Modeling the effect of Newcastle Disease vaccination on chicken production in villages surrounding Betampona reserve

Romario Randriatsarazafy

Department of Veterinary Science, Faculty of Medecine

University of Antananarivo

- Background: Newcastle Disease is one of the most important viral infection in chickens caused by paramyxovirus I that can cause more than 80% of losses in unprotected flocks and thus the only means of protection is the vaccination.

- Statistical question: "What are the parameters that affect chicken population size in villages surrounding Betampona reserve?"

- Mechanistic question: "How does chicken population size in villages surrounding Betampona reserve change overtime from poultry vaccination against Newcastle Disease?"

STATISTICAL MODEL

- Question: What are the parameters that affect chicken population size in villages surrounding Betampona reserve?

- Response variable: Chicken population size

- Predictor variables: Vaccination, chicken exploitation (chicken sales, chicken consumption), chicken mortality, human population size per household.

- Family: Poisson

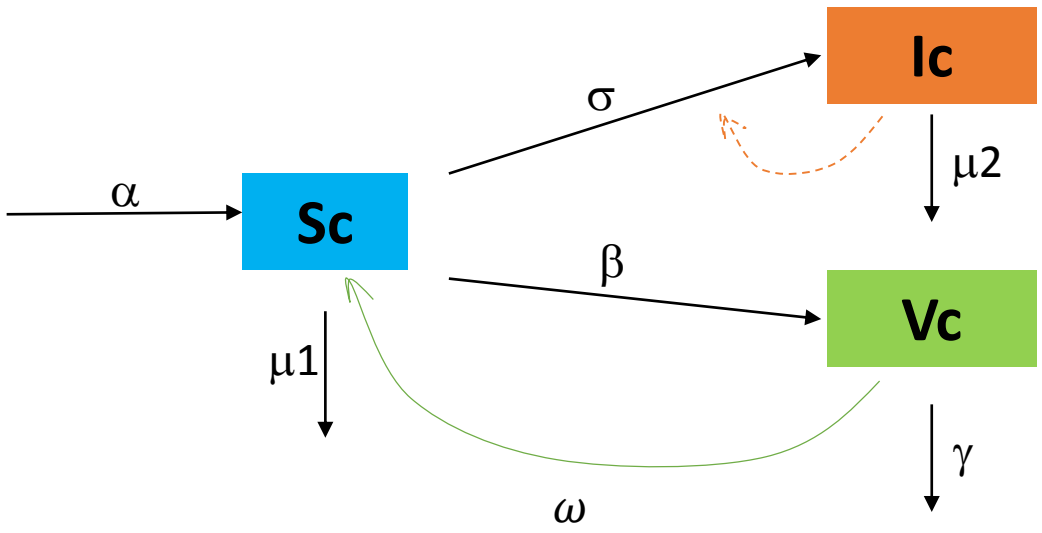
- Link: Natural log

- R code: glmer (chicken_population_size ~ Vaccination + chicken_exploitation + chicken_mortality + Human_population_size_per_household ,family= “poisson”)

- Hypothesis: we assume that vaccination interventions have significant positive effect on chicken population size.

MECHANISTIC MODEL

- Question: “How does chicken population size in villages surrounding Betampona reserve change overtime from poultry vaccination against Newcastle Disease?”



States:
Sc: susceptible chicken
Ic: infected chicken
Vc: Vaccinated chicken

Process:
α: birth rate
σ: infection rate
γ: death rate via vaccinated chicken
μ1: death rate via susceptible chicken
μ2: death rate via infected chicken
β: Vaccination rate
ω: susceptibility rate

FUTURE DIRECTION

- Data collection about cases of Newcastle Disease in chicken flocks with vaccination project

- Explanation of the occurrence of sporadic cases of ND in chicken population covered by vaccination program

Thank you