Research Experiences for Undergraduates (REU) 2013 Abstract

HALE, B., HOANG, K., SCHABER, K., RICE, H., LENHART, S.L., EDA, S. and M. KENNEDY. Modeling feline infectious peritonitis in a cattery. National Institute for Mathematical and Biological Synthesis, Knoxville, TN; University of Tennessee, Knoxville, TN; Emory University, Atlanta, GA; University of Dayton, Dayton, OH.

Feline Coronavirus (FCoV) is an RNA virus that infects cats and appears in two forms: Feline Enteric Coronavirus (FECV) and Feline Infectious Peritonitis Virus (FIPV). FECV, the more common form, is widely spread throughout feline populations and infects feline intestines but is normally non-fatal. FIPV, a mutated form of FECV, leaves the intestines by infecting neighboring macrophages and spreads throughout the body. Feline Infectious Peritonitis (FIP) is a fatal immune-mediated disease resulting from FIPV infection, and no cure has yet been found. With the long term goal of controlling the spread of this disease, we present a mathematical model for the epidemiology of FIP in cattery. Our age-structured, differential equations model focuses on tracking the development of FIP from FECV in felines in catteries. The condition for the existence of a disease free equilibrium is found, and our model without disease is approximately at equilibrium. The basic reproduction number of FCoV is greater than one, so the virus is expected to spread throughout the cattery population. The LHS/PRCC sensitivity analysis shows key parameters that have a strong effect on the FIP-affected population.