World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:18, No:04, 2024

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

Authors : Nurudeen O. Lasisi, Sirajo Abdulrahman, Abdulkareem A. Ibrahim

Abstract : Newcastle disease is an infection of domestic poultry and other bird species with the virulent Newcastle disease virus (NDV). In this paper, we study the dynamics of the modeling of the Newcastle disease virus (NDV) using a novel quarantine-adjusted incidence. The comparison of Vaccination, linear incident rate and novel quarantine-adjusted incident rate in the models are discussed. 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 of an 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 the 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
Conference Title : ICMCB 2024 : International Conference on Mathematical and Computational Biology
Conference Location : London, United Kingdom
Conference Dates : April 11-12, 2024