Supporting Information. Clay, P.A., M.H. Cortez, and M.A. Duffy. 2021. Dose relationships can exacerbate, mute, or reverse the impact of heterospecific host density on infection prevalence. Ecology.

Appendix S2: Parameter Values and Derivations

Section S1: Parameter Values

Table S1: Model parameter values

Parameter	**Value**
r_1	1
r_2	0-2
α_{11}	1
α_{22}	1
α_{12}	0.5
α_{21}	0.5
f	1
k	0.5, 1, 1.5
m	0.4
x_1 (scenario 1)	100
x_2 (scenario 1)	0, $\frac{x_1}{2}$, x_1, 1.5x_1
x_1 (scenario 2)	0
x_2 (scenario 2)	100
μ	0.1
γ (Figure 3,5)	-3,0,0.5

ρ (Figure 4,5)	0.5, 1, 1.5

Section S2: Calculating β

For each model parameterization, we calculated the per propagule infectivity constant, β, which would yield $I_1 = S_1 > 0$, and $I_2 + S_2 = N_2 = 0$ when the system of equations was at equilibrium. When we set $I_1 = S_1$ and $N_2 = 0$, eq. 3 becomes

$$2r_1 - \alpha_{11}4\,S_1 = \beta_1(f_1P)^{k_1} \quad \text{(S1)}$$

With the same assumptions, eq. 4 becomes

$$\beta_1(f_1P)^{k_1} = m_1 \quad \text{(S2)}$$

Combining eq. S1 and S2, we get

$$2r_1 - \alpha_{11}4\,S_1 = m_1 \quad \text{(S3)}$$

Which we can solve for S_1:

$$S_1 = \frac{2r_1 - m_1}{4\alpha_{11}} \quad \text{(S4)}$$

We then solve eq. 7 for P, replace I_1 and S_1 with eq. S4, and get

$$P = \frac{x_1 \frac{2r_1 - m_1}{4\alpha_{11}}}{\mu + f_1 \frac{2r_1 - m_1}{2\alpha_{11}}} \quad \text{(S5)}$$

Subbing eq. S5 into eq. S2 and solving for β_1, we get

$$\beta_1 = \frac{m_1}{\left(f_1 \frac{x_1 \frac{2r_1 - m_1}{4\alpha_{11}}}{\mu + f_1 \frac{2r_1 - m_1}{2\alpha_{11}}} \right)^{k_1}} \quad \text{(S6)}$$

Unless otherwise stated, we assume that $\beta_2 = \beta_1$.

For Scenario 2 (Host cannot maintain parasite transmission, Appendix S3: Section S10),

$x_1 = 0$ and thus β_1 becomes infinite according to eq. S6. Thus, for scenario 2, we calculated β_1 according to eq. S6 as though $x_1 = 100$. Therefore β_1 is the same for both scenario 1 and scenario 2 for a given value of k_1. As in scenario 1, we assume that $\beta_2 = \beta_1$.