



RESEARCH ARTICLE

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CANINE AND FELINE DIMENSIONING FOR THE IMPLEMENTATION OF A POPULATION CONTROL PROGRAM IN THE CITY OF GUARAPUAVA, PARANÁ, BRAZIL

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ABSTRACT

The objective of this work was to measure the canine and feline population in the city of Guarapuava, Paraná, Brazil. In total, 695 interviews were carried out in residences distributed in the 20 neighborhoods of the municipality. The sample size was calculated considering the total number of residences, 44,497, with a 95% confidence interval and standard error of 20%. The dog: human ratio found in the municipality was 1:1.77. This number ranged from 1.06 to 2.92 among neighborhoods. The cat: human ratio was 1:5.98. Considering the current city population, the number of dogs is 102,544 and of cats is 30,351; being 24,098 dogs and 17,088 cats semi-domiciled. The dog estimation is above the one established by the WHO, which is from 1:7 to 1:10 (dog: human). It is necessary to implement public policies that enable the development of an efficient population control program for dogs and cats, such as shared responsibility through actions that involve the population, public agencies, companies, universities and NGOs, in addition to the introduction of responsible ownership education in schools and accountability of tutors.

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INTRODUCTION

It is estimated that there are more than 200 million dogs living in abandonment worldwide. In Brazil, according to the World Health Organization (WHO), there are about 20 million dogs and 10 million cats. A number that highlights the dimension of a global problem that deserves the immediate attention of veterinarians, government agencies and the entire population (Machado, 2017; CFMV, 2019). Most municipalities in the country face problems involving non-domiciled animals. Social characteristics, such as low level of education and sanitation, associated with the lack of sanitary awareness from the population and the neglect of the public authorities, originate a large number of non-domiciled dogs, which live freely on the streets (Garcia et al., 1996), resulting in a public health problem in most urban centers.

Wandering animals, with or without guardians, can cause traffic accidents, attacks on human beings, transmission of diseases, environmental contamination, among others (Vieira et al., 2009). An effective population control, according to WHO (2005), must simultaneously use restriction to the freedom of movement, habitat control and reproduction control. The restriction of freedom occurs through responsible custody, and can be attempted through socio-educational measures. Habitat control can be done through community education to reduce the litter accumulation on the streets, in order to avoid the free supply of food to dogs and cats. Reproduction control is provided through animal sterilization and / or dog confinement campaigns. However, before any action is taken, it is essential to know the size of the canine and feline population, to obtain greater effectiveness in planning and evaluating the results, aiming at preserving the health of men and animals (Alves et al., 2005). Therefore, the objective

of this work was to measure the canine and feline population of the city of Guarapuava/PR, Brazil, in order to plan more effective actions to keep control of these populations.

MATERIALS AND METHODS

This work was approved by the Research Ethics Committee, COMEP / UNICENTRO, under number 3,231,809 of 03/29/2019.

Study characterization and location: The study, classified as prospective and observational as a sample survey, was carried out from March to September 2019, in the municipality of Guarapuava (25°33'38.8"S, 51°21'50.7"W), south-central region of the State of Paraná (PR), Brazil. Its territorial area is 3,168.087 km² with 167,328 inhabitants, distributed in an urban area (20 neighborhoods), rural area and four districts. A large part of the municipality's inhabitants, approximately 152,993 (91.44%) live in urban areas, and 14,335 (8.56%) in rural areas (IBGE, 2010).

Sample size: In Guarapuava/PR, the total number of residences according to IBGE/2018 estimation was 44,497. A 50% prevalence, 95% confidence interval, 5% confidence limit and delineation effect (deff) 1.5 were considered, resulting in 572 residences to be visited. To this number, 20% were added, considering the standard error, totaling 690 residences. The data were calculated using the OpenEpi[®] program.

Sample distribution: The heterogeneity of space occupation was considered in the sample composition. The municipality of Guarapuava has 193 census sectors. The sectors vary from 5 to 397 households, totaling 44,497 residences. For better distribution, using the Excel tool and IBGE data and basing it on the number of households, addresses were randomly selected within each census sector.

Guarapuava), masters students of the Veterinary Sciences Graduate Program at UNICENTRO, the veterinarian of the Municipal Kennel of Guarapuava and health agents of the municipality, who received an instruction on the procedures to be followed for conducting the interviews and completing the questionnaires. When arriving at the selected place, if there were no houses on the street, a parallel street was chosen. And if there were no residents in the selected house, the same was replaced by the next house on the right. Prior to the interview, the free and informed consent form (FICF) was read and explained, which was signed by the interviewee. Only people over 18 years old were able to participate in the survey.

RESULTS

In total, 695 interviews were carried out in residences distributed in the 20 neighborhoods of the municipality of Guarapuava/PR, as shown in Figure 1. The questionnaires addressed socioeconomic and environmental issues, in addition to questions related to animals, dogs and cats. In 87% of the residences visited, dogs and/or cats were present. Among the people interviewed who did not own animals, 15% stated that they had a dog at some point in their lives, and 40% never had a cat. The main purpose of animals is companionship, being the most common answer in both dog tutors, 69.4%, and cat tutors, 73.8%. It was found that the majority (36.4%) of the dog guardians and (32.8%) of the cat guardians received the animals as presents; and 31.2% of dogs and 26.6% of cats were adopted. Only 18.5% of dog guardians and 1.7% of cat guardians claim to have purchased the animals. Regarding the dimensioning of dogs and cats in Guarapuava/PR, Table 1 shows the human: dog and human: cat ratios. The human: dog ratio for the municipality is 1.77, in other words, there are 1.77 people for each dog in the city. This number ranged from 1.06 to 2.92, among neighborhoods. On the other hand, the human:cat ratio is 5.98, varying from



Figure 1. Distribution of the points visited during the research carried out to measure the canine and feline population in the various neighborhoods of the city of Guarapuava, Paraná, Brazil

Preparation and application of questionnaires: The questionnaire used in the interviews was adapted from a similar estimation carried out in São José dos Pinhais, PR, Brazil by Catapan *et al.* (2015 a). Sixteen questions were elaborated about dogs and cats in stray and guard situations and the interviewee's perception on the subject. The application was carried out by the students of the Veterinary Medicine course at Mid-West State University (UNICENTRO,

2.25 to 18.66 in the neighborhoods visited. There are significantly more dogs than cats per person in the municipality. Taking into account the IBGE estimate for the Guarapuava population in 2019, which was approximately 181,504 people, the municipality would have a population of 102,544 dogs and 30,351 cats. In the opinion of the interviewees, the best way to control stray animals would be

Table 1. Population dimensioning of dogs and cats by neighborhood, number of residences visited and people living in them, number of animals and proportion (human:dog/cat) in Guarapuava, Paraná, Brazil in 2019

Neighborhood	Number of residences	Number of people	Number of dogs	Number of cats	Human:dog ratio	Human:cat ratio
Imóvel Morro Alto	14	56	21	3	2.66	18.7
Morro Alto	41	143	74	15	1.93	9.53
Santana	48	159	108	33	1.47	4.81
Bonsucesso	38	120	41	14	2.92	8.57
Conradinho	35	117	56	23	2.08	5.08
Industrial	60	231	131	53	1.76	4.35
Primavera	28	100	49	8	2.04	12.5
Alto Cascavel	21	73	42	6	1.73	12.2
Jardim das Américas	22	83	39	13	2.12	6.38
Vila Bela	56	212	118	25	1.79	8.48
Vila Carli	47	176	79	17	2.22	10.4
Boqueirão	93	230	202	56	1.13	4.10
Santa Cruz	39	120	57	19	2.10	6.31
Trianon	20	63	36	28	1.75	2.25
Alto da XV	14	44	23	9	1.91	4.88
Batel	19	56	29	16	1.93	3.50
Cascavel	15	52	29	4	1.79	13.0
Downtown	19	59	33	8	1.78	7.37
Bairro dos Estados	18	53	50	19	1.06	2.79
Total	695	2308	1304	386	1.77	5.98

by castration carried out by the city hall (27.1%) followed by the rescue of animals by the dog kennel (19.1%). Castration still reaches very low numbers in the animal population of Guarapuava, being only 15.95% among dogs and 27.46% among cats, and when asked if they would like to castrate their animals, 52.3% of respondents answered that they did not.

Considering the total number of dogs, the relative semi-domiciles population in the municipality of Guarapuava is approximately 24,098 animals. When asked about the presence of wandering animals in the neighborhood, 83.5% said they observed more than 5 dogs, 13.2% less than 5 dogs and 3.3% said they also observed cats. Regarding the origin of the stray animals, 35.1% of the interviewees said that the animals that are on the streets have an owner, but wander freely; 30.4% think that dogs are abandoned by people from the own municipality; 18.2% say they are from abandoned litters on the street; 12.4% would be from people who moved and left the animals; and 3.7% from people who live in the nearby municipalities that come to Guarapuava and abandon the animals.

DISCUSSION

The large number of residences that have pets is explained by the relationship of animals with man since prehistory, when animals were used as a way to protect the territory in which man lived (Giumelli and Santos, 2016). According to IBGE (2013) in Brazil there are 52 million dogs and 22 million cats, and Paraná is the state that has the most number of dogs at home, in other words, 61% of the households have dogs, in line with the data found in this work. Catapan *et al.* (2015b) also reported a more expressive number of people who own a dog (50%) in relation to those who own cats (7%), evidencing that there is a preference for dogs. Pets are of great importance due to the benefits that their interaction with humans can bring (Oliveira-Neto *et al.*, 2018). According to data from IBGE (2017), in Brazil the number of animals that live with families exceeds the number of children up to the age of twelve. In a study carried out in São Paulo, São Paulo, Brazil, it was also found that having animals for companionship prevails as the main objective of owning (81.5%) compared to having animals for guarding (11.8%) (Canatto *et al.*, 2012). With the growing number of campaigns, mainly on social networks, carried out

by NGOs and groups of animal protectors, encouraging adoption instead of purchase, it is clear that there is a change in people's behavior in relation to the way they acquire their animals. The human:dog and human:cat ratios found are extremely high, and this is probably due to inconsistent or very recent public policies to control the population of dogs and cats carried out in the municipality of Guarapuava. In São Paulo, for example, where actions have been carried out for a long time, a study of the demographic characterization of the dogs and cats population in the municipality, performed between 2006 and 2009 by Canatto *et al.* (2012), found the humans: dog ratio in 4.34 and humans:cat in 19.33. The number of animals served has a great impact on the success or failure of programs to control the population. If the number is too low, it will not significantly reduce the number of animals. An assertive option would be to establish public-private partnerships with universities, companies and NGOs in order to increase the number of services and consequently increase the effectiveness and results of the programs. The implantation of castration programs as the only alternative to control the animal population, without association with other methods such as education and responsible ownership, identification of animals and guardians, responsibility of guardians for abandoned animals and adoption campaigns, may not be very efficient, because the castration rates of the population would have to be very high as shown in a study carried out in the municipality of São Paulo, São Paulo, Brazil, on the impact of surgical sterilization on canine population control.

In this study, sterilization rates of 10, 20, 30, 40, 50 and 60% were evaluated per year for 5, 10, 15 and 20 years using a mathematical model of population dynamics for two sexes, without age differentiation. It has been shown that at a rate of 60% per year, there is a 56.05% decrease in the canine population after 20 years of a permanent sterilization program. To obtain a 20% reduction in the population, after 10 years, the need to use a minimum sterilization rate of 5% per year was evaluated (Gutjahr, 2013). Considering the total animal population of Guarapuava, a monthly spaying of 420 dogs and 125 cats would have to be performed, in a permanent spaying program, so that the results of the population control programs were better. Despite widespread disclosure about the benefits of animal castration, there is still a concern among the population regarding this practice. The same was found in a

similar survey conducted online by Catapan *et al.* (2015b), where the majority, 53.68%, would not perform sterilization on their dogs, however 98% of respondents in this same survey were in favor of sterilization in stray dogs. While for cats, the result was different, as 76.92% said they had performed sterilization on cats. In Guarapuava, it is also possible to associate the large number of people who would not like to castrate their animals to the low purchasing power of the population associated with the educational issue. For this reason, it is important to develop efficient public policies, developing animal castration programs for low-income populations, allied to information and clarification for some myths regarding this method of population control. Animals called semi-domiciled are the main problem for controlling the population of stray animals, as they have shelter, water and food, going out on the street just to do their needs and mate.

As a result, they generate a large number of puppies, which are often abandoned. Therefore, the most efficient solution would be the education of the population for responsible ownership. There must be awareness of animal tutors so that they do not go out on the street, because, in addition to the reproduction problem, they can cause accidents or bites, they can be run over, and eventually get lost and do not return to their homes. If there were the identification of animals and the responsibility of guardians who released their animals, with fines, perhaps this habit would be extinguished. The amount collected from these fines could help maintain castration programs, for example. The fact of observing animals wandering on the streets can also be explained by the support capacity of the system (environment), which consists of the maximum number of individuals of a species that the habitat is capable of supporting, in other words, the population level at which birth and death rates are precisely equivalent, resulting in a stable population over time. It takes into account the availability of resources for the maintenance of animals, such as water, food, shelter, access to public roads and mating (Biondo and Morikawa, 2014).

This shows that responsible ownership is one of the main pillars for the solution or reduction of this great problem caused by the animals on the streets. Unfortunately, society does not assume its share of responsibility, which is perhaps the most important. For that reason, the animals released on the streets issue is unlikely to have an effective and permanent solution, because, as seen, this is a complex problem and depends on several factors. Vieira (2008) reports that an efficient population control of animals should be based on five pillars: education in responsible ownership, mass sterilization of dogs and cats, registration of animals, responsible adoption and incentive to the creation of laws that support these actions. It is possible to conclude that the shared responsibility between society, universities and public authorities can be the key to solving this problem, which are animals that are released and abandoned on the streets.

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