Animal welfare assessment in nine dog shelters of southern Brazil
Avaliação de bem-estar animal em nove abrigos de cães do Sul do Brasil

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ABSTRACT

The present study has tested the Shelter-Quality Protocol (SQ) and its applicability in nine long-term dog shelters in the Curitiba metropolitan area, State of Paraná, southern Brazil. Welfare indicators were scored on three different levels including shelter, pen and dogs. Data were qualitatively analyzed, presenting an average of 66.67 (±27.63) allocated dogs per shelter, receiving only dry food, with meal frequencies varying from once (44.4%), twice a day (33.3%), and *ad libitum* (22.2%). Water was available *ad libitum* in 98.5% of pens and was clean in (89.5%) of shelters. Most of the shelters grouped the dogs by size. Animals were kept indoors (41.0%) or entirely outdoors with only close movable shelters (41.3%), from which 78.5% had materials that could hurt the animals. None of the dogs were panting, crowding, or had any stereotypy behavior. No cough, swelling, and ectoparasites were observed. Animals were in satisfactory body-score condition and clean; no lameness was observed. In the human-animal relationship test, 15.3% of animals showed fearful and aggressive reactions. Hence, the level of shelter-quality was feasible and provided relevant information about the Brazilian dog shelter welfare. However, it is important in future studies to include and adopt additional indicators to gather other relevant aspects of dogs' welfare, such as health management, environmental enrichment, dogs' socialization, people involved in the chain, rate of adoption, and turnover of dogs.

Keywords: shelter medicine; population control; ethology; abandonment; relinquishment.

RESUMO

O presente estudo testou o Protocolo Shelter-Quality (SQ) e sua aplicabilidade em nove abrigos de cães de longa permanência na região metropolitana de Curitiba, estado do Paraná, Sul do Brasil. Os indicadores de bem-estar foram pontuados em três níveis diferentes, incluindo abrigo, recinto e cães. Os dados foram analisados qualitativamente, apresentando média de 66,67 (±27,63) cães alocados por abrigo, que recebem apenas ração seca, com frequência de alimentação variando entre uma (44,4%), duas vezes ao dia (33,3%) e *ad libitum* (22,2%). A água estava disponível *ad libitum* em 98,5% dos currais e era limpa em 89,5% dos abrigos. A maioria destes agrupou os cães por tamanho. Os animais eram mantidos em ambientes fechados (41,0%) ou inteiramente ao ar livre, apenas com abrigos móveis próximos (41,3%), dos quais 78,5% possuíam materiais que pudessem machucar os animais. Nenhum dos cães estava ofegante, aglomerado ou com comportamento estereotipado. Não foram observados tosse, inchaço e ectoparasitas. Os animais estavam em condição corporal satisfatória e limpos; nenhuma claudicação foi observada. No teste de relação humano-animal, 15,3% dos animais apresentaram reações de medo e agressão. Assim, o nível de qualidade do abrigo foi viável e forneceu informações relevantes sobre o bem-estar do abrigo de cães brasileiros. No entanto, é importante em estudos futuros incluir e adotar indicadores adicionais para reunir outros aspectos relevantes do bem-estar dos cães, como gestão da saúde, enriquecimento ambiental, socialização dos animais, pessoas envolvidas na cadeia, taxa de adoção e rotatividade de cães.

Palavras-chave: medicina veterinária do coletivo; controle populacional; etologia; abandono; desistência.

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Introduction

The worldwide population of domestic dogs has been estimated at around 700 million, with around 75% identified as "free-roaming" (Smith et al., 2019). Out of this total, an estimated 52.2 million dogs (7,5%) live in Brazil, representing 1.8 dogs per household. In the southern region of Brazil, 58.6% of households have at least one dog, the highest proportion in Brazil (Arruda et al., 2020).

Thus, the "unowned" or stray dog population's growth is a significant problem in urban centers, especially in developing countries (Smith et al., 2019). The World Organization for Animal Health (OIE, 2018) estimates that there are approximately 200 million stray dogs globally and 30 million only in Brazil. As a result of systematic and multi-causal abandonment, stray dogs present a social and economic problem related to the costs of population control strategies and zoonotic risks, especially in Latin America (Mota-Rojas et al., 2021).

Stray dog reallocation to shelters has been a Brazilian governmental strategy for free-roaming dog populations, besides responsible guard education, castration, and community dog programs (Kwok et al., 2016; Mota-Rojas et al., 2021). Within this context, dog shelters are getting increasingly overpopulated, which can directly compromise animal welfare, particularly in long-term shelters where dogs present lower adoption rates (Raudies et al., 2021).

A dog shelter is a place that receives and takes care of a considerable number of these animals, most of which were collected from the streets. Its main activities are being a safe haven for animals, acting as a place of passage, seeking permanent homes, and being a reference center in terms of animal care, control, and welfare programs, facilitating the safe release back into society. Meeting the needs of animals in the shelter environment is not an easy task and requires a lot of planning and commitment, including physical and behavioral assessments (Clay et al., 2020).

Building and maintaining a shelter requires many other considerations, such as obtaining a license, meeting regulatory requirements, planning activities, and staff training. The shelter is not always the best strategy to solve animal welfare problems. These places do little to solve the problem of stray animals, and provide no solution to animals on the street. Inadequate planning, lack of experience, and insufficient resources can seriously compromise the welfare of shelter animals, and, if the dog stays too long, adoption becomes more difficult due to social isolation, one of the major stressors for dogs living in animal shelters (Gunter et al., 2019).

Shelters should be one of the strategies that make up a humane management program, which aims to collect, rehabilitate, and reintroduce animals into society through adoptions (Arruda et al., 2019; Arruda et al., 2020). In addition, shelters can be governmental, private, non-governmental organizations, or government-controlled private entities. In Paraná, in southern Brazil, government-run shelters include Municipal Kennels, Zoonosis Control Centers, Zoonosis Surveillance Units (Brasil, 2016), Animal Screening Centers and Reference Centers for Animals at Risk (Prefeitura de Curitiba, 2016). In Paraná, all municipal shelters work as animal adoption sites (Arruda et al., 2020).

Regardless of the shelter type, size, or ownership, dogs are often subjected to specific stressors just by being in a shelter environment (Arruda et al., 2019), and unfortunately they might spend a long period of their life without any important behavior stimuli (Gunter et al., 2019). This proliferation of long-term dog sheltering, combined with low adoption rates and absence of facilities or basic management standards, has become a vital concern for kenneled dogs and their welfare assessment (Miller and Zawistowski, 2014; Polgár et al., 2019). Furthermore, although there is a growing interest in improving dog welfare in Brazilian shelters, acceptable management practices are often limited due to staffing, time, and budgetary constraints (Mota-Rojas et al., 2021).

So far, there have been no studies that assess shelter dogs' welfare at housing and animal level in Brazil, even though it is a well-known problem. Measuring dog welfare in shelters is not an easy task because many indicators must be applied involving shelter management, housing, environmental conditions, dog health, sociability status, food quality restriction, lack of veterinary care, and even genetic changes (Clay et al., 2020; Raudies et al., 2021). Therefore, it is essential to have a tool that directly evaluates the real welfare state of dogs housed in shelters by simultaneously observing all these indicators.

The Shelter Quality protocol was developed to provide a valid, reliable, and practical tool for assessing shelter dog welfare (Berteselli et al., 2019). This protocol was built and based on Welfare Quality® protocols for livestock (Welfare Quality, 2009), and respected the four welfare principles — good feeding, adequate housing, good health, appropriate behavior, having the twelve specific shelter dog outcome criteria.

There is a historic scientific recognition about animal captivity (Cambridge Declaration, 2012). Consequently, its degree of well-being is defined as the mental and physical state of the animal based on its attempts to adapt to its environment. Therefore, knowing the holding environment of shelter animals and their management is critical for diagnosing and implementing improvements (Berteselli et al., 2019).

Accordingly, to estimate the actual welfare state of the Brazilian dog shelters, this protocol was applied, and further indicators were proposed to bring the protocol closer to the Brazilian reality.

Materials and Methods

This study was approved by Pontifícia Universidade Católica do Paraná (PUCPR), by the Animal Research Ethics Committee (CEUA), under protocol number 01129, and by the Ethics Committee for Research on Human Beings (CEP), under number 2.401.931.

Nine dog shelters were visited in Curitiba's metropolitan region (Figure 1). Only those shelters that voluntarily accepted to participate in the study were considered. The Shelter Quality (SQ) protocol was applied to assess the dogs' welfare using well-defined parameters, divided into four principles and twelve evaluation criteria (Table 1).
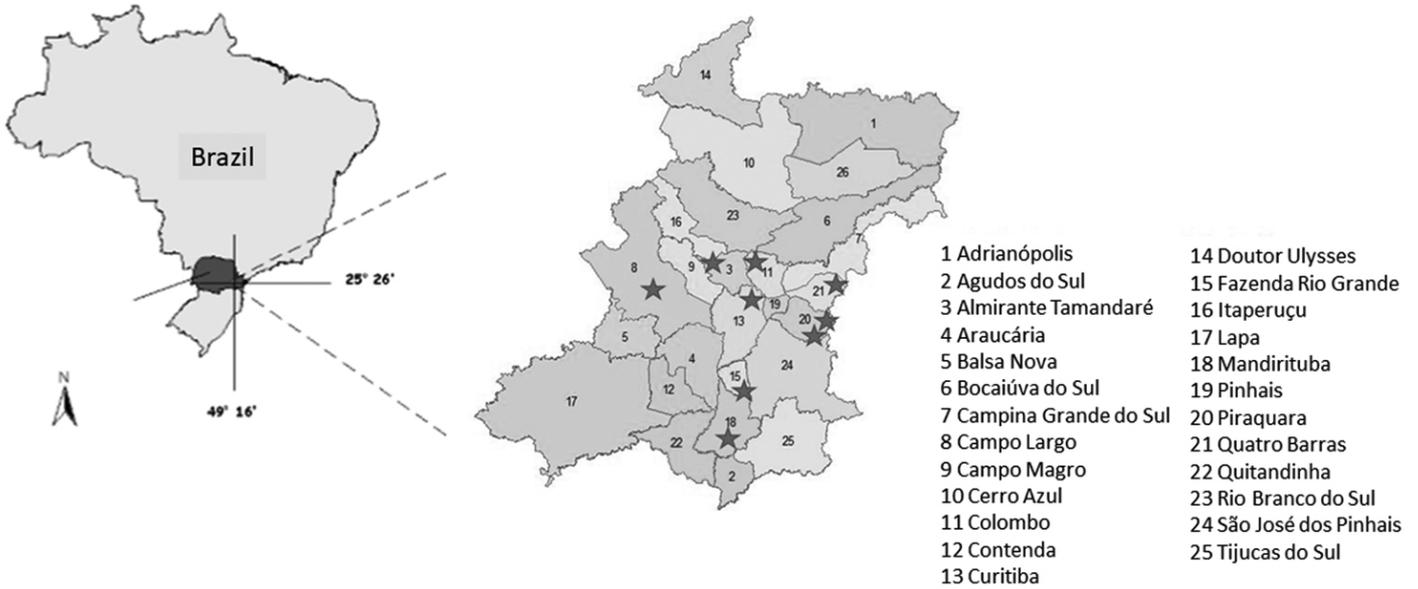
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Figure 1 – Nine shelter locations evaluated in Curitiba-PR in the metropolitan areas, Brazil.

1 Adrianópolis
2 Agudos do Sul
3 Almirante Tamandaré
4 Araucária
5 Balsa Nova
6 Bocaiúva do Sul
7 Campina Grande do Sul
8 Campo Largo
9 Campo Magro
10 Cerro Azul
11 Colombo
12 Contenda
13 Curitiba
14 Doutor Ulysses
15 Fazenda Rio Grande
16 Itaperuçu
17 Lapa
18 Mandirituba
19 Pinhais
20 Piraquara
21 Quatro Barras
22 Quitandinha
23 Rio Branco do Sul
24 São José dos Pinhais
25 Tijucas do Sul

Table 1 – Animal welfare indicators based on Shelter Quality® protocol.

Principles	Criteria	Measures
Good feeding	Absence of prolonged hunger	- Body condition - Feeding
	Absence of prolonged thirst	- Water supply
Good housing	Comfort regarding resting	- Bedding - Sharp edges - Cleanliness
	Thermal comfort	- Shivering - Huddling - Panting
	Ease of movement	- Space allowance
Good health	Absence of injuries	- Skin condition - Limping
	Absence of disease	- Evidence of pain - Diarrhea - Coughing - Mortality - Morbidity
	Absence of pain induced by management procedures	- Surgeries - Pain relief
Appropriate behavior	Expression of social behaviors	- Social housing
	Expression of other behaviors	- Abnormal behavior barking - Stereotypy - Exercise
	Good human-animal relationship	- Reaction to humans
	Positive emotional state	- Emotional state – QBA

For each criterion, there were specific indicators based on the shelter's records (management data), based on environmental resources (facilities), and the animals (behavior and health). The protocol was applied by a single evaluator who was trained by one of the SQ authors.

The study was divided into two steps: the first one was the Shelter dog welfare evaluation by SQ protocol, and, finally, the adaptation of the protocol indicators and suggestion of new measurements based on the Brazilian reality.

Management-based indicators involved a questionnaire that was answered by the shelter manager or another competent person, and referred to the total shelter dog population and its condition on the day of the visit, including the following variables:

- number of dogs in the shelter;
- number of hospitalized dogs;
- operating procedures for post-surgical monitoring;
- analgesia protocol;
- whether dogs were walked on leash by shelter personnel or by volunteers;
- number of hospital pens;
- number of single pens (pens containing only one isolated animal), pens in pairs, pens in groups of less than 5 dogs, and pens with more than 5 dogs;
- total number of shelter pens;
- outdoor area and size;
- number of euthanized animal for health and behavioral reasons;
- number of deaths other than euthanasia;
- animal behavioral assessment by a visual analog scale, called QBA (Qualitative Behavior Assessment);
- the type of diet (dry pellet, cooked, wet/canned);
- whether there was any specific diet for puppies, geriatrics or hospitalized animals;
- feeding regime (once a day, twice a day, or *ad libitum*);
- annual shelter clinical treatment expenses.

Resource-based indicators assessed animal pens, their living environment, and all animals confined to them (regardless of the number of dogs), thus, assessing:

- the number of animals over and under 20 kg;
- pen area dimensions;
- whether there was any indoor space (for sun protection) and outside area;
- beds and their type;
- sharp edges in the animals' living environment;
- type and function of water supply;
- water cleanness;
- the number of animals panting, shivering, huddling;
- the number of animals barking insistently in the evaluator's presence;
- the number of stereotyped animals (active repetitive/other compulsive behavior);

- the number of animals in pain;
- diarrhea on the pen floor.

Animal-based indicators included:

- animal age class;
- body condition;
- animal cleanness;
- number of animals hurt;
- hair loss;
- swelling;
- ectoparasites;
- limping;
- cough;
- human-animal relationship tests.

For these evaluations, a dog subsample was individually evaluated according to the sample proposed by the protocol (Table 2), using the minimum sample required for reliable data.

Since it is a descriptive study with a methodological approach, all welfare indicators of the nine evaluated shelters were compiled into a database and were synthesized, analyzed, and presented in a predominantly qualitative manner to summarize and describe the most important aspects of the Brazilian shelter dog welfare.

Results

Indicators based on shelter management

On average, the shelters housed 66.67 (±27.63) dogs, ranging from 112 to 21, according to the largest and smallest shelters assessed. Dogs were mostly housed in pens with less than 5 animals, representing 32.30% (n=42), formed by groups of mainly four dogs. However, a high rate of single housing was also observed in 26.15% (n=34), excluding 9% (n=11) of dogs that were in isolation for health reasons. Most of the animals (91%, n=23) were isolated due to behavioral problems, with aggressiveness being the main cause.

Five (55.5%) out of nine shelters visited left the dogs in an outdoor fenced area every day, while three (33.3 %) had no outdoor access. Just in one shelter (11.1%) dogs were walked on a leash by volunteers once a week. All shelters provided dry pellets to the ani-

Table 2 – Sample suggested by the *Shelter Quality*® protocol for individual assessment based on shelter population size.

Total number of dogs in the shelter	Total number of dogs to be evaluated
Up to 59	30
60-89	40
90-139	50
More than 140	60

mals with a noncooked or wet/canned diet. Furthermore, all shelter managers continuously offer a mix of dry pellet ingredients and raw materials based on donation availability. However, most of the shelters (n=9) had a standard procedure to provide a special diet for puppies (88.8%, n=8), as well as mature (77.7%, n=7), and hospitalized (88.8%, n=8) animals. Meals varied in shelters, where 44.4% (n=4) provided animals with food once a day, 33.3% (n=3) twice and 22.2% (n=2) *ad libitum*.

Regarding surgical procedures, 77.7% (n=7) of the managers said that the shelters had postoperative monitoring, and 66.6% (n=6) affirmed to have some analgesia protocol, especially for castration surgeries. Nevertheless, just a few shelters had specific pens for keeping the hospitalized animals; on the day of the visit, only one shelter (11.1%) demonstrated this resource. Shelters recorded 4.5% (n=27) of natural deaths without human intervention, adding to the rate of 2.5% (n=15) of dogs euthanized for health reasons, and 0.16% (n=1) euthanized for behavioral problems.

Pen evaluation

In total, 130 pens were evaluated; 37 % (n=48) of them housed animals weighing more than 20 kg (large dogs), 42% (n=55) housed animals weighing less than 20 kg (medium dogs), and 16 % (n=21) had mixed large and medium-sized animals in the same pen. Exclusive small dog (less than 10 kg) pens were also present in Brazilian shelters with a 5% (n=6) prevalence.

The pens with only an indoor area and no outdoor access represented 41% (n=53) of the cases; in contrast, 41% (n=53) of the shelters only had an outdoor area with a small, roofed area within a movable shelter made of plastic or wood material, which allows the animal to hide from mild adverse weather conditions. Finally, 18% (n=24) of the pens had both indoor and outdoor areas. The pens had on average 65.65 m² (±10.12), ranging from 100 m² for the largest one, and 4 m² for the smallest.

Regarding bedding (considered by the protocol as any structure that allows dogs not to have direct contact with the floor, that is easy to clean and disinfect, and made of good material, ensuring the safety of the dog — i.e., without harmful edges or ingestible parts) 78% (n=101) of the pens had appropriate bedding requirements. However, 9% (n=12) of the pens had less than one bed per dog, dangerous conditions (9%, n=12), or the material provided was wet or with feces (4%, n=5).

The most common type of bed found was the movable shelter (79%, n=102), followed by the basket bed (11%, n=14), and a bed with a pallet material (6%, n=8). Most of the pens (79%, n=103) had visible edges in the environment that could hurt the animals, the most common being wires and wood pieces.

Drinking water was supplied in bowls or buckets, which were manually filled by shelter staff in 99% (n=128) of the pens, and the remainder pens (1%, n=2) provided water in cement troughs. No automatic drinker was found in any shelter. Of all pens evaluated, 9% (n=12) of them had little or no water available for the dogs. Regarding drinker safety, only 4% (n=5) were not considered safe because they contained sharp edges or rust. The water was clean in 90% (n=117) of the evaluated pens, with the other 10% (n=13) with feces and sludge inside.

During the behavioral evaluation at the visit, no animals were found under thermal stress conditions since no animal was shivering or panting. In the behavioral assessment, it was observed that 28% (n=37) of the pens had insistently barking dogs (defined by the protocol as a short and repetitive continued vocalization), 0.18% (n=2) had animals with behavioral characteristics of pain, and 0.56% (n=7) with diarrhea on the ground. No dogs were observed performing stereotyped movements or any other compulsion.

Individual animal evaluations

A total of 131 dogs were evaluated individually, 97% (n=127) of them were adults (between 1 and 6 years old) and 3% (n=4) were elderly (over 6 years). Young animals (under one year old) are not evaluated by the protocol. Thus, most of the dogs (99.3%, n=130) had an adequate body score condition, and only one animal (0.7%) had an overweight score (obese). All animals were clean, no coughing, no big injuries, and no ectoparasites. There were a few skin wounds (6.16%, n=8) and alopecia conditions (9.24%, n=12) in the animals. However, it is noteworthy that, only in one shelter, out of the 19 dogs evaluated, 7 had hair loss (representing 36.8% of the total for this shelter). It can be inferred that such alopecia is associated when the type of material used to cover the ground around the animal pen is wood straw, which, when in constant contact with the animals' coats, may cause irritation and extensive hair loss at this specific shelter.

Regarding limping, only 2 dogs from different shelters presented moderate limping score (1.5%). During the fear test, 84.6% (n=110) of the animals showed no signs of fear or aggressiveness in the presence of the evaluator. However, in two shelters (22.2%), out of 39 animals evaluated, 19 showed signs of fear, dodging, or hiding in human presence (48.7%).

Welfare indicators added in SQ protocol

Shelter management

The protocol adaptation consisted of identifying, during SQ application, critical points of Brazilian shelter dog welfare that were not included in the protocol or did not have any indicator to assess. During the management questionnaire, eight questions were added to better characterize the shelters:
- vaccination protocols, endo and ectoparasites control;
- environmental enrichment;
- dog socialization program;
- castration program;
- shelter adoption rate and turnover dog rate;

- the number of stakeholders involved in shelter activities;
- main shelter income;
- detailed veterinarian care.

It was found that all the shelters had a vaccination protocol with an annual calendar, including multipurpose and rabies vaccines. However, deworming was received twice a year just in one shelter (11.1%), and that was because of pharmaceutical donations. For ectoparasite control, two shelters (22.2%) said they performed environmental control, and no shelters administered animal drugs for this purpose.

Environment enrichment was present in just one shelter (11.1%) in a single dog's pen, consisting of a raw bone functioning as a portion of food and bite item. Two shelters (22.2%) affirmed to have a dog socialization program. In one of them, the socialization was developed by a veterinary student group (n=8) consisting of a one-hour session, three times a week, as part of a Vet course subject. The students performed basic dog training and inter and intraspecies socialization techniques. The other shelter had volunteers during the weekends who interacted with the dogs in 30-min sessions in each shelter pen, one person at a time.

All the shelters evaluated were registered in the Brazilian government castration program, performing an average of 6.2 (±2.0) castrations per month. In general, the adoption rate in Brazilian shelters is low, with an average of four animals being adopted in each marketplace (usually four per month), aside puppies, whose adoption is higher. In all the shelters, the dog turnover had dog behavior as the main problem, non-adaptation to the environment, increasing destructive and aggressive behavior.

Few people were involved in daily shelter activities. It was more common to find just three (66.6%) or four (33.3%) fixed workers for each shelter. All the shelter costs (food supply, cleaning and maintenance, medical care, employees salary, water, and energy were mainly paid by donations raised through shelter campaigns (88.9%, n=8), with a few having some governmental supply (11.1%, n=1).

All shelters except one (which represented 11.1%) did not have their own veterinarian, and different professionals attended dogs at private clinics or veterinary hospitals (88.9%, n=8).

Pen evaluation

Hygiene assessment was included in the Brazilian protocol, once 88.8% (n=8) of the shelters had the floor clean (scored 0), without urine and feces accumulation during the visit. However, 22.2% (n=2) of the shelters scored 1 — with the floor dirty and wet.

We also added a new pen classification according to dogs' size and weight, once an exclusive pen for small-sized dogs (less than 10 kg) appeared in 5% (n=6) of Brazilian shelters. It was also necessary to include another type of bed (despite those required by the original protocol) with pallet material. This characteristic bed was present in 6% (n=8) of the evaluated shelters.

The positive emotional state (QBA assessment) was not applied in this study since the evaluator did not feel confident in applying the methodology, nor performing the measurements. For individual animal evaluations, no other parameters were added.

Discussion

The uncontrolled stray dog population on the streets is perceived by society as a problem, both because of the zoonoses risk and, more recently, the recognition of animal suffering (Arruda et al., 2020).

The Federal Constitution of 1988, in its Art. 225, was the first in the world to consider cruelty to animals. There is also the Environmental Crimes Law 9.605/98, Art. 32 (Brasil, 1998), which provides that mistreatment of animals is a crime. This law has been recently amended by Law 14,064, of September 29, 2020, which increased to 5 years the penalties provided for the crime of mistreatment of animals when it comes to dogs or cats. Furthermore, in Paraná, State Law 14,037/2003 establishes protective measures for animals, while State Law 17,422/12 prohibits the extermination of dogs and cats for population control purposes.

Public shelters in Paraná have a proposal to care for the animals at risk, through Ordinance No. 1138/2014. The Ministry of Health establishes that the Zoonosis Surveillance Units (ZSU) perform public health services focused on the surveillance, prevention, and control of zoonoses (Brasil, 2014). Thus, ZSUs can house street animals suspected of zoonotic diseases, aggressive dogs, and cats with a history of biting people, and victims of mistreatment or abandonment on public areas. Thus, regardless of their mission, all these establishments must follow the precepts of shelter medicine (Arruda et al., 2019).

Shelters are facilities that keep a considerable number of animals, usually coming from situations of risk or abandonment. These facilities should rehabilitate, re-socialize, and reintroduce the animals into society through adoption, that is, they are places of passage; they should be a reference in veterinary care, animal welfare, and educational programs on responsible ownership and for preventing abandonment (Mota-Rojas et al., 2021).

The SQ protocol was widely applicable to Brazilian shelters with the inclusion of some additional indicators that complete the welfare diagnosis. So far, no study has been published involving a complete animal welfare assessment in Brazilian shelters.

Barnard et al. (2016), using the same protocol tool, evaluated 29 shelters in different countries — Italy (11), Spain (10), Croatia (3), Romania (3), Serbia (1) and Montenegro (1) —, concluding that systematic data collection across different countries provides relevant information that could be included in policy-making processes, or integrated in international organization recommendations as the World Organization for Animal Health (OIE) code. The authors also highlight that those refined measures could also provide important research advance.

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Brazilian shelters had the characteristic of being mainly maintained by donators, with a few government suppliers (Catapan et al., 2015). This particularity often risks dog welfare due to the constant absence of basic resources. However, no animal welfare diagnosis has been used to point out the Brazilian challenges and qualities. Thus, the present study brings an overview of shelter dog welfare and places Brazil in the welfare framework and their world ranking.

After the nine-shelter assessment, the mainly Brazilian management welfare problems are: low rate of single dog housing; a percentage of indoor facilities lacking outdoor access for dogs; varying diet because of mixing different ingredients based on type of food donated; few shelters with specific pens for hospitalized animals; percentage of natural deaths; deworming and ectoparasite control failure; lack of environment enrichment; low adoption rate and few shelter employees.

It is common knowledge that providing dogs with social contact moderates their temperament over time, making it more attractive for adoption and probably increasing their welfare (Arruda et al., 2020). Isolating an animal causes intense frustration since the dog, an intrinsically social animal, is unable to make physical contact, compromising animal welfare particularly in long-term shelters (Raudies et al., 2021). Other drastic changes include increased excitement and aggression, which may require a behavior modification program (Clay et al., 2020). In Brazilian shelters, dogs with the worst behaviors are the ones that are put into isolation. This suggests that the cases will become even worse, significantly reducing the adoption chances for these animals, perpetuating their shelter enclosure.

Dogs also commonly sunbathe to stimulate important vitamins production for their maintenance and because sun exposure releases serotonin, responsible for pleasant sensations (Serpell, 2016). Shelters that did not provide the dogs with outdoor areas are directly impairing animal welfare. The shelter environment itself is characterized by a large proliferation of pathogens (Smith et al., 2019) easily transmitted from dog to dog, causing unhealthiness in dogs. In this study, only one shelter had hospital pens, which may represent a health risk. Together with feed quality, deworming and ectoparasite control failure, this could worsen animal health, reflecting on natural deaths in Brazilian shelters.

At the pen level, the main factors that affected the dog welfare were poor environmental conditions, and visibly sharp edges that could hurt the animals. Many of these points were related to facility maintenance, which intrinsically needs financial investment. The problem worsened with the shortage of people involved in daily shelter activities.

Regarding the bed, almost all types were considered adequate for dogs; however, none proved to be effective in offering thermal comfort to the animals in low temperature situations. We suggest, as a complementary indicator, that shelters have temperature measurement (a thermometer) in the dogs' sleeping accommodations in order to identify the risk of thermal stress during the year.

Another issue at the pen level evaluation is barking, destructive and repetitive behavior in Brazilian shelters, indicating a high stress level, as previously described in Austrian no-kill shelters (Raudies et al., 2021). Depending on the noise level, barking could damage a dog's hearing. Although dogs living in the shelter for a prolonged period may decrease barking over time, panting increases it, which reflects fatigue and acute anxiety (Clay et al., 2020).

During the individual evaluation, skin wounds and alopecia at a specific shelter deserved attention, mainly because of the inappropriate material used to cover the ground. The wood straw used, when in constant contact with the animals, can cause alopecia and wounds; as a result, an allergic reaction and other skin disorders may occur (Dowgray and Shaw, 2018). The allergic procedure causes intense itching associated with a painful sensation, significantly decreasing the animal's welfare.

All in all, the Brazilian shelter dog welfare depends on several factors related to the animal itself, management procedures, and the environment, which can be addressed to improve the animals' coping abilities and adaptation (Rowan and Kartal, 2018). SQ protocol addresses various criteria and critical points of dog welfare, proving to be a useful tool in a scientific manner, or as normative standards, and offering a practical tool for shelter managers to identify potential welfare risks to animals under their care. By improving Brazilian shelter management, we expect to provide a better quality of life for dogs by avoiding suffering situations. Finally, dogs may play an important part in the Brazilian cultural shifting, in which most families now consider their pet dogs as non-human family members, as previously reported in the USA (Rowan and Kartal, 2018).

Conclusions and animal welfare implications

The quality of the shelters interferes with the welfare, behavior, and adoption of these animals. Therefore, it is essential and relevant to evaluate the animals' and the shelters' quality, seeking to identify critical points that may harm the animals and should be corrected.

For dogs kept in shelters to have a high degree of well-being, their nutritional, health, environmental, psychological, and behavioral freedoms must be met; this requires adequate facilities, resources within the enclosures, and good facility management.

Based on the new reality, shelters have been trying to adapt their facilities, train their employees, invest in education on responsible ownership, and encourage animal adoption. The sterilization of these animals is also fundamental for an effective program of humane management. Therefore, it is essential to establish the animal capacity of each shelter. Shelters should also implement, monitor, and evaluate program efficiency, develop, disseminate, and enforce laws related to animal protection, register, and identify the animals, and offer preventive veterinary treatment to protect the animals' health and welfare, reducing zoonotic risk.

The SQ protocol is an internationally valid tool for assessing the welfare of shelter dogs, built on the four principles of well-being, good food, suitable accommodation, good health, appropriate behavior, and

respecting and involving the five freedoms. In addition, it independently assesses facilities, existing resources, and shelter management.

SQ protocol was feasible and practical for Brazilian shelter dog evaluations with significant indicators, highlining the main critical points, and exalting those that had better results. Although it contemplates extra measures, it was necessary to make adjustments to the original protocol to gather more relevant dog welfare aspects. The included elements, such as health management (vaccination, endo and ectoparasite control, castration, veterinary care), availability of environmental enrichment, aspects of dog socialization, adoption, dog turnover dog rate, and several employees involved in the chain and shelter income, enriched welfare indicators. For further validation, this adapted protocol must be applied to many Brazilian shelters in different regions to characterize the dog shelters' current situation.

Considering that abandoned animals are protected by the State, it is of great importance to talk about public policies regarding shelters.

It is necessary to have specific laws for animal protection to ensure the safety and welfare of animals, but it is just as important to ensure sound management and proper functioning of shelters since living in this environment influences the animals' physical and mental health.

Issues such as population control, animal abandonment, animal abuse, and encouragement of adoptions must be handled together with the shelters. Only a systemic vision can find solutions to solve these issues that are of great importance to society's growth and evolution.

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