

SIMPLE MODELS FOR AVIAN INFLUENZA

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ABSTRACT. Simple models for avian influenza are constructed and analyzed. These models are based on the standard SEIQ model, but include constant immigration of latent class and an additional property of the avian influenza, namely, that asymptomatic individuals in the latent period have an infectious force.

The general quarantine-adjusted incidence and a special incidence $\lambda_1 + (\lambda_2/N)$ are studied, respectively. The models not only show the importance of strengthening quarantine work to recruitment and treatment for infections, but also indicate that hunting and isolation are helpful to the epidemic control.

Finally, an eco-epidemiological system of two noninteraction species is proposed and investigated to study human avian influenza. The model gives an important indication that the most effective way to control the disease spreads among human beings is to inhibit the influenza virus from spreading among animals.

1. Introduction. Avian influenza is a serious disease of poultry occurring more and more frequently all over the world. Many methods such as hunting and isolation have been taken to control the spread of avian influenza. However, it is observed that poultry without any symptom can excrete much highly pathogenic virus, which makes it more difficult to inhibit the H5N1 type virus from spreading.

Several studies [2, 4, 5, 8] have examined models to attempt to control such a pandemic influenza at the source where it should develop. These models are based on networks and stochastic simulations. Very recently, it is shown in [1] that many of the predictions of the above models can also be obtained from simple deterministic compartmental models. It is suggested in [1] that simple models may be a

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