



2015 Summer Research Experiences (SRE) for Undergraduates and Teachers

Abstract

DANTZLER, A., HUJOEL, M., PARKMAN, V., WILD, V., LENHART, S., LEVY, B., and R. WILKES. Canine distemper outbreak modeled in an animal shelter. National Institute for Mathematical and Biological Synthesis, University of Tennessee, Knoxville, TN; University of Tennessee, Chattanooga, TN; Harvey Mudd College, Claremont, CA; University of Tennessee, Knoxville, TN; Tennessee State University, Nashville, TN; University of Tennessee College of Veterinary Medicine, Knoxville, TN.

Canine distemper virus (CDV) is a highly contagious virus that can cause outbreaks, specifically in crowding situations, such as an animal shelter, in which a large number of susceptible dogs are brought together. Introduction of this virus into a shelter can have devastating effects, potentially resulting in shelter canine depopulation. Motivated by recent outbreaks in Tennessee, a mathematical model was constructed to find relevant factors that could assist in preventing or reducing outbreaks. A system of ordinary differential equations (ODEs) was derived to represent the spread of CDV through S (susceptible), E (exposed), I (infected), and R (recovered) classes as well as a vaccinated and two different infectious classes. Our model was adapted to represent a local Knoxville shelter. The effect of various control methods, both preventative and corrective, on disease spread was investigated.