose em bovinos no Estado do Rio Grande do Sul (RS). Este estudo é parte de um projeto maior que engloba uma avaliação da leptospirose em diversos animais domésticos e silvícolas (uma zoonose).





## INTRODUÇÃO

A leptospirose é uma zoonose causada por bactérias do gênero *Leptospira*, a qual se manifesta clinicamente de diversas formas, podendo ser assintomática ou causar graves problemas à saúde pública, principalmente devido às diversas manifestações clínicas. A zoonose é causada pela ingestão de alimentos contaminados ou pelo contato direto com a urina ou fezes de animais infectados. No Brasil, a leptospirose é considerada uma das principais causas de zoonoses. Este trabalho tem como objetivo avaliar a prevalência de leptospirose em bovinos no Estado do Rio Grande do Sul (RS). Este estudo é parte de um projeto maior que engloba uma avaliação da leptospirose em diversos animais domésticos e silvícolas (uma zoonose).

## OBJETIVOS

O objetivo principal deste projeto é avaliar a prevalência de leptospirose em bovinos no Estado do Rio Grande do Sul (RS). Este estudo é parte de um projeto maior que engloba uma avaliação da leptospirose em diversos animais domésticos e silvícolas (uma zoonose).

Local	N. de amostras	N. de amostras positivas	% de positividade
Bovinos	100	10	10%
Caprinos	100	5	5%
Ovinos	100	3	3%
Equinos	100	2	2%
Porcos	100	1	1%
Canídeos	100	0	0%
Felinos	100	0	0%
Ungulados	100	0	0%
Outros	100	0	0%

## METODOLOGIA

Foram coletadas amostras de urina e fezes de bovinos, caprinos, ovinos, equinos, porcos, canídeos, felinos e ungulados em diversas regiões do Estado do Rio Grande do Sul (RS). As amostras foram analisadas por métodos de cultura e PCR para detectar a presença de *Leptospira*.



## RESULTADOS ESPERADOS

Este trabalho tem como objetivo avaliar a prevalência de leptospirose em bovinos no Estado do Rio Grande do Sul (RS). Espera-se que os resultados possam contribuir para a compreensão da epidemiologia da leptospirose em bovinos e para a implementação de medidas de controle e prevenção.







Thank you very much.