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Stability Analysis of Endemic State of Modelling the Effect of Vaccination and Novel Quarantine-Adjusted Incidence on the Spread of Newcastle Disease Virus

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Abstract : Newcastle disease is an infection of domestic poultry and other bird species with virulent Newcastle disease virus (NDV). In this paper, we study the dynamics of modeling the Newcastle disease virus (NDV) using a novel quarantine-adjusted incidence. We do a comparison of Vaccination, linear incident rate, and novel quarantine adjusted incident rate in the models. The dynamics of the models yield disease free and endemic equilibrium states. The effective reproduction numbers of the models are computed in order to measure the relative impact for the individual bird or combined intervention for effective disease control. We showed the local and global stability of endemic equilibrium states of the models, and we found that stability of endemic equilibrium states of models are globally asymptotically stable if the effective reproduction numbers of the models equations are greater than a unit.

Keywords : effective reproduction number, endemic state, mathematical model, Newcastle disease virus, novel quarantine-adjusted incidence, stability analysis
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