**Supplementary Information**

In order to test for the robustness of our modeling approach to single vs trickle infection regimes, we used data from single dose infection published by Hong et al. (1986). Briefly, 14 week old naïve lambs were infected with a single dose of 3000, 10 000 or 33 000 *Teladorsagia circumcincta* larvae. On 8 occasions between day 10 and day 77, 2 lambs from each group were sacrificed and their worm burdens (differentiated by stage) were counted.

In order to parameterize our model, we fixed the starting dose and allowed the establishment of a fraction ε of these larvae. All parameters were fitted using a non-linear least square method as described in the main text of the manuscript.

Overall, our model captures a great deal of variance in total worm burdens for all three doses (supplementary figure, right hand side panels). The adult nematode fits are even better described (supplementary figure, left hand side panels). Interestingly, immunity appears to exhibit dose-dependence similar to that observed in the trickle infections described in the main article: *ν* is highest at the lowest infective dose and decreases with increasing dose. The main difference between trickle and single infections appears to be the role of the establishment factor: while *ε* has a very limited effect in the trickle case, it appears to be instrumental in the fitting of single dose infection. Given the extremely large doses, a crucial role for establishment success in single infection is unsurprising and could be mediated biologically by inter-individual competition between larvae for attachment space in the stomach.



Supplementary figure: Adult (left) and total (right) worm burdens for different trickle infection regimes. Dots represent the worm count data presented in Hong et al. (1986). Curves represent nonlinear least squares fit of dose-dependent immune parameters 3000 larvae: *ν* = 1.4\*10-5, *β1* = 0.45, *β2* = 1.73, *ε* = 0.56; 10000 larvae: *ν* = 0.5\*10-5, *β1* = 0.52, *β2* = 2.95, *ε* = 0.7; 33000 larvae: *ν* = 0.1\*10-5, *β1* = 0.45, *β2* = 3.66, *ε* = 0.89. Other parameter values: *µL* = 0; *µM* = 0.02; *µI* = 0; γ = 0.1; α = 0.