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A MATHEMATICAL MODEL DEMONSTRATING THE EFFECT OF QUARANTINE TECHNIQUE ON BOVINE TUBERCULOSIS IN CATTLE

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Abstract: Bovine Tuberculosis(BTB) is an infectious disease caused by a bacteria called Mycobacterium Bovis. It affects the lungs and lymph nodes of mammals which results in death. A mathematical model describing the BTB in Cattle incorporating both within-herd transmission and external infection is proposed. The external infection is caused by infected cattle from other herds. The true reactors to BTB are quarantined and the effect of quarantine in the control of BTB is analysed. A system of differential equations is used to formulate the mathematical model. The spread of BTB in the cattle is represented by a bilinear transmission. Stability analysis of the disease free state and endemic state of the system is carried out locally and globally. Analysis of the proposed model shows that the disease free state of the system is globally asymptotically stable when the basic reproduction number of the system is less than 1 and the endemic state of the system is globally asymptotically stable when the basic reproduction number is greater than 1. Numerical simulations reveal that, by quarantining true reactor cattle, the infection in herd can be controlled upto 60% effectively.

Keywords and Phrases: Mathematical Modelling, Bovine Tuberculosis, Differential Equations.

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