

Abstract title:

Resource quality and distribution impacts vectors and vector-borne infections in wild wood mice

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Introduction

Vector-borne pathogens (VBPs) cause some of the most ubiquitous diseases to humans and animals. Natural and human-impacted environments fluctuate in resource availability and quality, which can have varied impacts on animal populations – for example, by altering host condition, immunity, behavior or demography – and these processes can result in diverse impacts on disease transmission, particularly in wild reservoirs. We used experimental food supplementation of wild wood mice, *Apodemus sylvaticus*, to test how resource quality and distribution impacted host infection by a range of zoonotic VBPs and vectors.

Methods

We carried out longitudinal rodent trapping at two woodland sites in Edinburgh, UK over two years (6-8 months per year). Within each site, we manipulated i) the quality (high vs low) and ii) the distribution (aggregated vs evenly-spread) of supplemented food available to the wood mice. We counted the number of ticks and fleas infecting rodents and collected host blood and tissue samples, which were screened for the presence of nine zoonotic VBPs. We tested how food supplementation quality and distribution affected host infection with VBPs and ectoparasites, using generalised linear mixed effects models.

Results & Discussion

We found that evenly-spread, high-quality food reduced host infection risk with flea-borne bacteria *Bartonella* spp. compared to non-supplemented areas. When we compared high- and low-quality food, we found that high-quality food reduced the infection risk with ticks; this suppressive effect on ticks was enhanced when the high-quality food was evenly distributed.

Together, these results highlight how resource quality and distribution can interact to generate taxon-dependent effects of resource availability on VBP infection risk. These results underscore the importance of using experimental approaches to uncover drivers of disease transmission, whilst embracing the heterogeneities present in wild host-parasite systems.