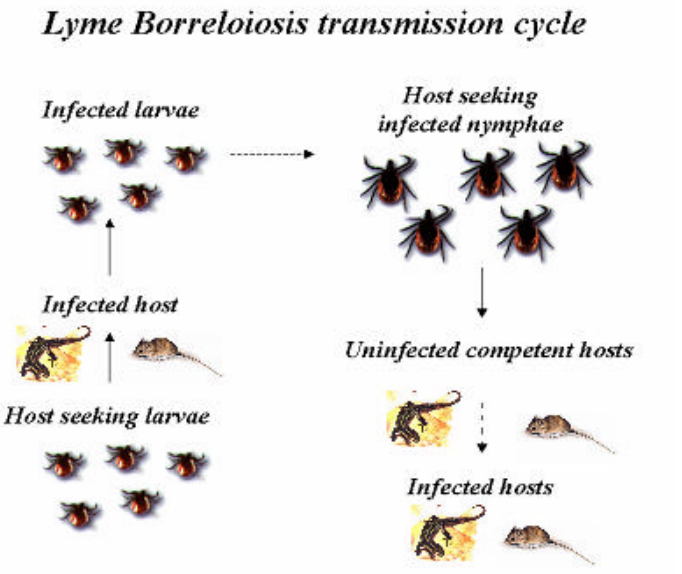
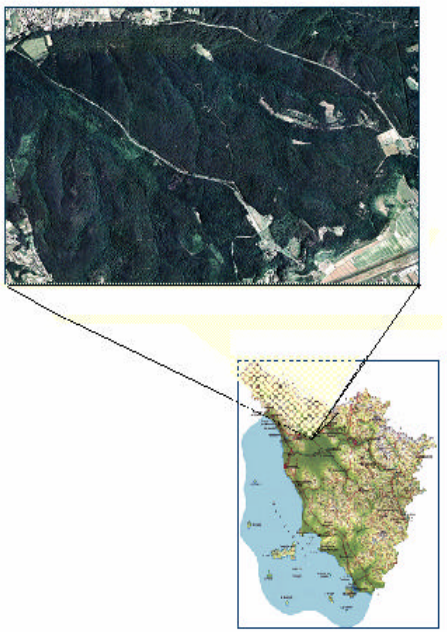
Dynamics of Borrelia burgdorferi sensu lato (s.l.) transmission between ticks and two different hosts: basic reproductive number estimation, in an italian Natural Reserve

-emerging tick-borne zoonosis
-genospecies *B. burgdorferi* s.l. complex, host specie associated
-tick vector *Ixodes ricinus*
-different reservoirs hosts species





-*B. lusitaniae* and *B. afzelii* in host seeking and infesting *I. ricinus* ticks,
-abundant *I. ricinus* population
-lizards (*Podarcis* spp.) and mice (*Apodemus* spp.), *B. lusitaniae* and *B. afzelii* reservoirs

Qualitatively R_0 estimation B. lusitaniae and B. afzelii considering interactions among vectors, hosts and pathogens.

Basic Reproductive Number (R_0):

The expected number of infected hosts when a single infected host has been inserted in a susceptible population of hosts and vectors

Published data

survival probability from feeding larva to feeding nymph

transmission probabilities

$$R_0^{H?H} = F(L, H_c, a_{LH}, D_H, t_I) \cdot b_{HL} \cdot s_N \cdot b_{LN} \cdot ?(N, H_c, H_{nc}) \cdot b_{NH}$$

number of susceptible larvae that feed on the infected host during the host's infectious time period

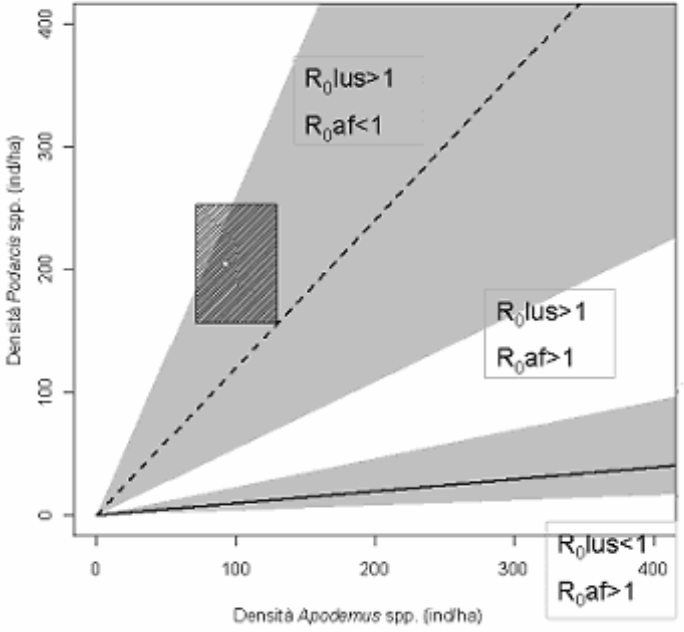
Field data:
capture and recapture
→populations density estimation
→ hosts infestation

proportion of competent uninfected hosts on which the infected nymphs feed

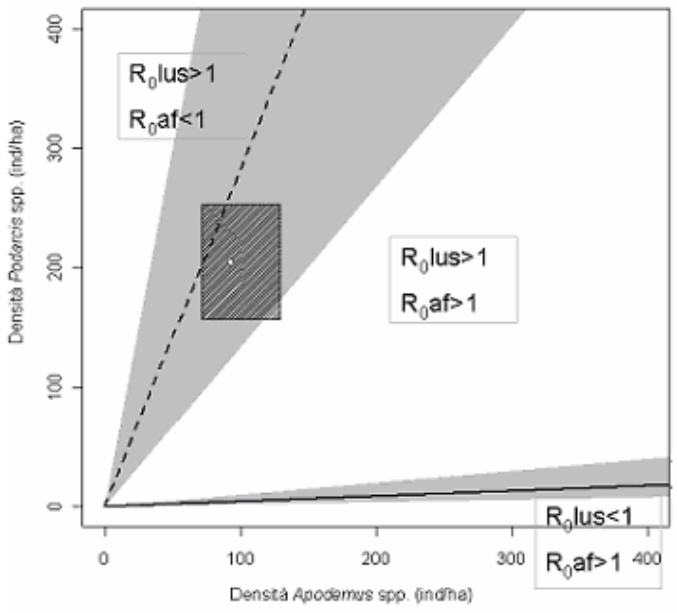
The model suggests a R_0 greater than 1 for B. lusitaniae and around the epidemic threshold for B. afzelii:

right combination of the two host populations sizes
→ coexistence of both spirochete genospecies

Competent and non competent hosts system



Competent hosts system



Presence of other hosts species,
non competent for *B. burgdorferi* s.l.:
→ absence of influence on *B. lusitaniae* R_0 /
effect on the persistence of *B. afzelii*.

Nymphs infestation, population density and diversity, and *B. burgdorferi* s.l. host species association