Modelling transmission and control of African Swine Fever in Uganda with transportation of infected pigs

Michael Byamukama and Julius Tumwiine

Abstract

African Swine Fever (ASF) is a devastating haemorrhagic fever of pigs that causes up to 100% mortality, for which there is no vaccine and treatment. Its highly contagious nature and ability to spread over long distances make it one of the most feared diseases, since it's devastating effects on pig production have been experienced most of sub-Saharan Africa. A mathematical model for spread and control of African Swine Fever with and without transportation of infected pigs is studied using a system of ordinary differential equations. Model analysis is carried out for existence and stability of the equilibrium points to establish the long time behavior of the disease. It is revealed that without inflow of infected pigs into the population, the model has both the disease free and the endemic equilibrium points. The disease free equilibrium point is globally stable when the basic reproduction number is less than one and the disease can be wiped out of the community. If R0>1, the endemic equilibrium point is globally stable and the disease persists in the community. With transportation of infected pigs, the model only has the endemic equilibrium point which is locally stable. This indicates that with constant inflow of infected pigs the disease cannot be wiped out of the community.