

Transmission Dynamics of Lumpy Skin Disease in Ethiopia

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Abstract : Lumpy skin disease (LSD) is a severe viral disease of cattle, which often occurs in epidemic form. It is caused by lumpy skin disease virus of the genus capripoxvirus of family poxviridae. Mathematical models play important role in the study of infectious diseases epidemiology. They help to explain the dynamics and understand the transmission of an infectious disease within a population. Understanding the transmission dynamics of lumpy skin disease between animals is important for the implementation of effective prevention and control measures against the disease. This study was carried out in central and north-western part of Ethiopia with the objectives to understand LSD outbreak dynamics, quantify the transmission between animals and herds, and estimate the disease reproduction ratio in dominantly crop-livestock mixed and commercial herd types. Field observation and follow-up study were undertaken, and the transmission parameters were estimated based on a SIR epidemic model in which individuals are susceptible (S), infected and infectious (I), and recovered and immune or dead (R) using the final size and generalized linear model methods. The result showed that a higher morbidity was recorded in infected crop-livestock (24.1%) mixed production system herds than infected commercial production (17.5%) system herds whereas mortality was higher in intensive (4.0%) than crop-livestock (1.5%) system and the differences were statistically significant. The transmission rate among animals and between herds were 0.75 and 0.68 per week, respectively in dominantly crop-livestock production system. The transmission study undertaken in dominantly crop-livestock production system highlighted the presence of statistically significant seasonal difference in LSD transmission among animals. The reproduction numbers of LSD in dominantly crop-livestock production system were 1.06 among animals and 1.28 between herds whereas it varies from 1.03 to 1.31 among animals in commercial production system. Though the R estimated for LSD in different production systems at different localities is greater than 1, its magnitude is low implying that the disease can be easily controlled by implementing the appropriate control measures.

Keywords : commercial, crop-livestock, Ethiopia, LSD, reproduction number, transmission

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