Mathematical Model and Optimal Control of the Transmission Dynamics of Avian Spirochaetosis

Blessing Emerenini[1] **Joy I. Uwakwe** [2], **Simeon C. Inyama** [2]

[1] *Oregon State University, Corvallis, OR 97331, Oregon state, US*
                                                   emerenib@oregonstate.edu
[2] *Federal University of Technology, Imo State Owerri West, 460114, Nigeria.*

Avian Spirochaetosis is an acute endemic tick-borne disease of birds, caused by *Borrelia anserins*, a species of *Borrelia* bacteria. In this paper, we present a compartmental mathematical model of the disease for the bird population and Tick population. The disease equilibrium and the conditions for reaching a stable disease-free equilibrium were determined. The analysis by Lyapunov method showed both local and global stability. Further investigation involved the introduction of controls to the model; the existence and uniqueness of optimal control were established. Finally, the effect of the controls were investigated using numerical solutions.

References

[1] J. Uwakwe, S.C. Inyama, B.O. Emerenini. M*athematical Model and Optimal Control of the Transmission Dynamics of Avian Spirochaetosis (TICK Fever).* Under Review

---

[*]Mini-Symposium: Recent Advances in Epidemiological Modeling Arising from Human, Animal and Plant Communities