Supporting Information. Occhibove, F., Kenobi, K., Swain, M., Risley, C. An eco-epidemiological modeling approach to investigate dilution effect in two different tick-borne pathosystems. Ecological Applications

Appendix S2

Modelling two tick-borne pathosystems

Appendix S2. Parameters estimation methodology

Parameters estimated from rodent live-trapping in this study included wood mouse and bank vole growth rates (r) as described in the Ground dwelling rodent populations survey section of the Methods. In addition, rodent species body mass allowed the allometric estimation of the carrying capacity (K) using the formula: $K= 16.2w^{-0.70}$ where w is the mean body mass in grams (De Leo and Dobson 1996, Bolzoni et al. 2008). Rodents' body mass values were the average of adults and sub-adults (this study) of each species.

Adult body mass values from PanTHERIA database (Jones et al. 2009) were used to estimate carrying capacity (K) (same formula above), birth (v), and death rate (ρ) of common shrew and least weasel using the following allometric formulae: $v=w^{-0.25}$, $\rho=0.4w^{-0.25}$.

The competition factor (c) was computed algebraically, ranging from 0 (competition absent) to the maximum value for the competing species to co-exist, K_j/K_i in the case of species i competing over species j. Predation parameters were estimated with methods in Turchin and Hanski (1997), using empirical data from this study or data specific to the UK. These were estimated separately for rodents and shrews, as the latter have a significantly lower body mass and are secondary prey items (Henttonen et al. 1989).

Tick aggregation parameter (k) was calculated from empirical data: it represents the dispersion parameter of the negative binomial distribution fitting field data of ticks collected on rodent hosts (pooled rodent species: k = 0.18, μ = 0.23, D = 264.14, df = 543; analysis performed with the function glm.nb, link = log, package MASS, R Core Team, 2016).

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