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Hayriye Gulbudak* (hgulbudak@ufl.edu). *A Structured Avian Influenza Model with Imperfect Vaccination.*

Vaccination of poultry is an important control strategy for avian influenza. In general, vaccination does not induce perfect immunity in populations, instead producing partial protection by reducing the probability of infection and decreasing the severity of infection. We introduce a model of avian influenza in domestic birds with imperfect vaccination and age-since-vaccination structure to account for variable waning of the partial protection. The basic reproduction number, \mathcal{R}_0 , is calculated. The disease-free equilibrium is found to be globally stable when $\mathcal{R}_0 < 1$ under certain conditions. When $\mathcal{R}_0 > 1$, existence of an endemic equilibrium is proved (with uniqueness for a special case), and uniform persistence of the disease is established. The inclusion of both mechanisms of partial protection from vaccination can have important implications for disease control. We analytically and numerically demonstrate that vaccination can paradoxically increase the total number of infected, resulting in the “silent spread” of the disease. We also study the combined impact of increasing vaccine efficacy and vaccination coverage on *H5N1* AI disease control. (Received September 17, 2013)