Short Report: A Survey of Antibodies against *Rickettsia rickettsii* and *Ehrlichia chafeensis* in Domestic Animals from a Rural Area of Colombia

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Abstract. In a rural area of Colombia endemic for Rocky Mountain spotted fever, we performed indirect immunofluorescent antibody assays for *Rickettsia* spp. and *Ehrlichia* spp. using sera from randomly sampled dogs and horses to test the use of domestic animals as possible sentinels. Antibodies against *Ehrlichia* spp. were detected in 8 dogs (31.8%). Antibody titers against *Rickettsia rickettsii* antigen were positive in 4 dogs (18.2%) and 26 horses (16.3%). These values, albeit not directly comparable, are lower than those previously reported for humans in this region. A systemic approach to understanding dynamics of transmission is needed before implementing the use of domestic animals for disease surveillance activities.

Spotted fever group (SFG) rickettsioses and ehrlichioses are tick-transmitted emerging human infections caused by obligate intracellular gram-negative bacteria belonging to the order Rickettsiales.1 There is a current large re-emergence of Rocky Mountain spotted fever (RMSF) in the Americas; the highest number of RMSF cases reported in one year in the United States (1,514) occurred in 2004,2 and new and large clusters of spotted-fever group rickettsioses have been recently reported from several Latin American countries including Argentina,3,4 Brazil,5,6 Peru,7 Mexico,8,9 Panama,10 and Colombia.11

It was recently suggested that horses could be used as sentinel animals for detection of RMSF in disease-endemic areas, even before human cases of the disease are detected.12 Therefore, we designed this study to test whether a similar concept could be applied to other areas of Latin America. The study area is particularly relevant because of the endemicity of SFG human rickettsioses.11,13 The study area is located in Villeta, Cundinamarca, Colombia, (5°0′53″N, 74°28′29″W), which is 842 meters above sea level, and has an annual average temperature of 26°C and a relative humidity of 80–97%. The estimated horse population in the rural area is of 1,695 animals in 22 villages. The dog population could not be estimated because registration is not mandatory and because most dogs roam freely with access to pasture and forest areas. Horses graze on mixed overgrowth pastures in the study area. Three tick species have been documented in the area: *Amblyomma cajennense*, *Rhipicephalus sanguineus*, and *Anocentor nitens*.

Because of the high mobility of animals within the region, we applied a snowball sampling strategy. In the locations where horses were found, dogs where included for collection of serum samples. During March and April 2008, blood samples were collected from 22 dogs, and 159 horses. An immunofluorescent antibody assay was performed as previously described.13 The Taiaçu strain of *Rickettsia rickettsii* (kindly provided by Dr. Marcelo Labruna, University of Saõ Paulo, Saõ Paulo, Brazil) was used to prepare antigen slides in our laboratory. Slides containing *Ehrlichia chaffensis* antigen were provided by Dr. Jere McBride (University of Texas Medical Branch, Galveston, TX). We screened samples at a serum dilution of 1:64 to identify positive samples, which were subsequently titered to their end point.

We detected IgG against *R. rickettsii* in 4 (18.2%) of 22 dogs and 26 (16.3%) of 159 horses (Table 1). Eight (31.8%) dogs had IgG that reacted with *E. chaffensis* (Table 2). This reactivity...
may correspond to prior infection with *E. canis*. Interestingly, the two dogs sampled in the village of Naranjal, where a recent confirmed fatal case of human RMSF was identified,12 did not contain antibodies against *R. rickettsii* or *E. chaffeensis*.

It is generally expected that the seroprevalence of *R. rickettsii* and *E. chaffeensis* in domestic animals should be higher than in humans12; this suggestion is a probable reflection of a greater exposure of canines and horses to tick vectors. Conversely, our study suggests that in this disease-endemic region of Colombia the seroprevalence of domestic animals for SFG rickettsioses might be lower than that previously reported in humans (40.3%).13 However, these studies are not strictly comparable because they were not performed simultaneously and they used different strains of *R. rickettsii* as antigen. Although firm conclusions cannot be made, the proposed interpretation of our results is plausible because humoral immunity is long lived (many years) in mammals and the high level of cross-reactivity between strains of the same species of *Rickettsia* make it unlikely that positive samples would not be detected equally well with both types of antigens.

A recent anthropologic study in the study region reported that humans do not perceive ticks as a source of human diseases.14 Thus, we hypothesize that the contrasting serologic findings in humans and domestic animals may be explained, at least in part, by our observation that persons in this region of Colombia periodically treat their domestic animals with acaricides, but they do not address the presence of ticks on their own bodies. Another possible explanation is the differential preference of the tick species present in this region (including different stages of development) for feeding on humans, horses, or dogs. We conclude that domestic animals can only be used as markers of the activity or presence of tick-transmitted zoonoses if there is a clear understanding of the impact of human behavior (such as the periodic treatment of animals with acaricides) on the dynamics of transmission. Future studies should also address the role of domestic animals in the dynamics of transmission, including the possibility that some animals may serve as reservoirs, amplifiers, or both.

### Table 2

<table>
<thead>
<tr>
<th>Village</th>
<th>No. samples positive/no tested</th>
<th>End point titer of IgG anti-<em>R. rickettsii</em></th>
<th>No. samples positive/no tested</th>
<th>End point titer of IgG anti-<em>E. chaffeensis</em></th>
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</thead>
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<td>La Masata</td>
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<td>1</td>
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<tr>
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<td>3/6</td>
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<tr>
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<td>4/22</td>
<td>2</td>
<td>8/22</td>
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References:


