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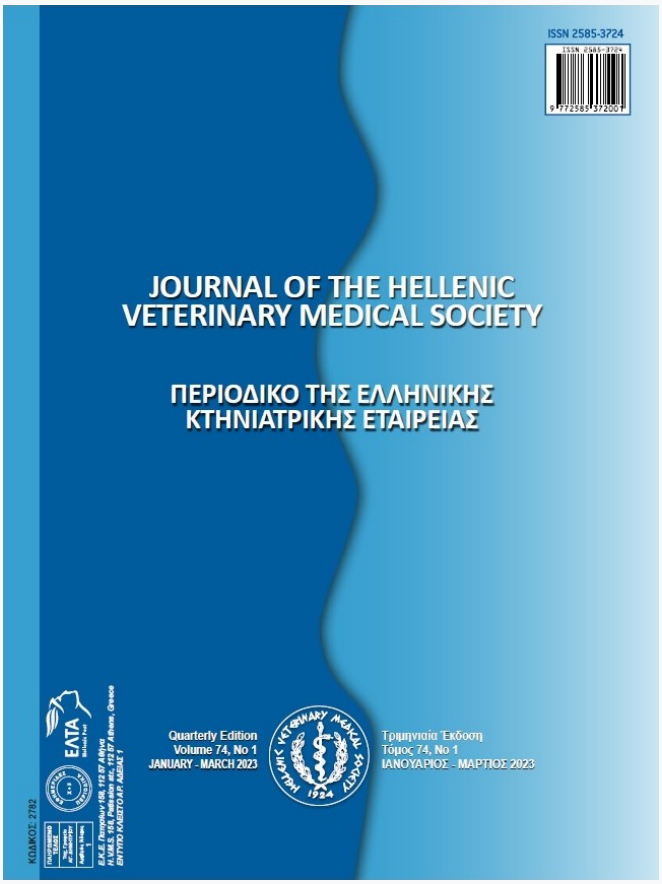

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Research article
Ερευνητικό άρθρο

Defining priority issues for managing stray dog populations: The case of Greece

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ABSTRACT: Recent literature on stray dogs offers evidence about their increasing overpopulation. However, very few studies have attempted to investigate and explain the overpopulation of stray dogs in Greece. The aim of this study is to define how different social and professional groups prioritize issues related to management practices and programs that could be adopted at national and regional level. The Delphi method was applied for drawing, experiences, information, knowledge and opinions of fourteen experts serving from different professions and positions the topic of the study in order to demonstrate how the participation and cooperation of all stakeholders will lead to a sustainable management of their population. The process was completed in three rounds of online meetings in which participants were asked to fulfill questionnaires to analyze their choices. It was concluded that stray dogs are overpopulated mainly due to the "irresponsible ownership of the pet dog" which usually leads to its abandonment (most often without neutering), and the uncontrolled reproduction of stray dogs. Also, the lack of interest in adopting stray dogs was a matter of high priority. Finally, neutering strays and pets was demonstrated by the majority of experts as a solution against overpopulation of stray dogs.

Keywords: stray dogs; animal welfare; Delphi method; overpopulation of stray dogs

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INTRODUCTION

Stray pet is every pet animal which either has no home or is outside the boundaries of the owner's residence, the owner, a crew member or guardian and is not under the direct supervision and control' (Law 4039/2012).

Stray dogs are estimated to represent around 75% of the world's dog population (Hughes and Macdonald, 2013). Around 100.000.000 are stray pets in the EU (ESDAW-EU, 2014-2019). The situation prompted the World Organization for Animal Health (OIE) to guide the management of these populations as well as their relation to human health (OIE, 2011).

Although in 2019 in Europe, dog ownership per household decreased compared to previous years, their number increased. Today, one quarter of households have a dog (about 87,5 million, an increase of approximately one million compared to 2016 (86,675 million), while in the early 2010s this was about 73,643 million) (Bedford, 2020a, b).

In Greece (Bedford, 2020c), during the same decade (2010 - 2019), the dog is the most popular pet(660,000 in 2019) (Bedford, 2020d). In 2019, Romania with 46% of its households owning at least one dog, is in the highest position among European countries, while Greece in 23rd (14%) (Bedford, 2020e). According to the Ministry of Rural Development and Food, most stray dogs are found in the Regions of Attica and Central Macedonia (22.711 and 20.986 respectively). The Regional Units of Eastern Attica (7.701) and Thessaloniki (8.234) have the most of stray dogs. On the contrary, in the Regional Units of Syros, Ithaca, Ikaria, Andros, and Kea-Kythnos no stray dogs have been declared (an email, Monitoring of stray pet management, Personal Communication,-May 14, 2021).

Animal welfare remains an area of public concern and the recognition that animals are sensitive beings is enshrined in the legislation of many countries (Fatjó et al., 2015), while the science of welfare of animals has developed as an independent science, in order to meet the new challenges (Sossidou, 2021).

Concerns about pet welfare were directed in 1993 when the Royal Society for the Prevention of Cruelty to Animals (Mellor, 2017; RSPCA, 2020) adopted the five animal freedoms(Mellor, 2016; RSPCA, 2020). In addition, a key priority of the Commission is the dialogue on animal welfare among stakeholders at EU level (European Union Platform on Animal Welfare, 2017), as it is recognized that animal welfare improves their level of health, while reducing the consumption of antibiotics and drugs and contributes to the conservation of biodiversity with environmental, economic and social benefits (Sossidou, 2021).

In Greece, Article 24, of the Greek Constitution of 1975, defines the protection of the natural environment (animals are included).Pets and stray dogs are protected from their exploitation or use for profit, by Greek legislation (Law 4039/2012-Government Gazette A15, article 2, as amended by article 46 of law 4235/2014-Gov.Gaz.A32, art.46 and law 4483/2017-Gov.Gaz.107A, art.54). Finally, the new legal framework for the welfare of pets entered into force in 18/9/2021 ("ARGOS" Program and other provisions, Law 4830/2021-Gov.Gaz. A169).

The stray dog overpopulation created the need to re-evaluate their management programs mainly due to the social problems raised (i.e. dog attacks) (Mead et al., 2011; Strand, 2011; Trotta et al., 2012; Pérez-Vera et al., 2014; Otranto et all., 2015; Movilla et al., 2016; Iliopoulou et al., 2018; Rusu et al., 2018; Angelou et al., 2019; Evason et al., 2019; Galluzzo et al., 2020; Huang et al., 2021; Petruccelli et al., 2021). Municipalities fund stray dogs neutering programs to prevent unwanted puppies (White et al. 2010; Kass et al., 2013), while the need for microchipping is strong (owners can be reunited with their lost pets) (Weiss et al., 2012). There are also many concerns about the shelters' contribution to reducing stray dogs (i.e. dogs living in poor conditions, breeding uncontrollably) (Protopopova and Gunter 2017; Animal Protection Index) and euthanasia has traditionally been the main response to zoonotic diseases (Sandøe et al., 2019). In recent decades, however, this perception has changed in most western countries and investments are made in programs to promote the adoption of these dogs and find new homes for them(Siettou et al., 2014; Lampe and Witte, 2015; Protopopova and Wynne, 2016; Sandøe et al., 2019; Vojtkovská et al., 2019).

There is an extensive literature on the management of pets and stray dogs in different EU Member States, however data is limited for Greece (FAO, 2014; OIE, 2016; Yoak, et al., 2016; OIE, 2017; ESDAW-EU, 2014-2019; Stregowski, 2019; Weliver, 2019; Hild and Schweitzer, 2019; Huang et al., 2021).

An effective way to set priorities, when there is limited scientific data, is the collection and analysis

of experiences, information, knowledge and opinions from experts who are actively involved in the management of stray dogs. The aim of this study was first to use expert's opinion to determinestray dog's welfare status in Greece and, secondly, to use the Delphi methodto classify the main priorities in managing stray dogs populations.

METHOD

Design

This study used the Delphi method, to solicit the opinions of experts on the welfare issues for stray dogs in Greece, and achieve a consensus and the identification of all possible issues on priority welfare issues. The Delphi method was conducted in three (3) research rounds and involved experts who have been dealing with this issue for many years (Aaltonen, 2010; Parente and Anderson-Parente, 2011).

In Round 1, participants were asked to answer an online questionnaire.Seven closed type questions have been included as determined by the relevant Greek legislation, entitled: "Evaluation of the stages of an integrated stray dog management program by Local Authorities".

In Round 2, participants answered in an online, closed type questionnaire (seven questions) that emerged from their answers during the 1st round of the process, entitled: "Risks associated with each stage of implementation of a comprehensive stray dog management program by Local Authorities".

In Round 3, participants answered in an online open-ended questionnaire (six questions), entitled: "Description of the problems of the various stages of implementation of a comprehensive stray dog management program by Local Authorities".

Expert Panel Recruitment

The experts were defined as being 18 years old and over, based in Greece, in different professional positions(Wakefield and Watson, 2014; Humphrey-Murto et al. 2017) in the field of stray dogs for more than 3 years (Hussler et al., 2011; Malhotra et al., 2014; Lin and Song, 2015; Martiskainen, 2016, Belton et al., 2019). Experts could fall into several categories (i.e. animal welfare representative and dog trainer).

A First contact with experts was undertaken via web to describe the objectives of the research, as well as the Delphi process. During the researcher's first contact some experts suggested other experts who would probably be interested in participating in the process (snowball sampling technique). A total of eighteen (18) experts in their field were identified, whose experience covers the lack of justification for the value of experts limited by a Delphi method (selected experts are really "experts") (Wright and Rowe, 2011; Humphrey-Murto and de Wit, 2019).

All eighteen (18) experts responded positively to participate in the research. They then received an electronic consent form, to state their contact information, their commitment to participate in all rounds of the process, as well as the absolute confidentiality regarding the results of the research, while being set out the expected timeline. Finally, the experts were informed that the completion of the questionnaires would be anonymous.

Finally fourteen experts (n = 14) agreed to participate in the Delphi method. Data were collected during the period July - September 2020 (~~Mozuni and Jonas, 2017~~), in three (3) rounds. Participants did not leave the process before it was completed (Landeta 2006).

Each expert received an invitation (by email), and was briefed on the objectives of the method, the methodology, the data collection process and the expected results.

Questionnaire Design

The three rounds were conducted using the Google Drive Forms tool and the experts answered according to their personal experiences and knowledge. The questionnaire for the first round was developed and evaluated by two experts and finally validated / completed based on the corrections proposed by them.

For the first round, participants were asked to rank the stages of a comprehensive stray dog management program by the Local Authorities according to their importance for the welfare of these animals. An even scale (1-100) was chosen, as this forced the experts to make a choice (priority or not). At the end of the 1st round, the presentation of each expert by the researchers took place and each expert was invited to comment on this questionnaire.

The results of round 1 were presented in round 2(those with the highest ranking at the top of the list). In the 2nd round, the experts answered in an online closed-ended questionnaire, giving priority to specific options of each stage. At the end of the 2nd round, an

interactive discussion followed and each expert had the opportunity to comment this questionnaire.

In the last 3rd round, the experts answered in an open-ended, online questionnaire, describing the problems, risks, specifics and expected benefits of implementing stray dog management programs and their suggestions for their improvement. At the end, an interactive discussion followed and each expert-developed his concerns regarding the welfare of stray dogs andhis suggestions for improving the programs implemented.

RESULTS

Demographic Information

The experts had a similar age structure and were mainly women (57.14%) Three of them are veterinarians (21.43%), three are competent officials in Municipalities (21.43%), three are political heads in municipalities (two are authorized councilors for stray issues in two different Municipalities and one is a deputy mayor) with the remainder made up of a range of other areas of expertise, including dog trainer, police officer, municipal police officer, member of an animal welfare organization, citizen / animal friendly.

First round

The first round took place on 2/7/2020 and the experts received an online questionnaire (seven questions), entitled: “Evaluation of stages of integrated stray dog management program by Local Authorities”,as defined by current legislation for pets and stray companion animals: 1) Informing the Local Authorities about the existence of stray dogs, 2) Their collection, 3) Veterinary control, 4) Neutering, 5) Shelters, 6) Adoption and 7) Returning them to their natural environment.

Experts had to evaluate on a scale of 1-100 points(100=maximum) the importance of the different criteria in controlling the stray dog population(the sum of the responses had to be equal to 100 points). The researchers evaluated the results of the research through qualitative analysis (Mozuni and Jonas, 2017). The Table 1 presents the added score by all participants for each criterion. The max score can reach 1400 points for the hypothetical case that all participants evaluate with 100 points the same (and only this one) criterion. This simple index was calculated to assign a total evaluation for each criterion taking into consideration all experts’ point of view.

The participants expressed their concern about the correctness of their choice, as these stages interact closely with each other and should be evaluated as a whole, while agreeing that dog abandonment creates new generations of strays and therefore pet management is necessary.

However, based on the answers, at the top of the management program is the neutering of stray dogs (24.29%) while the second is the adoption(18.57%). This is followed by the collection, with specific criteria, of these dogs (15.36%), the required veterinary checks (13.21%microchipping,rabies vaccination and de-parasitization), the information of the Local Authorities about the existence of strays (11.79%) and the conditional return to their natural environment (8.57%). In the last place is the entry of dogs in shelters (8.21%), since according to experts, shelters are not a solution to this problem.

Second round

In the 2nd round (16/7/2020), the participants(n=14)answered an online questionnaire(seven questions), entitled: “Risks related to each criterion of a stray dog management program by the Local Authorities” (questions arising from their answers to the first round). The researchers made it clear that all the answers are important, but the aim is to evaluate the

Table 1. Classification of the Criteriaof the stray dog management program

A/A	Criteria	Rate	Score
1	Neutering	24.29%	340
2	Adoption	18.57%	260
3	Collection of stray dogs	15.36%	215
4	Veterinary check	13.21%	185
5	Information of Local Authorities	11.79%	165
6	Return to their natural environment	8.57%	120
7	Shelter	8.21%	115
		100%	1400

answers as a matter of priority and therefore had to choose one of the answers to each question. The following Table 2summarizes the results of the second round.

As shown in Table 2, neutering both pets and stray dogs completes more than 71% of expert's answers. Adoptions of strays both through citizens' motivation (28.57%) and volunteer's network (28.57%) are at the top of the preferences. Also,the 14.29% suggested banning the sale of dogs from pet stores.

The collection of stray dogs should be done by specially trained people (100%) and well-equipped transport vehicle (100%), not by citizens (92.85%) and not all stray dogs should be collected (78.57%). Complain about the existence of stray dogs should be evaluated and the competent employees of the Local Authorities to carry out on-site inspections(64.28%). Also, 85.71% of experts agree that dogs should have a microchip (will be recorded in the database of the competent ministry) and a veterinarian providing care

Table 2. Results of the 2nd round

Neutering / Sterilization		**Number (% percentage) of respondents**	
	All pet dogs	6 (42.86%)	
	All stray dogs	4 (28.57%)	
	Other (neutering all dogs for 5 years, except licensed breeders)	3 (21.43%)	
	All female stray dogs	1 (7.14%)	
Adoption			
	Incentives for citizens	4 (28.57%)	
	Creating a network of animal friendly	4 (28.57%)	
	Price increase/taxation	3 (21.43%)	
	Banning the sale	2 (14.29%)	
	Other (all of the above)	1 (7.14%)	
Collection		**YES**	**NO**
	By a specially trained person	14 (100%)	
	With special equipment and suitable transport vehicle	14 (100%)	
	From competent employees/veterinarians	11 (78.57%)	3 (21.43%)
	From volunteers of animal welfare organizations	8 (57.14%)	6 (42.86%)
	From competent employees/veterinarians	11 (78.57%)	3 (21.43%)
	Collecting all stray dogs	3 (21.43%)	11 (78.57%)
	From citizens	1 (7.14%)	13 (92.85%)
Veterinary check			
	Mandatory microchip and registration in the electronic database of the competent ministry for every dog that enters a veterinary clinic	12 (85.71%)	
	Other (microchip, registration, blood tests etc., case assessment/proposal for euthanasia)	2 (14.29%)	
Information			
	From municipal employees	9 (64.28%)	
	From other (All of the above under the auspices of the Municipality)	3 (21.43%)	
	From Animal Welfare Organization	1 (7.14%)	
	From citizens	1 (7.14%)	
Return to their natural environment			
	Stay in a friendly environment	8 (57.14%)	
	Peripherals of the Municipality	2 (14.29%)	
	Other (if traceable)	3 (21.43%)	
	Shelter	1 (7.14%)	
Stay in a shelter			
	For a certain time and then euthanized	7 (50%)	
	Until its natural death	3 (21.43%)	
	Other (accommodation in a volunteer until adoption, stay in the shelter until adoption or repositioning where it does not pose a problem)	3 (21.43%)	
	Up to the age of <6 months	1 (7.14%)	

to dogs without microchips should be punished. In addition, experts agree to keep a stray dog in a friendly environment until its adoption (57.14%) rather than in a shelter (21.43%).

Finally, according to experts,most Municipalities do not meet the requirements for the establishment of shelters, and not have qualified staff and the necessary equipment for their operation. Most of the existing shelters operate without a license, while others are under-operated due to insufficient funding. However, the experts(50%) answered that stray dogs should stay in shelters for a certain time and then be euthanized (dog does not belong to endangered animals).

Third round

In the third round (17/9/2020, n=14) the experts answered an, open-ended questionnaire (six questions): 1) The problem with keywords, 2) Peculiarities in an management program, 3) The problems in an management program, 4) The expected benefits, 5) The risks of non-implementation management program and 6) Their proposals for better control of stray dogs, entitled: "Description of the problems of the stages of a stray dog management program by Local Authorities.The following Table 3 summarizes the results of the third round.

The experts, based on the results, reached high levels of agreement in their views on the problems that arise, since the answers were the same(not "responsible dog ownership", abandonment of pets, dogs are not neutered etc.).

However, there are peculiarities and problems in the implementation of programs, such as: a) lack of appropriate facilities, qualified staff and standard procedures, b) non-cooperation of all stakeholders, c) the geographical location (urban, rural) and low funding of the Municipalities, d) lack of knowledge of legislation and political will for solution and e) low interest in adopting stray dogs and banning euthanasia for a non-endangered animal.

Some of the expected benefits of these population management programs are mainly responsible dog ownership (reduction of dog abandonment), reducing their reproduction rate and their coexistence with humans.Experts also agree that stray dog management programs should be implemented even with imperfections (uncontrolled increase in stray dogs will lead citizens to use violence against them).

A program that:(a) focuses on "responsible dog ownership", b) requires the cooperation of all stakeholders, c) encourages the adoption of stray dogs, d) controls hunters and stockbreeders, e) secures Municipal funding and f) imposes the microchip on pet dogs, is a program that experts have concluded that has important implications for successfully controlling the stray dog population.

DISCUSSION

Experts reached significant levels of agreement, while a better consensus was achieved during face-to-face discussions at the end of each round.Their overall concerns reflected all aspects of stray dogs management, from the neutering of pets and stray dogs,the

Table 3. Results of the 3nd round Delphi method questionnaire

Problem with keywords	Peculiarities in the management programs	Problems in the management programs	Expected benefits	Proposals for better control of stray dogs
There is no «responsible dog ownership»	Lack of housing structures	Lack of qualified staff	Minimize reproduction	Educating citizens on «responsible dog ownership»
Abandonment of the dog	Low interest in adoption	Lack of standard procedures	Neutering of stray dogs	Standard procedures
Dog without microchip	Geographical location of Municipalities	Lack of appropriate facilities	Reduce the abandonment	Encourages citizens to adopt stray dogs
Dog is not neutered	Non- cooperation of all stakeholders	Lack of appropriate facilities	Smooth coexistence	Financing Municipalities
No implemented programs	Low funding ofMunicipalities	Lack of proper communication	Responsible dog ownership	Control hunters and breeders
Uncontrolled births	Prohibition of euthanasia	Unvaccinated strays		Cooperation of all stakeholders

adoptions of stray dogs,their collection,their veterinary control (public health, life-threatening diseases and citizens' insecurity),informing the responsible authorities,their return to their natural environment and finally, their stay in the shelters.

Completion of the questionnaires was anonymous and had the advantage that respondents were not influenced by the answers of others.However, at the end of each round there was a lively discussion where the individual ideas and perceptions of the experts could be analyzed, discussed and re-evaluated.In our study, we found that the discussion, in a structured way at the end of each round, allowed a better consensus to be achieved, based on the analyzes that emerged during the anonymous questionnaire process.

No other qualitative studies were found that have considered the welfare of stray dogs in Greece, therefore there are no other studies whose results could be directly compared to our prioritization.In this Delphi study, neutering of pets and stray dogs and adoption of stray dogs were found at the top of the list of experts.Issues such as the lack of a "responsible owner", the abandonment of pets without neutering as well as the non-cooperation of the stakeholders, were also addressed, as related to the overpopulation of stray dogs in Greece.

In our study, we asked experts to address with the welfare of stray dogs in Greece in the context of the management of these populations by the Local Authorities in determining the impact of their welfare. Although no specific definition of stray dog "welfare" was used to guide respondents, participants have been managing these populations for several years and may have used similar methods for stray dog welfare.

STRENGTHS AND WEAKNESSES

In this (online) study, opinions were gathered from a wide range of specialists (from different regions of Greece) on the welfare of stray dogs in Greece.The composition of the working group covers all stakeholders (based on relevant Greek legislation) in managing stray dog populations and their welfare (Zartha et al., 2019). Response rates of the experts for each round were 100%. Stakeholder representation in this Delphi process is disproportionate and may therefore reduce the generalization of results. However, participants had excellent knowledge of the subject, have been involved in the welfare of stray dogs for several years, the interactive discussion in each round was part of the process, while the data from the literature presented in the introduction, support the validity of the results.

CONCLUSIONS

According to experts, the abandonment of pets, the uncontrolled reproduction of stray dogs,the lack of qualified staff and appropriate facilities combined with the lack of standard procedures,the lack of knowledge of the legislation and the lack of political will to find a solution lead to the overpopulation of stray dogs in Greece.Neutering pets and stray dogs also helps to reduce their reproduction rate,while adopting stray dogs will contribute to their welfare and educating citizens as "responsible owners" will significantly reduce the abandonment of pets.It is necessary the cooperation of all stakeholders as well as the information of the Municipalities for the existence of stray dogs who should control and coordinate the collection of these dogs by experts (especially if preparations are used).

Veterinary control of stray dogs ensures public health and reduces citizens' sense of insecurity about the transmission of animal diseases while the return of dogs to their natural environment should be conditional.Finally, according to experts, keeping dogs in shelters (where they exist) does not reduce the problems that arise and since the dog is not an endangered animal, its (conditional) euthanasia should be allowed.

The impact and real consequences of these stray dog management programs will be determined in the future

CONFLICT OF INTEREST

The authors declare that the research was conducted without commercial or financial relationships that could be construed as a potential conflict of interest.

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