$$\frac{dS}{dt} = \kappa S - k_1 SI - k_2 SR_I - k_3 SH$$

$$\frac{dE}{dt} = k_1 SI + k_2 SR_I - \mu E + k_3 SH$$

$$\frac{dI}{dt} = \mu E - \gamma I - \Psi I$$

$$\frac{dR_I}{dt} = \rho_1 \gamma I - \beta R_I$$

$$\frac{dR_B}{dt} = \beta R_I + \eta R_B$$

$$\frac{dR_R}{dt} = (1 - \rho_1) \gamma I + \Phi R_R$$

$$\frac{dH}{dt} = \Psi I = \eta R_B - \Phi R_R$$

$$k_1 = \beta$$
$$k_2 = \beta x_2$$
$$k_3 = \beta x_1$$
$$\mu = a$$