

Surprising study results: More cattle means less Lyme disease

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(Phys.org) -- The abundance of cattle is the primary influence on the prevalence of two tick-borne pathogens, according to a paper in the April *Applied and Environmental Microbiology*. One of these, *Anaplasma phagocytophilum*, causes human granulocytic anaplasmosis, and the other, *Borrelia burgdorferi*, causes Lyme disease. Although other studies have examined the effect of hosts on tick and tick-borne pathogen dynamics, this is the first to clarify the role of host abundance on prevalence of the two pathogens in their natural habitat, where wildlife and domestic livestock coexist.

The impetus for the research was the fact that in recent decades, gamekeepers in the study area, a wildlife preserve in the northern [Iberian peninsula](#), had suffered [Lyme disease](#), and had noticed an increasing abundance of ticks, says first author Francisco Ruiz-Fons, of the Instituto de Investigación en Recursos Cinegéticos, Ciudad Real, Spain. "Our working hypothesis was that wild and domestic ungulates would be primary drivers of the abundance of *Ixodes ricinus* ticks, and of the prevalence of pathogens transmitted by this tick species, in natural foci where they coexist and where *B. burgdorferi* and *A. phagocytophilum* are endemic."

That hypothesis held up, but somewhat differently from expected, having opposite effects on *A. phagocytophilum* and lyme bacterium, *B. burgdorferi*, in reducing prevalence of the latter. That seemingly counterintuitive finding stemmed from the fact that "cattle and wild ungulates may act as diluters of borrelias by diverting infected ticks'

bites from competent reservoirs such as birds or small mammals," says Ruiz-Fons. Thus, more cattle meant reduced numbers of Lyme disease bacteria.

"The most important application of our findings is that if we want to reduce the risk of animals and humans becoming infected by [tick-borne] pathogens we should control the infestation by ticks in cattle—and perhaps in wildlife—rather than by reducing cattle or wild host abundance in areas where wild and domestic animals coexist," says Ruiz-Fons.

More information: F. Ruiz-Fons, I.G. Fernandez-de-Mera, P. Acevedo, C. Gortazar, and J. de la Fuente, 2012. Factors driving the abundance of *Ixodes ricinus* ticks and the prevalence of zoonotic *I. ricinus*-borne pathogens in natural foci. *Appl. Environ. Microbiol.* 78:2669-2676

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