# Two-stage Epidemic Model of Bovine Tuberculosis in African Buffalo

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We present a two stage SIS epidemic model in animal population with bovine tuberculosis in African buffalo as a guiding example. The proposed model is rigorously analyzed. The analysis reveals that the model may exhibit the phenomenon of backward bifurcation, where a stable disease-free equilibrium coexists with a stable endemic equilibrium. Two special cases when this phenomenon of backward bifurcation does not arise are highlighted. Further, it is shown via threshold analysis approach that a vaccine could have positive or negative impact. Numerical simulations of the model demonstrate that, the use of an imperfect vaccine can lead to effective control of the disease if the vaccination coverage and the efficacy of vaccine are high enough.