

# SYSTEMS MODELLING FOR INVESTIGATING SUSTAINABLE DOG POPULATION MANAGEMENT METHODS

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The worldwide population of domestic dogs (*Canis familiaris*) is estimated to be approximately 700 million individuals. Around 75% of domestic dogs are classified as "free-roaming", referring to their ability to roam and reproduce without restriction. Where free-roaming dogs exist in high densities there are significant implications for public health, animal welfare and the environment. Countries employ different approaches to manage dog populations. The goals of dog population management may include reducing the overall size of the dog population, increasing the proportion of owned dogs, reducing the number of free-roaming dogs or improving the overall health of the dog population. The management methods applied involve culling, reproductive control and the use of shelters to house unowned or unwanted dogs. Management programmes can also include educating the public about responsible dog ownership and implementing legislation which enforces registration and identification. Assessing the impact of each of these interventions is important in order to determine whether the methods are effective and efficient in achieving their goal. Moreover, it is important to determine the long-term sustainability of the dog population management methods.

Here we introduce a project designed to investigate the sustainability of methods to control free-roaming dog populations, including mass surgical sterilisation through "catch-neuter-release", long-term sheltering and culling. This project aims to determine how these different methods impact: (i) free-roaming dog population size over time, (ii) public health risk (including zoonotic pathogens, dog-bites and traffic accidents), (iii) free-roaming dog welfare and (iv) costs associated with each management method. This will be achieved by developing a systems model to evaluate the efficiency and effectiveness of the different methods when considering the above impacts. To develop this simulation, we incorporate mathematical modelling techniques together with data collected in three focal countries (Bulgaria, Italy and Ukraine). This data includes dog population size, public attitude towards free-roaming dogs and dog ownership, public health risk, animal health and welfare, and economic costs associated with the different population management methods. A systems model will elucidate patterns of behaviour and information which will enable the sustainability of the different interventions to be evaluated. In this presentation, we will discuss the components and structure of this systems model addressing the sustainability of the different dog population management methods. This work forms part of the STRAYS project developed under the coordination of the University of Leeds (UK), the Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" (IT) and VIER PFOTEN International.