

ASSESSMENT OF THE CONTROL OF THE STRAY DOG POPULATION

Miglena Kolarova - Dimitrova

Department of Hygiene and Epidemiology, Faculty of Public Health, Medical University - Varna,
Bulgaria, megank@abv.bg

Abstract: The world's domestic dog population is estimated at approximately 700 million, with about 75% classified as "stray". Stray dogs are free to roam and breed, thus creating large, difficult-to-control populations. Free-roaming dogs pose a threat to local wildlife and public health, including the transmission of a number of zoonotic pathogens to domestic animals and humans, attacks on animals and humans, and traffic accidents. The purpose of this study is to assess the control of the population of stray dogs in Varna for a period of 5 years (2017-2021) by analyzing the activities of the Municipal Shelter for Stray Animals (MSSA). Approaches to managing dog populations include killing, fertility control and shelter keeping. The municipal shelter in the city of Varna is having a hard time dealing with the stray dog population due to poor funding and lack of staff. For the monitored period there is a lasting tendency to reduce the number of stray animals caught in the Municipal Shelter. There is a significant difference between captured and neutered dogs. A similar difference is found in vaccination and deworming of stray dogs. Adoption and euthanasia of stray animals as practices for controlling the population of this species are not popular in Bulgaria. Dog population management is a multifaceted concept that aims to improve the health and well-being of stray dogs, reduce the problems they can cause and reduce the size of the dog population. Held in many countries around the world. It is performed by different groups with different methods according to different types of populations using different various indicators for assessing the impact of interventions. Understanding the effectiveness of each of these interventions is important to guide the future management of the dog population. Very few of the studies reviewed allowed correct conclusions to be drawn. The main challenges for future research on the problem are to assess the feasibility, effectiveness, sustainability and effects of mass campaigns to control the stray dog population.

Keywords: animal shelters, stray animals, zoonoses, main challenges.

1. INTRODUCTION

The global domestic dog population is estimated at approximately 700 million, with about 75% classified as "stray" (Smith L.M. 2019). The worldwide population of domestic dogs is estimated at approximately 700 million, with around 75% classified as "free-roaming". Stray dogs are free to roam and breed, thus creating large, difficult-to-control populations. Free-roaming dogs pose a threat to local wildlife and public health, including the transmission of a number of zoonotic pathogens to domestic animals and humans, attacks on animals and humans, and traffic accidents. (Hu CH, 2019 L Gamble et al, 2018)

Dogs are responsible for transmitting over 300 zoonoses to humans. They are perhaps best known for the role they play in the spread and maintenance of the rabies virus (Garde E Acosta-Jamett G.2014). This virus is responsible for approximately 60,000 deaths annually, amounting to an annual economic cost of \$ 8.6 billion (Hampson K., et al. 2015). Other zoonoses include *Leishmania infantum*, the causative agent of zoonotic visceral leishmaniasis *Echinococcus* spp. (*E. granulosus* and *E. multilocularis*) (Quinnell R., 2009; Yang Y.R.Y., et al 2016), which causes echinococcosis; and *Toxocara canis*, which causes toxocariasis. (Cvekova, 2018)

Approximately 59,000 people are dying each year from rabies virus infection worldwide, and dog bites are responsible for 95% of these deaths. In recent decades, many countries in the Western Hemisphere have significantly reduced the incidence of human rabies. These results have been achieved through the introduction and implementation of large-scale vaccination campaigns for dogs; changes in legislation by defining the responsibilities of pet owners, creating programs to control the free distribution of dog populations, as well as providing timely post-exposure prophylaxis. (Kolarova – D, 2022 c. 145)

Approximately 70% of the dog population must be immunized against rabies in order to achieve an epizootiological baseline of herd immunity in the population.

Different countries, as well as different regions within a country, may differ in their objectives for running dog population management programs (Tasker L, 2010), such as: reducing the number of stray dogs; raising the awareness and responsibility of dog owners; improving the health of stray dogs; reducing the prevalence of dog bite injuries and to the conservation of other animal species. However, Dog Population Management programs are mostly run in urban settings and are not funded by the government usually, which raises concerns about their applicability in rural areas and sustainability over time (Taylor LH et al, 2017)

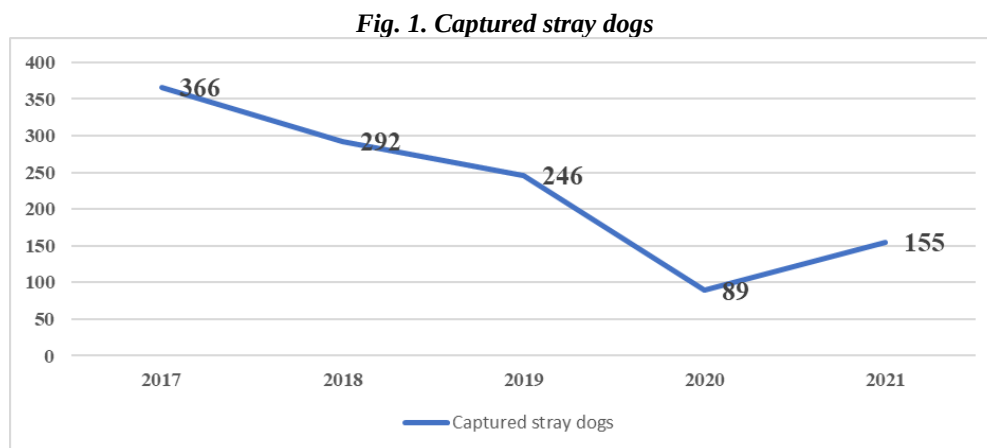
The purpose of this study is to assess the control of the population of stray dogs in Varna.

3. MATERIALS AND METHODS

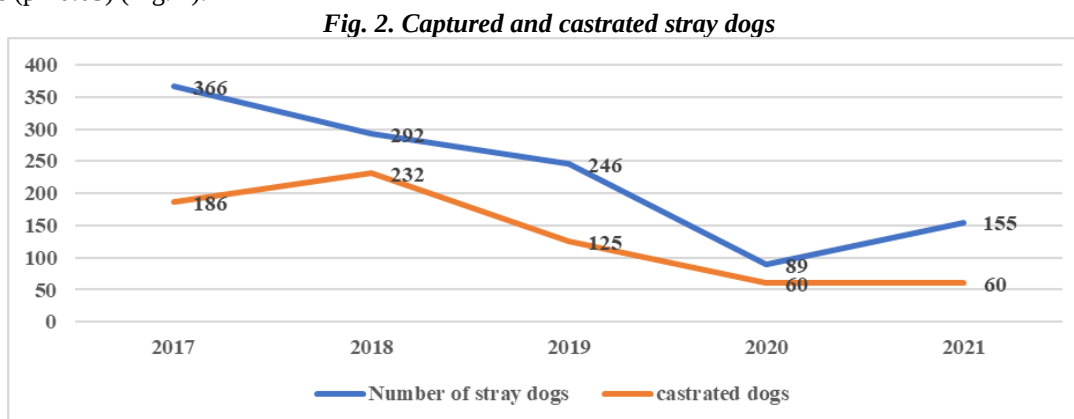
For a period of 5 years, an analysis was made of the management and control of the stray dog population in the city of Varna, using access to public information from the Municipal Shelter for Stray Dogs in the village of Kamenar (MSSD), Varna Region. The results were processed with SPSS using dissertation, variation and comparative analyzes.

4. RESULTS

The results of the analysis of the presented data on the management and control of the population of stray dogs after 2017 show that for the studied period there is a steady trend towards a decrease in the number of captured stray animals (366-155), and for 2021 and 2020 there is a statistically significant decrease in the number of captured animals compared to the previous 2017, 2018 and 2019. ($p < 0.01$) (Fig. 1)

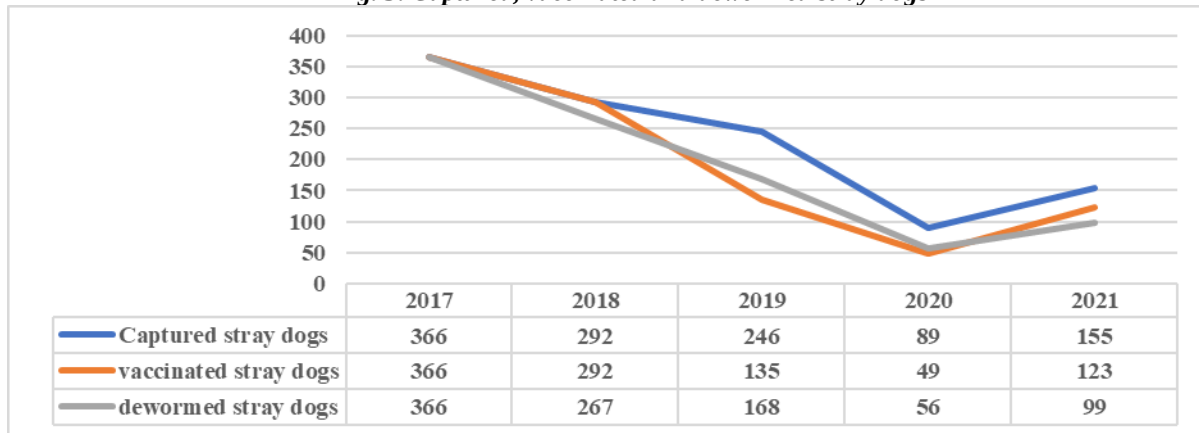


Fertility control in the country is carried out through surgical castration in shelters for stray animals, with a significant difference between neutered dogs and captured dogs, for example in 2021 of 155 captured animals, only 60 (39%) were neutered, which is an indicator that some of the dogs had already been neutered and returned to their habitats ($p < 0.05$) (Fig. 2).



A similar difference is observed with regard to vaccination and deworming of stray dogs, where in the first two years observed vaccination of all animals is observed, while then their number decreases significantly, which is an indicator of re-capture of the same animals and population ($p < 0.05$) (Fig. 3).

Fig. 3. Captured, vaccinated and dewormed stray dogs



The fact that only in two of the years 2019 and 2021 there are dogs housed in shelters (51 and 16, respectively) shows that these structures are overcrowded and insufficient to cover all animals in need of care.

The adoption of stray animals is also an indicator of providing good care and reducing the population of this species, but the results show that this practice is not popular in Bulgaria, as the animals are adopted mainly from Western Europe.

No animals were euthanized during the period under review.

4. DISCUSSION

Free-roaming dogs are a global problem (Garde E et al, 2022) Dog Population Management (DPM) is a multifaceted concept that aims to improve the health and well-being of stray dogs, reduce the problems they can cause and may also to aim to reduce the size of the dog population.(Smith, L.M. et al, 2019)

According to stray dog control programs, management is achieved in three main ways: killing, long-term shelter, and fertility control (Tasker L. 2007). to manage dog populations include culling, fertility control, and sheltering. Historically, killing has been the main method used to reduce the number of stray dogs (Meslin F., et al. 2000). The World Health Organization published guidelines in 1990 that prevented the use of destruction and recommended alternative methods (eg registration and identification, vaccination, public education and sterilization). Despite these recommendations, many countries continue to use extermination as the primary method of population control (Dalla Villa P., et al 2010, Spehar DD, 2020)

Injectable barbiturates are more commonly used in high and high middle income countries, while killing and shooting are more commonly used in lower and middle income countries ((Dalla Villa P., et al, 2010). National legislation in some countries and Kosovo prohibits the killing of dogs to control the population. of stray dogs is the most common method of controlling the dog population. The shelter aims to reduce the size of the stray dog population. The shelter aims to reduce the size of the stray dog population. Sheltered dogs can be: (1) euthanized; (2) adopted; or (3) remain in the shelter permanently. Shelters are common worldwide and can be run by the government (public shelters), privately run or run by NGOs. The number of dogs entering the shelter is often greater than the number of dogs leaving, for example, for relocation. This leads to a lifelong stay in the shelter or euthanasia. As national legislation in some countries prohibits the euthanasia of healthy animals, this can lead to long-term shelter and overcrowding (Barnard S., 2015). Shelter has little or no effect on the size of the dog population (reduction of the population by 3% in 10 years) (Hogasen H.R., 2013), or no effect. In addition, the use of shelters to house dogs is expensive and as such is more common in high- and high-income countries. Due to the cost, this method may not be appropriate in countries with lower average and lower incomes (Dalla Villa P., 2010). The municipal shelter in the city of Varna finds it difficult to cope with the stray dog population due to poor funding and lack of staff. Fertility control can also be achieved through surgical or chemical sterilization or contraception (Massei G., 2013). Non-surgical fertility control is increasingly recommended as more cost-effective than surgical sterilization for the management of dog populations and their effects(Massey G, Miller LA., 2013) Effective population control and selection of the most appropriate neutering interventions require a thorough knowledge of the characteristics and dynamics of the dog population (Shamsaddini S et al,2022).

Surgical sterilization by capture-castration-release (CNR) of stray dogs is the predominant method of fertility control. This method involves collecting stray dogs and performing castration or neutering in an inpatient or mobile clinic. CNR is conducted in several countries and states, for example in Italy (Barnard S., 2015), India (Yoak A ..

2016), Bangladesh (Tenzin T., et al., 2015), Sri Lanka and Brazil. Surgical sterilization is generally more socially acceptable than killing. Yoak et al. (2016) found that killing will reduce the population size by 13% in 20 years (Yoak A.J. 2016) at current capture levels, although the intensity needed to achieve this reduction does not have been reported. The effect varies from a minimal reduction in population size from 14% in 20 years to 78% in 20 years, depending on the extent of castration (Kisiel L., 2017.). Hogasen et al. (2013) show that increasing fertility control by 20-40% per year reduces the size of the stray dog population by 34%, compared to only 3% reduction when shelter increases by 10% each year. In studies that directly compared the effects of killing with fertility control on the size of the dog population, killing was less effective in reducing the size of the population. (Yoak A.J.2016)

5. CONCLUSION

Management of the dog population is a multifaceted concept that aims to improve the health and well-being of stray dogs, reduce the problems they can cause and reduce the size of their population. Held in many countries around the world. It is carried out by different groups with different methods according to different types of populations using different indicators to assess the impact of interventions. Understanding the effectiveness of each of these interventions is important to guide the future management of the dog population. Very few of the studies reviewed allowed the correct conclusions to be drawn. The main challenges for future research on the problem are to assess the feasibility, effectiveness, sustainability and effects of mass campaigns to control the stray dog population.

REFERENCES

- Barnard, S., Pedernera, C., Candeloro, L., Ferri, N., Velarde, A., & Dalla Villa, P.(2015). Development of a new welfare assessment protocol for practical application in long-term dog shelters. *Vet. Rec.* 2015;178:2–8
- Dalla Villa, P., Kahn, S., Stuardo, L., Iannetti, L., Di Nardo, A., & Serpell, J.A. (2010). Free-roaming dog control among OIE-member countries. *Prev. Vet. Med.*;97:58–63
- Cvetkova, T., Stoyanova, K., & Paunov, T.(2018). Journal of IMAB–Annual Proceeding Scientific Papers, Contamination with *Toxocara* spp. eggs of environmental samples of public places of Varna city, Bulgaria
- Gamble, L., Gibson, A.D., Shervell, K., Lohr, F., Otter, I., & Mellanby, R. J. (2018).The problem of stray dogs PMID: 30747127, DOI: 10.20506/rst.37.2.2822 *Rev Sci Tech* 2018 Aug;37(2):543- 550. doi: 10.20506/rst.37.2.2822.
- Garde, E., & Acosta-Jamett, G.(2014). BM Bronsvoort Review of the risks of some canine zoonoses from free-roaming dogs in the post-disaster setting of Latin America. *Animals.* 2013;3:855–865 , Gompper M.E. The Dog-Human-Wildlife Interface: Assessing the Scope of the Problem. Oxford University Press; Oxford, UK: 2014
- Garde, E., Marín-Vial, P., Pérez, G.E., & Sandvig, E.M.(2022). A Review and Analysis of the National Dog Population Management Program in Chile. *Animals (Basel)*, 2022 Jan 19;12(3):228. doi: 10.3390/ani12030228.PMID: 35158553
- Hampson, K., Coudeville, L., Lembo, T., Sambo, M., Kieffer, A., Attlan, M., Barrat, J., Blanton, J.D., Briggs, D.J., & Cleaveland, S. (2015). Estimating the global burden of endemic canine rabies. *PLoS Negl. Trop. Dis.* 2015;9:1–20
- Hogasen, H.R., Er, C., Di Nardo, A., Dalla Villa, P., Høgåsen, H., Er, C., Di Nardo, A., & Villa, P.D. (2013.) Free-roaming dog populations: A cost-benefit model for different management options, applied to Abruzzo, Italy. *Prev. Vet. Med.*;112:401–413
- Hu, C.H., Yu, P.H., Kang, C.L., Chen, H.L., & Yen, S.C. (2019). Demography and welfare status of free-roaming dogs in Yangmingshan National Park, Taiwan.*Prev Vet Med.* 2019 May 1;166:49-55. doi: 10.1016/j.prevetmed.2019.03.009. Epub 2019 Mar 11.PMID: 30935505
- Kisiel, L. (2017). Master's Thesis. The University of Guelph; Guelph, ON, Canada Using a dog demography field study to inform the development of an agent based computer simulation. Evaluating owned dog population control interventions in a small, semi-urban community in Mexico , 96
- Kolarova – Dimitrova, M. (2022). Коларова – Димитрова М. Бяс Предизвикателството, Стено 2022, с. 163, ISBN 978-619-241-206-7
- Macpherson, C. (2013). The epidemiology and public health importance of toxocariasis: A zoonosis of global importance. *Int. J. Parasitol* ;43:999–1008
- Massei, G., & Miller, L.A. (2013). Nonsurgical fertility control for managing free-roaming dog populations: a review of products and criteria for field applications.*Theriogenology.* 2013 Nov;80(8):829-38. doi: 10.1016/j.theriogenology.2013.07.016. Epub 2013 Aug 30.PMID: 23998740

- Meslin, F., Miles, M., Vexenat, A., & Gemmell, M. (2000). Zoonoses control in dogs. In: Macpherson C.N.L., Meslin F.X., Wandeler A.I., editors. *Dogs, Zoonoses and Public Health*. CABI Publishing; New York, NY, USA: 2000. pp. 333–372
- Quinnell, R. (2009). Parasitology O.C. Transmission, reservoir hosts and control of zoonotic visceral leishmaniasis. *Parasitology* ;135:1915–1934
- Smith, L.M., Hartmann, S., Munteanu, A.M., Dalla Villa, P., Quinnell, R.J., & Collins, L.M. (2019). The Effectiveness of Dog Population Management: A Systematic Review. *Animals* , 9, 1020. <https://doi.org/10.3390/ani9121020>
- Spehar, D.D., & Wolf, P.J. (2020). The Impact of Return-to-Field and Targeted Trap-Neuter-Return on Feline Intake and Euthanasia at a Municipal Animal Shelter in Jefferson County, Kentucky. *Animals (Basel)*. 2020 Aug 11;10(8):1395. doi: 10.3390/ani10081395.PMID: 32796681
- Shamsaddini, S., Ahmadi Gohari, M., Kamyabi, H., Nasibi, S., Derakhshani, A., Mohammadi, M.A., Mousavi, S.M., Baneshi, M.R., Hiby, E., & Harandi, M.F. (2022). Dynamic modeling of female neutering interventions for free-roaming dog population management in an urban setting of southeastern Iran. Mar 21;12(1):4781. doi: 10.1038/s41598-022-08697-w.PMID: 35314736
- Tasker, L. (2007). *Stray Animal Control Practices (Europe)* WSPA and RSPCA; London, UK: 2007, <https://www.rspca.org.uk/documents/1494939/0/Stray+dog+and+cat+control+practices+in+Europe+%28WSPA-RSPCA2007%29.pdf/ca537209-64e2-881a-b36d-6abd3795679d?t=1556901393627>
- Taylor, L.H., Wallace, R.M., Balaram, D., Lindenmayer, J.M., Eckery, D.C., Mutoonono-Watkiss, B., Parravani, E., Nel, L.H. (2017). *Front Vet Sci*. Jul 10;4:109. doi: 10.3389/fvets.2017.00109. eCollection 2017.PMID: 28740850 The Role of Dog Population Management in Rabies Elimination-A Review of Current Approaches and Future Opportunities.
- Yoak, A.J., Reece, J.F., Gehrt, S.D., & Hamilton, I.M. (2016). Optimizing free-roaming dog control programs using agent-based models. *Ecol. Modell.*;341:53–61