

Protocol S1. Mathematical details of the Feeding Cycle Model

Using the symbols in Table S2, the calculation of average mosquito survival probabilities, normalized egg production and average infectious bites per cycle is as follows.

$$F_i = \frac{\left(\sum_{m=0}^{i-1} f_{i,m} v_{i,m} \right)}{V_i}$$

$$S_i = \frac{\left(\sum_{m=0}^{i-1} s_{i,m} v_{i,m} \right)}{V_i}$$

$$u = \sum_{i=1}^{10} I_i V_i$$

$$I_i = 0 \quad i \leq D$$

$$I_i = \frac{\sum_{m=D}^{i-1} q_{i,m,2} v_{i,m} + q_{i,m,3} v_{i,m}}{V_i} \quad i > D$$

$$f_{i,m} = L \left(\sum_{h=1}^3 q_{i,m,h} \right) z_{i,m}$$

$$V_1 = 1$$

$$V_i = \sum_{m=0}^{i-1} v_{i,m} \quad i > 1$$

$$v_{1,0} = 1.00$$

$$v_{i,0} = v_{i-1,0} \left(q_{i-1,0,1} + q_{i-1,0,2} + q_{i-1,0,3} (1-M) \right) z_{i-1,0} \quad i > 1$$

$$v_{i,1} = v_{i-1,0} q_{i-1,0,3} M z_{i-1,0} \quad i > 1$$

$$v_{i,m} = v_{i-1,m-1} \left(q_{i-1,m-1,1} + q_{i-1,m-1,2} + q_{i-1,m-1,3} \right) z_{i-1,m-1}$$

$$i > 1 \quad m > 1$$

$$s_{i,m} = \left(\sum_{h=1}^3 q_{i,m,h} \right) z_{i,m} \quad i < 10$$

$$q_{i,m,1} = H e^{-tb} (1 - a_1)$$

$$q_{i,m,2} = (1-p)(1-H)e^{-rb}(1-a_1)(1-k_i\delta)$$

$$q_{i,m,3} = p(1-H)e^{-rb}(1-a_1)(1-k_i\delta)$$

$$z_{i,m} = (1-a_2)e^{-r(\phi+\eta)}$$