



RESEARCH PROGRESS REPORT SUMMARY

Grant 01480: Leptospirosis: An Emerging Health Concern for Field Trial and Hunting Dogs

Principal Investigator: Dr. Janet Foley, DVM, PhD

Research Institution: University of California, Davis

Grant Amount: \$73,620.00

Start Date: 1/1/2011 **End Date:** 12/31/2013

Progress Report: End-Year 3 (FINAL)

Report Due: 12/31/2013 **Report Received:** 1/26/2014

Recommended for Approval: Approved

(Content of this report is not confidential. A grant sponsor's CHF Health Liaison may request the confidential scientific report submitted by the investigator by contacting the CHF office. The below Report to Grant Sponsors from Investigator can be used in communications with your club members.)

Original Project Description:

Leptospirosis is a disease of dogs and humans that can be fatal, occurs worldwide, and originates from wildlife. The bacteria causing disease has many different strains, each coming from a different wildlife reservoir. Although vaccination of dogs against canine leptospirosis has taken place for decades, novel and potentially emerging vaccine-resistant strains from wildlife have been detected recently. As our society increasingly encroaches on wildlife habitat, there is greater risk for dogs to acquire infection from contact with infected wildlife. No current spatial or risk analysis has been performed for canine leptospirosis in the western US. Moreover, diagnostic tests that are rapid, sensitive, quantitative, and capable of discriminating among strains are lacking, which hinders our ability to manage individual cases and understand the epidemiology of this disease. Our study aims to determine risk factors for, and clinical characteristics of, modern leptospirosis in dogs by retrospective analysis of two large databases; generate a statistical risk model and use GIS-based mapping to detect spatial clustering of cases; develop a reliable, sensitive diagnostic method to identify active infections and differentiate among strains of *Leptospira interrogans*; and prospectively sample dogs in high risk areas in order to acquire isolates for future pathogenesis study and molecular genotyping, and to evaluate acute active infections of individual dogs to allow for successful treatment. Results from our study will provide valuable information that will improve success of patient management, reduce risk of infection to other dogs and humans, and inform future surveillance and vaccine efforts to improve canine health.



Grant Objectives:

Objective 1: Determine risk factors for, and clinical characteristics of, modern leptospirosis in dogs by analysis of UC Davis VMTH data records.

Objective 2: Generate a statistical risk model and use GIS-based mapping to detect spatial clustering of cases.

Objective 3: Develop a reliable, sensitive diagnostic method to identify active infections and differentiate among pathogenic strains of *Leptospira* spp. in order to support molecular epidemiological investigations and management of infected dogs.

Objective 4: Evaluate acute active infections of individual dogs to describe dynamics of infection and response to treatment. For each positively infected dog we will collect epidemiological, temporal and spatial data to continue the ongoing assessment of case mapping and risk analysis.

Publications:

- Leptospirosis. Author: J.E. Sykes. In *Canine and Feline Infectious Diseases* 1st edition. 2014. Elsevier
- Spatial and temporal patterns of *Leptospira interrogans* seropositivity in dogs in Northern California. Authors: J. Hennebelle, J. E. Foley, T.E. Carpenter, J.E. Sykes. *JAVMA* 242:941-947.

Report to Grant Sponsor from Investigator:

Leptospirosis is a re-emerging infectious disease of dogs, people, and wildlife. Infected dogs may develop acute renal failure but also multiple-organ failure and even death. This is one of the most commonly diagnosed infectious diseases in dogs at UC Davis. We now have vital information about hot spots for risk of canine leptospirosis as well as epidemiological information including breed and vaccination status for affected dogs, exposure routes, and serovars. Importantly, we demonstrate that small dog breeds are indeed vulnerable to leptospirosis and thus vaccine protocols need to include them. We have ongoing surveillance in these hot spots to detect cases in order to obtain bacterial isolates and critical data on patterns of leptospiral infection in blood and urine. One promising aspect of ongoing research is the interaction of canine and wildlife leptospirosis, and whether some wild animals that may enter yards and suburban landscape could be a source of infection to dogs. Our data to date implicate squirrels and skunks, although other wildlife species or domestic farm animal species may be important sources to dogs even in their home yards. Further molecular characterization of infection will help us understand this linkage. The most important jobs in our



to-do for Leptospira research at present are to use molecular techniques to understand dog-wildlife risk and to continue surveillance and use molecular approaches to determine the pathophysiology of infection by west-coast strains of Leptospira in dogs.