

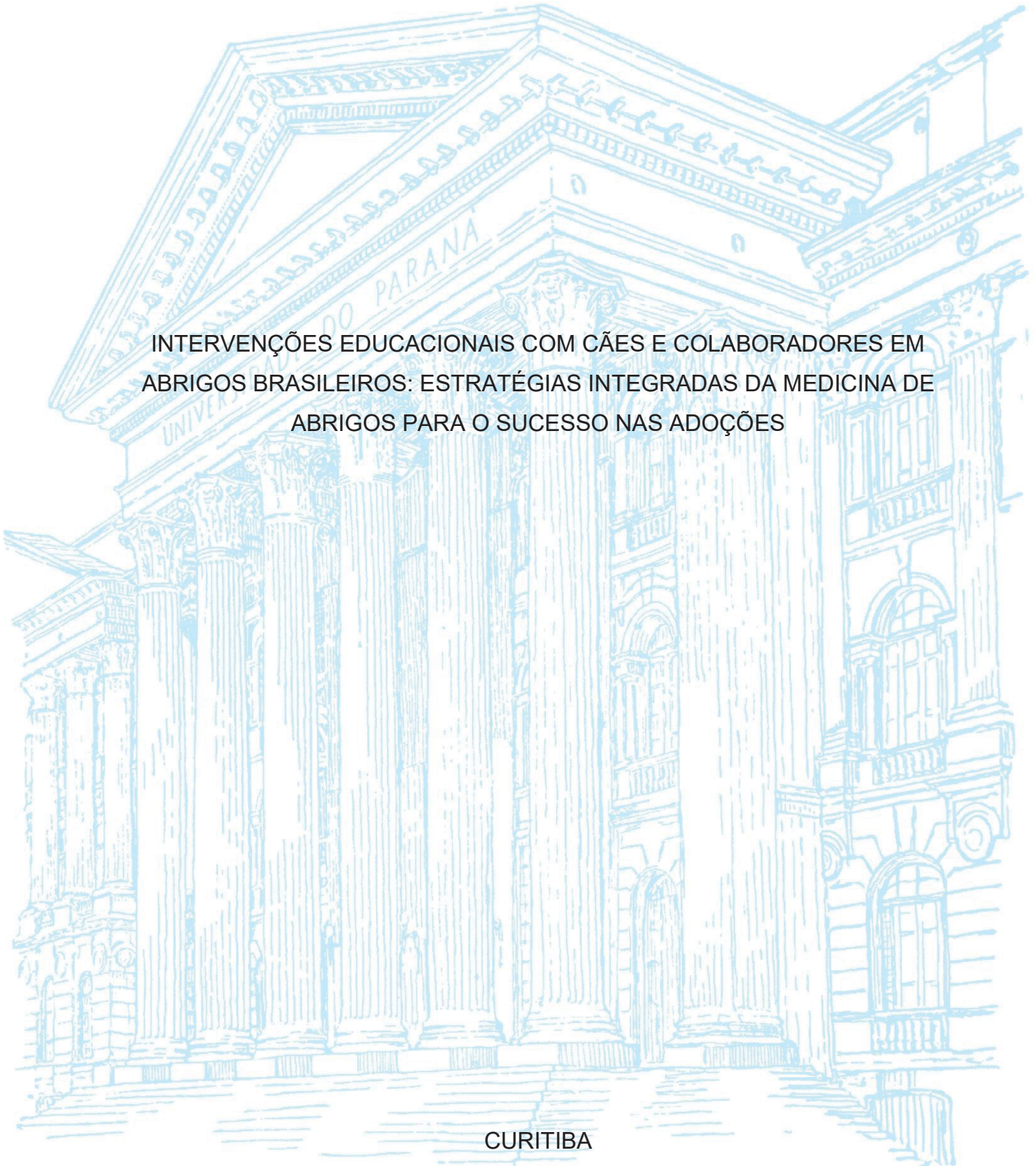
UNIVERSIDADE FEDERAL DO PARANÁ

ANA LUCIA BALDAN

INTERVENÇÕES EDUCACIONAIS COM CÃES E COLABORADORES EM  
ABRIGOS BRASILEIROS: ESTRATÉGIAS INTEGRADAS DA MEDICINA DE  
ABRIGOS PARA O SUCESSO NAS ADOÇÕES

CURITIBA

2025



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ABRIGOS BRASILEIROS: ESTRATÉGIAS INTEGRADAS DA MEDICINA DE  
ABRIGOS PARA O SUCESSO NAS ADOÇÕES

Tese apresentada ao curso de Pós-Graduação em  
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## QUEM SOU EU

Meu nome é Ana Lucia Baldan, mas preferido que me chamem somente de Lu, então ficou Lu Baldan, que é como gosto de ser chamada. Sou Lu Baldan e sempre tive duas paixões na vida, o mar e os animais. O mar eu conheci bem pequena, tinha uns 5 anos, quando meus pais me levaram para Santos/SP para encarar as ondas de frente, “de peito aberto”, porque era uma “simpatia” para curar a bronquite, e eu me apaixonei tanto pelo mar que me tornei Bióloga Marinha. Já os outros animais, desde que conheço por gente, sempre cuidava para que ninguém pisasse em formigas, dessem estilingadas nos pássaros, e queria muito um cachorro, coisa que não podia por causa da bronquite, assim diziam os médicos da época. Mas eu convenci meus pais e ganhei meu primeiro cachorro com 14 anos e aí nunca mais consegui ficar sem e me dediquei a essa espécie.

Passei por todas as áreas que envolvem cães, todas mesmo, fui criadora de cães, das raças Cocker Spanish Inglês, Poodle Toy e Fox Terrier Pelo Liso; tive um pet shop; fui handler em exposições de cães pelo CBKC (Confederação Brasileira do Kenel Clube); fiz um curso de adestramento de trabalho e guarda, com alemães que vieram para o Brasil sendo a única mulher da turma; fiz curso de “faro” com uma americana da Polícia de Los Angeles USA; fiz curso de agility e comecei a competir em eventos com um cão mestiço de pitbull que ganhava de todos os Border Collier; treinei cães para trabalhar com Terapia Assistidas por Animais e foi um Golden adotado, Billy, que me deu a maior alegria, trabalhava maravilhosamente no Instituto An Sullivan, que acolhe pessoas de todas as idades e todas as deficiências como downs, autismo, demência entre outras, sendo homenageado na Câmara Municipal de Ribeirão Preto por seu trabalho maravilhoso; tive hotel e creche para cães e hospedava cães de protetores com um valor bem abaixo da média e conseguia, além de cuidar deles, leva-los para eventos de adoção todo final de semana para que conseguissem um lar definitivo, e com isso eu cheguei a ter 22 cães sob minha proteção que foi o meu último investimento na área pet, último antes de entrar para a pesquisa. Eu vendi tudo para me dedicar a pesquisa porque queria usar todo o conhecimento e experiência que tinha com cães em algo que pudesse ser replicado e atestado cientificamente.

Cheguei na pesquisa através da USP de Ribeirão com a profa. Patrícia, que foi minha orientadora de mestrado e me puxava muita a orelha para eu entender como o universo da pesquisa opera, acho que entendi, mas sei que preciso caminhar muito ainda. Agradeço muito a profa. Patrícia por ter me aceitado no programa de pós-graduação mesmo não trabalhando com cães, eu queria muito estudar etologia e cães, e ela abriu as portas. E foi na minha banca de mestrado que a profa. Rita Garcia conheceu meu trabalho com cães de abrigo e me convidou para ingressar no grupo de pesquisa da medicina veterinária do coletivo alegando que não tinha ninguém trabalhando com comportamento e que isso poderia fazer uma grande diferença no grupo. E foi assim que cheguei aqui na UFPR, essa renomada universidade, e agradeço muito a profa. Rita por ter me trazido para Curitiba, onde tudo de bom está acontecendo, as portas se abriram desde que cheguei aqui em 2021. Hoje sou a primeira pesquisadora e futura doutora na área de medicina veterinária comportamental de abrigos. **Amo muito o que eu faço!!**

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***“...DESAFIO VOCE OLHAR NOS OLHOS DOS ANIMAIS COM MEDO OU COM DOR, E ENTÃO TENTAR NEGAR PARA SI MESMO OU PARA OS OUTROS, QUE ESSES INDIVÍDUOS NÃO ESTÃO SENTINDO NADA.”***

(BEKOFF, 2006 p.31)

## RESUMO

A crescente população de cães em abrigos brasileiros demanda estratégias inovadoras e sustentáveis que promovam o bem-estar animal, aumentem as chances de adoção e reduzam as taxas de devolução. Esta tese tem o objetivo de apresentar uma abordagem multidimensional por meio de intervenções educacionais aplicadas a cães e colaboradores em abrigos e aos adotantes dos cães em situação de abrigo, com base em evidências científicas e protocolos práticos desenvolvidos no contexto da etologia para aplicar em Medicina de Abrigos. O Capítulo 1 apresenta o curso MECA (Manejo Etológico de Cães em Abrigos), avaliando sua eficácia na capacitação de profissionais e seu impacto nas taxas de adoção e devolução. O Capítulo 2 relata casos de cães com medo e agressividade e os efeitos da aplicação da modulação comportamental. O Capítulo 3 investiga o impacto da qualidade do sono e da mudança de ambiente no comportamento de cães de abrigo e como isso pode ajudar a explicar o período da adaptação. O Capítulo 4 apresenta os programas de adoção, Lar Adotivo e Passeio para Adoção, como estratégias para aumentar as adoções de cães em situação de abrigamento. Capítulo 5 propõe aplicação do Acompanhamento Pós-Adoção (APA), ressaltando a importância do suporte contínuo aos adotantes para a manutenção do vínculo e prevenção de devoluções. As considerações finais como parte da conclusão da tese indicam, de forma inequívoca, que a sinergia entre intervenções educativas e a adoção de protocolos comportamentais estruturados fomenta melhorias substanciais no bem-estar dos animais, ao mesmo tempo que otimiza a sustentabilidade das instituições de acolhimento.

**Palavras-chave:** Medicina de Abrigos; Bem-estar animal; Adoção; Modulação comportamental; Educação; Devolução; Acompanhamento pós adoção

## ABSTRACT

The growing population of dogs in Brazilian shelters demands innovative and sustainable strategies that promote animal welfare, increase adoption rates, and reduce returns. This thesis aims to present a multidimensional approach through educational interventions applied to shelter dogs, shelter staff, and dog adopters, based on scientific evidence and practical protocols developed within the framework of ethology and applied to Shelter Medicine. Chapter 1 introduces the MECA course (Ethological Management of Shelter Dogs), assessing its effectiveness in training shelter staff and its impact on adoption and return rates. Chapter 2 presents case reports of dogs exhibiting fear and aggression and evaluates the effects of behavioral modulation techniques. Chapter 3 investigates the impact of sleep quality and environmental change on the behavior of shelter dogs and how these factors may influence the adaptation period. Chapter 4 describes adoption programs such as Foster Homes and Adoption Field Trips as effective strategies to increase adoption opportunities for sheltered dogs. Chapter 5 proposes the implementation of Post-Adoption Counseling (PAC), emphasizing the importance of continued support for adopters in maintaining the bond and preventing returns. The final considerations, as part of the thesis conclusion, unequivocally indicate that the synergy between educational interventions and the adoption of structured behavioral protocols fosters substantial improvements in animal welfare, while optimizing the sustainability of the shelter institutions.

**Keywords:** Shelter Medicine; Animal Welfare; Adoption; Behavioral modulation; Education; Return rates; Post adoption counseling.

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## 1 INTRODUÇÃO

No Brasil, há um número expressivo de cães e gatos em situação de rua ou de livre circulação, que podem ter sido abandonados, estar perdidos ou ainda serem considerados comunitários ou semidomiciliados, vivendo em condições de vulnerabilidade (Oliveira, 2019). O abandono animal é um problema multifatorial, com impacto direto no bem-estar dos animais e risco potencial à saúde pública, especialmente diante da escassez de políticas efetivas de manejo populacional (Oliveira, 2019; Garcia et al., 2019). Programas completos de manejo populacional devem incluir, não apenas medidas direcionadas à reprodução, mas também estratégias contínuas de educação da população sobre guarda responsável, aumentando a capacidade de enfrentamento do problema em diversos municípios brasileiros (Garcia et al., 2019).

Pesquisas demonstram que falhas nas adoções estão fortemente relacionadas a problemas de comportamento e dificuldades na interação tutor-cão. Em um estudo de acompanhamento pós-adoção, constatou-se que 70% dos insucessos relatados pelos adotantes estavam associados ao comportamento dos cães, sendo 40% relacionados a maus-modos e 30% à destruição de móveis (Gates et al., 2018). Dessa forma, torna-se evidente que intervenções preventivas voltadas ao comportamento são determinantes para o sucesso da adoção. A promoção de interações humano-cão fora das baias melhora o comportamento dos animais, reduz o estresse e promove aumento significativo no bem-estar de cães em situação de abrigo. Além disso, o treinamento para comportamentos sociais adequados está associado a maiores taxas de adoção (Protopopova et al., 2012; Protopopova et al., 2014; Protopopova & Gunter, 2017; Protopopova et al., 2018; Gunter et al., 2021).

Cães submetidos a treinamento e modulação comportamental em abrigos tendem a apresentar repertórios comportamentais mais adaptados à convivência em lares, o que pode reduzir riscos de devolução e aumentar as chances de adoção exitosa (Luescher & Medlock, 2009; Protopopova et al., 2012). Além disso, o comportamento tem sido considerado pelos adotantes um fator mais relevante do que a aparência física do cão no momento da escolha (Wells & Hepper, 1992). Dessa forma, a promoção do bem-estar e a preparação comportamental dos cães em abrigos são elementos essenciais dentro das práticas de Medicina de Abrigos, contribuindo para a sustentabilidade das instituições e para a qualidade da relação humano-animal. A implementação de enriquecimento ambiental durante o período de permanência dos cães no abrigo também apresenta efeito positivo no sucesso das adoções. Segundo Miller e Zawistowski (2012), estímulos ambientais estruturados contribuem para a redução de comportamentos indesejáveis e para melhor adaptação dos animais ao convívio social. Protocolos de enriquecimento, ao oferecerem atividades físicas e estímulos cognitivos, reduzem parâmetros fisiológicos relacionados ao estresse e a ocorrência de comportamentos anormais (Martins, 2015).

A interação humano-cão funciona como uma forma de enriquecimento para animais de abrigo e, quando aliada ao treinamento comportamental, pode aumentar

significativamente as chances de adoção (Baldan et al., 2023a; Baldan, 2022; Baldan, 2021). Perry et al. (2020) testaram quatro estratégias de enriquecimento, aplicadas uma ou duas vezes ao dia: caminhada individual; caminhada associada ao fornecimento de brinquedo interativo com petiscos; passeio com voluntário; e treinamento de educação. Os resultados mostraram aumento no índice de adoção em comparação com a linha de base, sendo que 100% dos cães dos dois últimos grupos foram adotados. De forma semelhante, Baldan (2021) observou 100% de adoções permanentes em cães que participaram de sessões combinadas de interação humano-cão e treinamento.

A modulação comportamental antes da adoção desponta, portanto, como estratégia essencial para a prevenção de devoluções e de novos abandonos. Patronek et al. (2022) destacam que cães abrigados apresentam características comportamentais distintas daquelas observadas em cães domiciliados, e que tais diferenças podem contribuir para dificuldades de adaptação no novo lar. Se esses comportamentos forem avaliados e, quando necessário, modificados antes da adoção, o número de retornos pode ser significativamente reduzido. Processos estruturados de avaliação comportamental permitem que os adotantes tenham conhecimento prévio sobre o perfil do cão, facilitando o ajuste da expectativa e a criação de vínculos sustentáveis. Isso é particularmente relevante considerando que os maiores índices de devoluções estão associados a comportamentos inadequados percebidos pelos adotantes (Gates et al., 2018).

Um dos desafios recorrentes nos abrigos que impacta diretamente o bem-estar dos cães é a dificuldade em manter um padrão adequado de descanso e sono. O confinamento, associado ao estresse, frequentemente resulta em latidos excessivos, o que prejudica o repouso dos próprios animais e reduz o interesse de potenciais adotantes em interagir com eles (Titulaer et al., 2013). Além dos danos ao bem-estar dos cães, o ruído constante afeta negativamente as pessoas, influenciando decisões de adoção (Protopopova & Wynne, 2015). Nos Estados Unidos, por exemplo, 35% das queixas de tutores estão relacionadas a latidos inadequados (Yin & McCowan, 2004), e esse comportamento está associado ao retorno de animais aos abrigos — situação que reduz significativamente a probabilidade de nova adoção (Payen & Assemi, 2017; Salman et al., 2000). Contudo, o latido pode ser manejado e reduzido por meio de intervenções comportamentais estruturadas (Hiby et al., 2004). Baldan (2021) avaliou três protocolos destinados à promoção do bem-estar, redução de estresse e modulação comportamental de cães em abrigos com foco na adoção permanente: o Protocolo de Redução de Latidos (PRL), posteriormente publicado por Baldan et al. (2023b); o Protocolo de Interação Humano-Cão (IHC); e o Protocolo de Treinamento (TR), com comandos básicos e comportamentos sociais relevantes para o convívio em um ambiente familiar.

Considerando a multidimensionalidade do bem-estar animal, é imprescindível que estratégias variadas e integrativas sejam implementadas para promover a adoção. A Maddie's® Foundation, organização internacional dedicada ao bem-estar de animais de abrigo, desenvolveu os programas *Field Trip* e *Sleepover*, que ampliam o alcance dos cães à comunidade e aumentam a probabilidade de adoções bem-sucedidas (Gunter et al.,

2021). O *Field Trip* possibilita que voluntários previamente cadastrados levem os cães para passeios, permitindo maior exposição social; já o *Sleepover* possibilita que os animais passem desde uma noite até vários dias na casa de uma família interessada, favorecendo o conhecimento mútuo e a formação do vínculo. Essas estratégias foram aplicadas pela primeira vez no Brasil, em Curitiba, no estudo de Baldan & Gracia (2024), com resultados promissores para o aumento de adoções permanentes.

Além da preparação prévia à adoção, o suporte oferecido aos tutores após a chegada do cão ao novo lar é fundamental para a manutenção do vínculo. O Acompanhamento Pós-Adoção (APA) foi proposto como estratégia voltada à redução das taxas de devolução, e estudos indicam que o apoio técnico-comportamental auxilia os adotantes a manejar desafios iniciais, prevenindo rupturas no processo de adaptação (Powell et al., 2022).

A literatura evidencia, portanto, a importância da compreensão do comportamento animal e da modulação comportamental dos cães nos abrigos, bem como a necessidade de estratégias educativas integradas ao processo de adoção, com o objetivo de aumentar as taxas de adoções duradouras e melhorar o bem-estar dos animais. Dessa forma, esse estudo teve como objetivo descrever todas as intervenções e estratégias em cada capítulo, buscando aumentar as taxas de adoção e diminuir as devoluções de cães em situação de abrigo para mudar a realidade na medicina de abrigos no Brasil.

## 1.1 OBJETIVO GERAL

O objetivo geral desta tese é implementar intervenções educacionais envolvendo cães e colaboradores em abrigos brasileiros, buscando novas estratégias para aumentar as taxas de adoção e diminuir as devoluções de cães em situação de abrigo.

## 1.2 OBJETIVOS ESPECÍFICOS

- Aplicar o curso MECA em vários abrigos brasileiros e avaliar o impacto do curso na capacitação dos colaboradores e nas taxas de adoções dos cães.
- Avaliar o efeito da modulação comportamental de cães em situação de abrigo com medo e agressividade: relato de caso em abrigos brasileiros.
- Ver a qualidade do sono e o comportamento dos cães de abrigo, dentro e fora do ambiente: um estudo brasileiro.
- Implantar os programas de adoção, Lar Adotivo e Passeio para Adoção em um abrigo brasileiro e ver o impacto desses programas nas adoções.
- Aplicar o Acompanhamento Pós Adoção (APA) e ver o impacto na redução de retornos dos cães aos abrigos após a adoção.

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## 2 CAPÍTULO 1: EDUCATIONAL INTERVENTIONS WITH DOGS IN BRAZILIAN SHELTERS: IMPROVING ADOPTION RATES THROUGH BEHAVIOR PROTOCOLS<sup>1</sup>

### RESUMO

Animais que são devidamente preparados antes da adoção podem desenvolver repertórios comportamentais mais adequados para a convivência com humanos e outros animais, reduzindo assim o risco de devolução. Programas que promovem a interação humano-cão em abrigos, combinados com treinamento educativo, são essenciais para aumentar as taxas de adoção e fortalecer o vínculo entre os cães e seus futuros tutores. A modificação comportamental antes da adoção é um fator-chave na prevenção de devoluções e abandonos. Este estudo teve como objetivo avaliar o impacto de protocolos comportamentais aplicados a cães de abrigo no Brasil, analisando as taxas de adoção e devolução, bem como a capacitação da equipe dos abrigos para replicar essas práticas. Os protocolos comportamentais incluíram o Protocolo de Redução de Latidos (PRL), o Protocolo de Interação Humano-Cão (IHC) e o Treinamento básico (TR). Esses protocolos foram implementados por meio do curso MECA (Manejo Etológico de Cães em Abrigos), que treinou tanto os cães quanto os colaboradores em seis abrigos localizados em quatro estados brasileiros, envolvendo 214 cães e 67 profissionais. O conteúdo programático do curso abordou bem-estar animal, senciência, etologia (incluindo a linguagem corporal dos cães), avaliação comportamental, agressividade e medo, e modulação comportamental. O curso foi composto por 3 horas de aulas teóricas e 27 horas de treinamento prático em cada abrigo. Para avaliar os resultados da aprendizagem, os participantes responderam a um questionário via Google Forms antes (Fase 1) e após (Fase 2) o curso. Além disso, foram realizadas três avaliações de treinamento (AV1, AV2 e AV3) para medir o desempenho dos colaboradores na aplicação do protocolo de treinamento. Os resultados mostraram que, na Fase 1, 73,13% (49/67) dos participantes nunca haviam treinado um cão, enquanto na Fase 2, 100% (67/67) conseguiram fazê-lo ( $p < 0,001$ ). Observou-se melhora significativa em quatro dos cinco comandos nas três avaliações, com os comandos "sentar" e "deitar" apresentando valores de  $p < 0,001$ . Os dados de adoção e devolução foram analisados em um dos abrigos participantes ( $n = 80$  cães), sendo que 71,25% (57/80) foram adotados, 18,75% (15/80) encaminhados para lares temporários, 3,75% (3/80) faleceram, 5% (4/80) permaneceram no abrigo e apenas 1,25% (1/80) foi devolvido. Esses achados sustentam a premissa de que a implementação de protocolos comportamentais estruturados em abrigos melhora o sucesso das adoções e reduz as taxas de devolução. O estudo destaca a importância da capacitação da equipe dos abrigos para garantir a replicabilidade e a sustentabilidade a longo prazo. Aumentar as adoções e reduzir as devoluções é um objetivo comum entre abrigos no mundo todo.

**Palavras-chave:** adoção, interação, treinamento, cão de abrigo, bem-estar, avaliação

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<sup>1</sup> CAPÍTULO 1 – SUBMETIDO

## ABSTRACT

Animals that are properly prepared before adoption can develop more appropriate behavioral repertoires for living with humans and other animals, thereby reducing the risk of being returned. Programs that promote human-dog interaction in shelters, combined with educational training, are essential for increasing adoption rates and strengthening the bond between dogs and their future guardians. Behavioral modification prior to adoption is a key factor in preventing returns and abandonment. This study aimed to evaluate the impact of behavioral protocols applied to shelter dogs in Brazil by analyzing adoption and return rates, as well as assessing the training of shelter staff to replicate these practices. The behavioral protocols included the Bark Reduction Protocol (BRP), the Human-Dog Interaction Protocol (HDI), and basic Training (TR). These were implemented through the MECA course (Ethological Management of Shelter Dogs), which trained both dogs and staff in six shelters across four Brazilian states, reaching 214 dogs and 67 staff members. The course curriculum addressed animal welfare, sentience, ethology (including dog body language), behavioral assessment, aggression and fear, and behavioral modification. It consisted of 3 hours of theoretical instruction and 27 hours of hands-on training at each shelter. To assess learning outcomes, participants completed a Google Forms questionnaire before (Phase 1) and after (Phase 2) the course. Additionally, three training evaluations (EV1, EV2, and EV3) were conducted to measure staff performance in applying the TR protocol. Results showed that in Phase 1, 73.13% (49/67) of participants had never trained a dog, whereas in Phase 2, 100% (67/67) were able to do so ( $p < 0.001$ ). Significant improvement was observed in four out of five commands across the three evaluations, with "sit" and "lie down" showing  $p$ -values  $< 0.001$ . Adoption and return outcomes were analyzed in one of the participating shelters ( $n = 80$  dogs), with 71.25% (57/80) adopted, 18.75% (15/80) placed in foster care, 3.75% (3/80) deceased, 5% (4/80) still in the shelter, and only 1.25% (1/80) returned. These findings support the premise that implementing structured behavioral protocols in shelters improves adoption success and reduces the rate of returns. The study highlights the importance of training shelter staff to ensure replicability and long-term sustainability. Increasing adoptions and reducing returns is a shared goal among shelters worldwide.

**Keywords:** adoption, interaction, training, shelter dog, welfare, evaluation

## 2.1 INTRODUCTION

In Brazil, there are many animals—dogs and cats—living on the streets, abandoned, semi-owned, or community animals, all in vulnerable conditions (Oliveria, 2019). According to Oliveira (2019) animal abandonment is a multifactorial issue that negatively impacts animal welfare and poses risks to public health. The lack of effective population management programs for dogs and cats further exacerbates the problem (Gracia et al., 2019). Currently, in Brazil, adoption programs are evaluated solely by the number of animals adopted, without considering the reasons for returns or the dynamics caused by abandonment.

According to Association Shelter Veterinarian (ASV, 2022) overcrowding in shelters poses a significant challenge to animal welfare, as it restricts the rest and sleep, individual space and limits access to basic resources such as food and water, additionally creates significant barriers to implementing enrichment strategies—such as socialization, exposure to new textures and scents, and meaningful human-dog interactions—that are crucial for improving overall welfare.

One typical shelter issue related to rest and sleep quality in dogs is excessive barking, which arises from confinement stress and disturbs the rest of housed animals. It also discourages people from interacting with dogs, ultimately affecting adoption decisions. Dogs' sensitivity to sound is approximately 20 dB (decibels) within frequencies of 4,000 to 8,000 Hz (Lipman & Grassi, 1942; Barber et al., 2020). The upper limit of their hearing is better than that of humans; however, at lower frequencies, dogs and humans are likely similar. Sound levels measured in shelters exceeded 90 dB and were sometimes recorded as high as 125 dB (Sales et al., 1997; Coppola et al., 2006; Scheifele et al., 2012; Baldan et al., 2023).

For the World Health Organization (2022), prolonged exposure to noise levels of 50 dB or higher is potentially harmful to the hearing of mammals (Kryter, 1994). Research by Scheifele and colleagues (2012) found that exposure to kennel noise over a six-month period resulted in hearing loss in dogs. In a study, Protopopova and Wynne (2015) confirmed that excessive barking is not only harmful to dogs but also to humans, negatively influencing adoption decisions. In the United States, 35% of complaints from guardians are related to inappropriate barking (Yin & McCowan, 2004), which often leads to returns to shelters. Once returned, these dogs are less likely to be adopted again (Payen & Assemi, 2007; Salman et al., 2000). However, barking can be controlled through training. (Hiby & Bradshaw, 2004; Baldan et al., 2023).

The literature shows that unsuccessful adoptions are often associated with problems in the interaction between owners and dogs, which can lead to undesirable behaviors (Gates et al., 2018). Animals that are prepared prior to adoption can develop a more appropriate behavioral repertoire for living with humans and other animals, thereby preventing future returns (Protopopova et al 2012; Luescher e Medlock, 2009). Behavior

has proven to be a more important factor than appearance for prospective adopters (Wells & Hepper, 1992). Programs that encourage human-dog interaction and socialization among animals in shelters, along with education through training, are essential for increasing adoption rates and strengthening the bond between the dog and its future guardian.

Several studies show that promoting human-dog interactions outside the kennels improves animal behavior, reduces stress, and increases the well-being of shelter dogs, and that training for socially appropriate behavior enhances adoption rates (Protopopova et al., 2012; Protopopova & Wynne, 2014; Protopopova et al., 2014; Protopopova e Gunter, 2017; Protopopova et al., 2018; Gunter et al., 2021; Baldan & Garcia, 2024). Modifying the behavior of shelter dogs before they are made available for adoption is a key factor in preventing future returns and abandonment. Patronek and collaborators (2022) confirm that the population of shelter dogs is significantly different from that of companion dogs living in homes, and these differences play a critical role in abandonment. If specific behaviors are identified and addressed before adoption, many returns or cases of re-abandonment can be avoided.

Therefore, the objective of this study is to assess the effectiveness of a set of novel behavioral intervention protocols, developed specifically for practical implementation in shelter environments, in improving behavioral outcomes and adoption success among shelter dogs in Brazil. These protocols comprise the Bark Reduction Protocol (BRP), the Human–Dog Interaction (HDI) protocol, and Training (TR) protocol, each targeting stress-related behaviors, sociability, and human-directed engagement. By promoting standardized, evidence-based practices that can be feasibly applied by shelter personnel within resource limited contexts, this study seeks to contribute sustainable strategies for enhancing canine welfare, increasing adoption rates, and reducing returns to shelters.

## **2.2 METHODS**

### **2.2.1 Ethics statement**

This study is approved by the Ethics Committee on the Use of Animals of the Agricultural Sciences Sector of the Federal University of Paraná under number 015/2022 (05/04/2022). Research Ethics Committee (CEP-SD), of Health Sciences Sector of the Federal University of Paraná under number 5.389.529 (21/08/2022).

### **2.2.2 Subjects and housing**

This research was conducted in six different shelters, including two public and four private facilities, involving 214 dogs and 67 staff members. These shelters were located in four different states across the Northeast, Southeast, and South regions of Brazil, as shown in Figure 1. At the time of this study, Shelter A housed an average of 70

dogs, Shelter B 120, Shelter C 40, Shelter D 60, Shelter E 50, Shelter F 80, and Shelters G and H an average of 40 dogs each.

All dogs in this study were vaccinated, dewormed, neutered, spayed, and all ages, young, adult and senior but not less than 6 months years old but the precise ages are unknown, most shelter dogs were strays. They were housed in different types of kennels, but the majority were made of concrete and had a closed area and another open area as a solarium. Males and females were housed together with 4-6 dogs per kennel, those that could be housed in shared kennel, but dogs that displayed aggression were placed in separate kennel, with only one dog in each. Food was offered twice a day, and water was offered *ad libitum*, and all the dogs were in good health.



**Figure 1:** Brazilian map showing the four states and the shelters location. One state in northeast (Alagoas) with one shelter trained group, two states in southeast (Minas Gerais e São Paulo) with three shelters trained group and one state in south (Paraná) with two different shelters and four trained group.

### 2.2.3 Data collection – The course MECA

The data were collected through a course called MECA short for *Manejo Etológico de Cães em Abrigos*, or *Ethological Management of Shelter Dogs*—was developed in response to the growing need for structured behavioral protocols in Brazilian shelters. The idea emerged from years of practical experience working with dogs in various contexts, including private training, rescue operations, and animal-assisted interventions, combined with academic research in ethology and shelter medicine. MECA

was founded and conceived by this researcher with the aim of presenting strategies for shelter dogs that not only improve canine's behavior but also help staff interact more effectively with the animals to increase adoption rates and reduce the likelihood of returns

The course MECA was implemented using three protocols, the Bark Reduction Protocol (BRP), the Human-Dog Interaction protocol (HDI) and the Training protocol (TR), divided in four modules: Module 1 – Animal Welfare and Sencient; Module 2 – Introduction to Ethology and Human-dog Interaction; Module 3 – Dog Behavior and Modulation and Module 4 – The protocols as a practical class. Covered animal welfare, sentience, ethology (including dog body language), behavior assessment, aggression and fear, and behavioral modification. It was divided into four modules: three hours of theory class and 27 hours of hands-on class practice in each participating shelter. See the MECA course curriculum program in Supplementary Material (Table 1).

Every class at shelters before (Phase 1) and after the course (Phase 2), a *Google Forms* questionnaire was used to assess participants' understanding of the course topics. The goal was to verify learning outcomes and determine whether staff could continue applying the protocols independently. After the course, students underwent three evaluations to assess learning progress, the first (EV1) with the dogs that were trained during the course and conducted three days of post-training; the second (EV2) took place three weeks later; and the third (EV3) was conducted three months later and, on the EV2 and EV3 new dogs were selected by the students. All evaluations were held online in real time, during which students presented their dogs and received a score from 1 to 5 for each command using a Likert scale to represent the responses.

In one of the participating shelters, the Shelter F with 80 dogs and 10 staff members, the adoption and return rates were evaluated to assess the effectiveness of the implemented protocols and to determine whether they contributed to securing permanent homes for the dogs. Additionally, adoption programs such as *passeio para adoção* and *lar adotivo* were introduced at this shelter to evaluate how well-prepared dogs, with interaction and training, could influence adoption outcomes (Baldan & Garcia, 2024).

#### 2.2.4 Protocols applying at MECA course

The Bark Reduction Protocol (BRP) is a protocol that helps stop barking in the presence of humans by using counterconditioning training with treats and clicker. Dogs only receive positive reinforcement when they stop barking in the presence of people (Baldan et al., 2023). For this course MECA the BRP was applied in just four days during the practical class for the purpose of teaching the staff members how easy it was to replicate. For this study the BRP was not in the role for collecting data, it was only to show the staffs members how to apply.

The Human-Dog Interaction (HDI) protocol aims to promote socialization between dogs and students, enhancing sociability and increasing the chances of permanent adoption. Sessions were conducted outside the kennels, lasting 10 minutes,

and included the use of toys (e.g., balls, rope bones) and lots of petting. Each student was required to work with at least one dog per HDI session. Given the short duration of the protocol, students were able to interact with multiple dogs across sessions. This approach facilitated several group socialization opportunities and helped the shelter more effectively organize and manage dog groupings. This protocol is implemented over just five days, which is particularly beneficial for the daily operations of shelters, where time and resources are often limited.

The TR protocol involves basic commands, such as “walk together”, “sit down”, “lie down”, “stay” and “here”, to help dogs behave well in future homes. It is also conducted outside the kennels for 10 minutes right after the HDI. And as same as in the HDI each student was required to work with at least one dog per TR session. Similar to the HDI protocol, this was also implemented over a five-day period. The training protocol enables dogs to participate in adoption programs with greater confidence and behavioral readiness.

### 2.3 STATISTICAL ANALYSIS

To analyze the questionnaire from *Google Forms* on Phase 1 and Phase 2, for the statistical analysis, since the variables were qualitative, they were initially examined in aggregate across all groups, using absolute and relative frequency distributions. To assess the association between qualitative variables, the chi-square test was applied. This test determines whether there is a statistically significant relationship—dependency or independence—between two nominal categorical variables by comparing observed and expected frequencies. To enhance the visualization of the results, percentage bar charts were generated to represent the overall descriptive data. All statistical analyses were performed using the R statistical environment, version 4.1.0 (R Core Team, 2021).

All evaluation, EV1, EV2 and EV3 represented on the Likert scale responses, statistical analysis a performance score was created by summing the students' scores across all commands in each evaluation. This variable was analyzed descriptively through mean, standard deviation, minimum, and maximum values. To assess normality, the Shapiro-Wilk test was applied, and the results indicated that the score did not follow a normal distribution ( $p < 0.001$ ). Therefore, the Friedman test was used to compare the evaluations. The number of students across the three evaluations varied due to staff turnover, as some students were no longer part of the shelter team at the time of subsequent assessments.

To evaluate the adoption and return rates and describe the results with the distribution of dogs in adoption, foster home, return and stay in the shelter, a one-sample chi-square test ( $\chi^2$ ) was performed. This test assesses whether the observed proportions among nominal categories significantly differ from the expected proportions under the null hypothesis of equal distribution across groups.

## 2.4 RESULTS

The results correspond to the data describing the questionnaires applied in Phase 1 and Phase 2. These assessed the topics covered in the MECA course to evaluate knowledge retention and learning. Regarding the concept of *sentience*, 17.91% (12/67) of participants answered incorrectly in Phase 1, while in Phase 2 only 5.17% (3/67) did so, a p-value: 0.010 ( $p < 0.05$ ). For the topic of *canine body language*, 11.94% (8/67) had never heard of it in Phase 1, whereas in Phase 2, 100% (67/67) recognized dog body language, with a p-value 0.019. When asked about *identifying aggression in dogs*, 14.93% (10/67) were unable to recognize it in Phase 1, but after the course, only 1.72% (1/67) still could not recognize it, with a p-value 0.023. Finally, regarding *prior experience in training a dog*, 73.13% (49/67) had never trained a dog in Phase 1. By Phase 2, a remarkable 100% (67/67) of the participants were able to train a dog, with a highly significant p-value of  $<0.001$  (Table 2).

Question	Phase 1		Phase 2		p-value*	
	N	%	N	%		
Do you know what sentient is?	It is the ability to feel sensations and feelings with consciousness, in both humans and animals.					0,010
	1	1,49	3	5,17		
	It is when animals, not humans, feel pain and stress.					
	1	1,49	0	0,00		
None of the above are correct.						
Never heard of it.						
Have you ever heard of body language in dogs?	No	8	1,94	0	0,00	0,019
	Yes	59	88,06	58	100,00	
Do you know how to identify aggression in dogs?	No	10	14,93	1	1,72	0,023
	Yes	57	85,07	57	98,28	
Have you ever trained a dog?	No	49	73,13	0	0,00	<0,001
	Yes	18	26,87	58	100	

\*Chi-square test; N = number of participants; % = percentage of participants in the phase.

**Table 2:** Comparison of questionnaire responses between Phase 1 and Phase 2 (n = 67), with respective p-values.

From the questionnaire analyses related to the four questions on Phase 1 and Phase 2 an eloquent result appointed that all differences were statistically significant ( $p < 0.05$ ) as shown in table 1, confirming the effectiveness of the training in improving theoretical and practical knowledge related to canine behavior and welfare in shelters.

In the analysis of the three evaluations—EV1, EV2, and EV3—there was a significant difference in two out of the five commands assessed. For example, the "sit" and "lie down" commands showed a p-value of  $< 0.001$ , confirming the effectiveness of the training and the ability of the shelter staff to apply and replicate what they had learned. The p-value indicates the statistical significance of the variation in responses across the three time points, as assessed by the Friedman test (Table 3).

Command	Options	EV1		EV2		EV3		P-value*
		N	%	N	%	N	%	
Sit down	Did not perform	3	4,9%	0	0,0%	2	4,4%	<0,001
	Did not perform well	0	0,0%	0	0,0%	0	0,0%	
	Performed well	1	1,6%	0	0,0%	0	0,0%	
	Performed very well	3	4,9%	2	4,1%	0	0,0%	
	Performed with excellence	54	88,5%	47	95,9%	43	95,6%	
Lie down	Did not perform	6	9,8%	4	8,2%	7	15,6%	<0,001
	Did not perform well	2	3,3%	0	0,0%	0	0,0%	
	Performed well	3	4,9%	1	2,0%	1	2,2%	
	Performed very well	8	13,1%	3	6,1%	0	0,0%	
	Performed with excellence	42	68,9%	41	83,7%	37	82,2%	

\*Comparison test between evaluations; N= number of participants

**Table 3:** Distribution of participant performance across the three evaluations (EV1, EV2, EV3) based on Likert scale scores. The table presents the absolute (N) and relative (%) frequencies of participants' self-assessed performance levels for each evaluation phase.

The results of the adoption and return rates were evaluated among one of the participating shelters, Shelter F, with a larger number of dogs that participated in the MECA course. In a total of 80 dogs, the following results were obtained: adopted 71.25% (57/80), in temporary homes 18.75% (15/80), still in the shelter 5.00% (4/80), returned 1.25% (1/80) and deceased 3.75% (3/80) as shown on Table 3. The chi-square test revealed a statistically significant difference between the observed and expected (uniform) distributions:  $\chi^2 = 138.75$ ,  $p < 0.001$ . The return rate of dogs trained through the protocol was significantly lower than the expected rate (10%), supporting the effectiveness of the intervention in reducing post-adoption returns. The findings indicate that adoption was the most common outcome by a significant margin, supporting the effectiveness of the MECA training protocols in promoting successful rehoming of shelter dogs.

Condition	Total Nr.	Percentage %
Adopted	57	71,25%
Fostered	15	18,75%
In shelter	4	5,00%
Returned	1	1,25%
Deceased	3	3,75%

**Table 3:** Distribution of outcomes condition for 80 shelter dogs that participated in the MECA course and their percentage of each condition.

## 2.5 DISCUSSION

The implementation of the MECA course (Ethological Management of Shelter Dogs) demonstrated a meaningful and measurable impact on shelter dog management in Brazil. Unlike many previously reported interventions that focus narrowly on obedience training or behavioral suppression (e.g., Protopopova, 2016), the MECA course integrates complementary strategies centered on welfare, communication, and human–dog interaction. This comprehensive approach directly targets major barriers to successful rehoming—such as fear, aggression, and low sociability—while simultaneously improving staff knowledge, consistency of handling, and overall shelter practices.

Shelter dogs frequently experience prolonged and unpredictable stressors associated with confinement, high noise levels, and limited control over daily routines (Coppola et al., 2006; Hennessy et al., 2001; Baldan et al., 2023). Chronic stress contributes to behavioral deterioration, compromising adoptability and increasing the likelihood of return post-adoption (Mornement et al., 2010). In contrast to studies that primarily document the negative consequences of shelter stress, our findings highlight that structured staff-led behavioral modulation can effectively mitigate these outcomes. By empowering shelter personnel with practical assessment and intervention skills, the MECA course reduces behavioral risk factors related to relinquishment and euthanasia, thereby shifting shelters toward more proactive welfare-driven management.

Prior research has emphasized the need for interventions that are economically feasible and applicable in high-demand environments (Hiby & Bradshaw, 2004; Normando et al., 2009). The protocols developed and implemented in this study—the Bark Reduction Protocol (BRP), Human–Dog Interaction (HDI), and Training (TR)—address this gap by providing simple, low-cost, and time-efficient procedures that can be standardized across shelters with limited infrastructure. Importantly, while many interventions require prolonged or expert-led implementation, the present study demonstrated significant behavioral improvements after only five days of application, along with increased staff confidence in handling and training. These results reinforce the

value of adopting strategic, scientifically grounded protocols that maximize welfare impact while minimizing resource burden.

The improvement in staff knowledge and practical skills following participation in the MECA course clearly demonstrates that targeted educational interventions are a key determinant of animal welfare outcomes in shelters. Previous studies have shown that staff training improves the recognition of canine stress signals and early behavioral risks (Mornement et al., 2010), directly influencing the quality of human–dog interactions and adoption results (Arhant & Troxler, 2014; Miller & Zawistowski, 2015). Our findings align with this evidence, revealing that trained personnel became more confident in applying structured behavioral protocols, promoting welfare-oriented decision-making, and reducing inadvertent reinforcement of undesirable behaviors. As highlighted by Miller and Zawistowski (2015) and Gunter and collaborators (2016), shelter progress toward best practices is only sustainable when operationalized through staff empowerment—an outcome strongly supported by the present study.

In addition, the adoption and return dynamics observed in our intervention reflect global concerns regarding post-adoption success. International benchmarks suggest return rates ranging from 11% to 20% within the first months after placement, with returned dogs showing lower chances of rehoming (Salman et al., 2000; Garrison & Weiss, 2015; Payen & Assemi, 2017). Although Brazilian shelters do not yet maintain a standardized national database, estimates suggest potentially equal or higher return risks due to structural deficiencies and limited behavioral support for adopters. By proactively addressing behavioral barriers prior to adoption, the MECA course offers a preventive framework that contrasts with the reactive management commonly adopted in shelters. Such preventive welfare strategies are considered essential for reducing relinquishment and improving adoption stability worldwide

Reducing adoption returns is particularly critical in low-resource environments such as Brazilian shelters, where overcrowding and budget limitations already restrict welfare provisions (Starke et al., 2024). Previous literature indicates that dogs who experience adoption failure are more likely to exhibit heightened stress, fear, or regression in learned behaviors (Shore et al., 2005; Mornement et al., 2010), which further decreases their chances of successful rehoming. In contrast to international return rates of 11–20% reported in the United States and Europe (Salman et al., 2000; Garrison & Weiss, 2015; Payen & Assemi, 2017), the shelter implementing our behavior-based protocols achieved a remarkably low return rate of 1.25% during the follow-up period. This finding suggests that MECA supported interventions not only enhance behavioral readiness for adoption but also contribute to enduring human–animal bonds post-placement. Therefore, MECA represents a scalable welfare strategy capable of reducing shelter rotation, optimizing resource use, and improving long-term outcomes for dogs within capacity-constrained shelter systems (Garrison & Weiss, 2015; Protopopova & Wynne, 2015).

Sustainable behavioral training practices in shelters depend on the availability of simple, replicable, and time-efficient protocols that can be consistently applied by staff

and volunteers. The MECA protocols—focused on basic obedience, bark reduction, and structured human–dog interaction—align with previous research showing that brief, positive training interventions can meaningfully reduce dogs’ stress, improve sociability, and mitigate problematic behaviors (Hiby & Bradshaw, 2004; Protopopova & Wynne, 2015). Prior to training, many dogs exhibited excessive vocalization, fear responses, or avoidance of human contact, behaviors known to reduce adoption opportunities and contribute to a stressful environment (Marston & Bennett, 2003; Mornement et al., 2010). Following implementation of MECA strategies, dogs displayed increased relaxation, responsiveness, and affiliative behaviors, supporting a calmer shelter atmosphere. These collective improvements can reduce staff workload, facilitate group management, and lower noise levels, as previously reported in similar welfare-focused programs (Herron et al., 2014). When competency in these evidence-based protocols becomes embedded into routine care, shelters gain a sustainable mechanism to continuously enhance welfare and adoption outcomes.

The course also generated measurable improvements in adoption dynamics. In shelters where MECA was implemented, adoption rates increased, while the return rate decreased to just 1.25%, far below international averages. This reinforces evidence that pre-adoption training and structured social opportunities such as “*sleepover*” and “*fieldtrip*” programs promote more successful human–animal matches and improved adopter satisfaction (Marston & Bennett, 2003; Conley et al., 2014; Protopopova & Wynne, 2014; Gunter et al., 2021; Baldan & Garcia, 2024). These findings highlight that positive behavioral preparation not only enhances dogs’ adoptability but also contributes to relationship durability after placement.

Overall, MECA functions beyond a training curriculum: it represents a paradigm shift in shelter philosophy from a containment-driven model to one grounded in behavior and welfare science. Because the protocols are low-cost, feasible under resource constraints, and transferable across shelter staff with different levels of experience, MECA offers a scalable and impactful contribution to shelter medicine in Brazil. With wider adoption, both nationally and potentially internationally, this model could support more humane, efficient, and welfare-centered management systems, greatly improving life trajectories for shelter dogs.

Despite the positive outcomes reported in this study, some limitations should be acknowledged. It was not possible to systematically analyze post-adoption return rates across all participating shelters due to inconsistent record-keeping practices, particularly regarding intake and outcome data. Additionally, the course was implemented in shelters located in distinct regions of Brazil, each with unique cultural perceptions of animal sentience and welfare. These contextual disparities may have influenced staff engagement and the pace at which behavior-focused care was adopted, highlighting the persistent challenges in establishing uniform welfare standards nationwide. Future work should focus on expanding shelter personnel education in canine behavior and emotional needs, while promoting the mandatory collection of accurate and transparent shelter data. Moreover, longitudinal studies evaluating long-term adoption success and welfare

outcomes after behavior-based interventions would strengthen the evidence base for the implementation of MECA as a standard component of shelter medicine.

## 2.6 CONCLUSION

This study demonstrates that educational and behavior-based interventions—delivered through the MECA (Ethological Management of Shelter Dogs) course can generate substantial improvements in shelter dog welfare and adoption outcomes in Brazil. By equipping shelter staff with practical skills in behavioral assessment and management and implementing structured protocols such as the Bark Reduction Protocol (BRP), Human–Dog Interaction (HDI), and Training (TR), dogs exhibited enhanced sociability, decreased stress-related behaviors, and greater readiness for rehoming. The combination of improved behavioral presentation and increased staff confidence translated into a high rate of successful adoption (>70%) and a remarkably low return rate (1.25%), far below levels typically reported internationally. These findings indicate that the integration of scientifically grounded behavioral strategies within routine shelter care is both feasible and effective, even in resource-limited facilities.

Future research should incorporate control groups to strengthen causal inferences and evaluate long-term post-adoption outcomes to confirm the persistence of behavioral gains. Additionally, expanding MECA implementation across diverse shelter settings and improving data recording practices will support broader conclusions about the model's scalability and generalizability.

### **Implications for Animal Welfare**

This work provides evidence that empowering shelter staff through targeted training leads to sustained improvements in canine welfare and increases the likelihood of stable, long-term adoptions. By shifting shelter management toward animal-centered behavioral care, MECA helps reduce overcrowding, minimizes stress and behavioral deterioration, and improves the overall success of rehoming practices. As a low-cost and easily adoptable approach, MECA offers a practical and impactful contribution to shelter welfare initiatives in Brazil and has potential to inform best practices internationally.

### **CRedit authorship contribution statement**

**Ana Lucia Baldan:** Conceptualization, Data curation, Methodology, Writing – original draft, Writing – review and editing, Validation, Visualization, Project Administration. **Rita de Cassia Maria Garcia:** Formal analysis, Writing – review and editing, Supervision.

### **Ethical statement**

This study is approved by the Ethics Committee on the Use of Animals of the Agricultural Sciences Sector of the Federal University of Paraná under number 015/2022 (05/04/2022). Research Ethics Committee (CEP-SD), of Health Sciences Sector of the Federal University of Paraná under number 5.389.529 (21/08/2022).

### **Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## 2.8 SUPPLEMENTARY MATERIAL

**Table 1:** Curriculum content of the MECA training program applied in Brazilian shelters

<b>Module 1 – Animal Welfare and Sentience</b>			
<b>Topic</b>	<b>Objectives</b>	<b>Instructor</b>	<b>Duration</b>
Concepts in animal welfare and sentience	<ul style="list-style-type: none"> <li>Analyze the conceptual foundations of animal welfare Science</li> <li>Understand theoretical bases of sentience</li> </ul>	Dr. Ana Lucia Baldan	0.5 h
<b>Module 2 – Human–Animal Interaction (HAI) and Introduction to Ethology</b>			
<b>Topic</b>	<b>Objectives</b>	<b>Instructor</b>	<b>Duration</b>
Concepts in Human–Animal Interaction	<ul style="list-style-type: none"> <li>Explain the mechanisms and practical examples of HAI in shelter settings</li> </ul>	Dr. Ana Lucia Baldan	0.5 h
Concept in Behavioral Science	<ul style="list-style-type: none"> <li>Analyze basic principles of behavioral science and their application in canine shelter management</li> </ul>	Dr. Ana Lucia Baldan	0.5 h
<b>Module 3 – Canine Behaviour</b>			
<b>Topic</b>	<b>Objectives</b>	<b>Instructor</b>	<b>Duration</b>
Communication and Body Language; Aggression Ladder	<ul style="list-style-type: none"> <li>Understand how dogs communicate and express emotions</li> <li>Recognize and manage aggression in shelter environments</li> <li>Apply behavior modulation strategies</li> </ul>	Dr. Ana Lucia Baldan	0.5 h
Behavioral Assessment	<ul style="list-style-type: none"> <li>Describe challenges in implementing behavioral evaluations and modification programs in shelters</li> </ul>	Dr. Ana Lucia Baldan	0.5 h
Behavior Modulation with Human–Dog Interaction and Training	<ul style="list-style-type: none"> <li>Improve handling, environmental management, and behavioral interventions through structured staff training</li> <li>Introduction to practical activities</li> </ul>	Dr. Ana Lucia Baldan	0.5 h
<b>Module 4 – Practical Training Sessions</b>			
<b>Topic</b>	<b>Objectives</b>	<b>Instructor</b>	<b>Duration</b>
In-shelter practical work	<ul style="list-style-type: none"> <li>Implementation of the Bark Reduction Protocol (BRP)</li> <li>Human–Dog Interaction Protocol (HDI)</li> <li>Training Protocol (TR) all with shelter dogs and shelter staff</li> </ul>	Dr. Ana Lucia Baldan	27 h
<b>Total Course Duration: 30 hours</b>			

### 3 CAPÍTULO 2: EFFECTIVENESS OF BEHAVIORAL MODULATION FOR FEAR AND AGGRESSION IN SHELTER DOGS: BRAZILIAN CASES STUDY <sup>2</sup>

#### RESUMO

A modulação comportamental, como uma abordagem não aversiva, pode ser uma ferramenta eficaz no manejo de animais, ao reduzir a prevalência de distúrbios comportamentais. Seus benefícios incluem a melhoria da comunicação entre o cão e o cuidador, a facilitação da habituação, o aprimoramento de protocolos de relaxamento e a implementação de sessões de treinamento curtas, mas frequentes. Este estudo teve como objetivo aplicar técnicas de modulação comportamental — como habituação, extinção e contra condicionamento — para auxiliar cães de abrigo que apresentavam medo e/ou agressividade, o que impedia que fossem disponibilizados para adoção. Oito abrigos identificaram a necessidade de intervir em 12 cães: 80% (8/12) deles, em cinco abrigos, apresentavam agressividade com humanos e outros cães, enquanto 20% (4/12), em três abrigos, demonstravam medo de contato humano. O reforço positivo com petiscos foi utilizado para promover um novo ambiente de aprendizagem e modificar respostas, com técnicas voltadas à redução da agressividade e do medo. O tempo necessário para a modulação comportamental variou de acordo com a resposta individual de cada cão — alguns demandaram períodos mais longos, outros responderam mais rapidamente. Todos os cães (100%, 12/12) responderam positivamente ao processo e se tornaram aptos para adoção. Esses achados sugerem que a modulação comportamental deve ser parte integrante das práticas dos abrigos, garantindo que mais cães tenham a chance de serem disponibilizados para adoção e encontrem lares permanentes. O estudo também destaca que a modulação comportamental deve ser avaliada e aplicada caso a caso, sempre sob supervisão de um médico-veterinário comportamentalista.

**Palavras-chave:** Cães de abrigo; Modulação; Agressividade; Medo; Aptidão para adoção; Bem-estar animal.

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<sup>2</sup> CAPÍTULO 2 – SUBMETIDO

## ABSTRACT

Behavioral modulation, as a non-aversive approach, can be an effective tool for managing animals by reducing the prevalence of behavioral disorders. Its benefits include improving communication between dog and caregiver, facilitating habituation, enhancing relaxation protocols, and implementing short but frequent training sessions. This study aimed to apply behavioral modulation techniques—such as habituation, extinction, and counterconditioning—to assist shelter dogs exhibiting fear and/or aggression, which prevented them from being made available for adoption. Eight shelters identified the need to work with 12 dogs: 80% (8/12) of them across five shelters displayed aggression toward humans and other dogs, while 20% (4/12) across three shelters exhibited fear of human contact. Positive reinforcement using food treats was employed to promote a new learning environment and modify responses, with techniques aimed at reducing both aggression and fear. The time required for behavioral modulation varied depending on individual dog responses—some required longer periods, others responded more quickly. All dogs (100%, 12/12) responded positively to the behavioral modulation process and became suitable for adoption. These findings suggest that behavioral modulation should be an integral component of shelter practices, ensuring that more dogs have the opportunity to be made available for adoption and find permanent homes. The study also emphasizes that behavioral modulation must be assessed and applied on a case-by-case basis, always under the supervision of a veterinary behaviorist.

**Keywords:** Shelter dogs; Modulation; Aggression; Fearful; Adoption readiness; Animal welfare

### 3.1 INTRODUCTION

Animal shelters accommodate a significant number of animals from diverse backgrounds, including those rescued from neglect, abuse, or abandonment (Arruda et al., 2019; Garcia, 2019). These environments frequently face challenges such as overcrowding (Turner, 2012), lack of stable routines (Hennessy et al., 1998), spatial restrictions, and deficiencies in meeting the animals' basic needs (Garcia, 2019). Such conditions may lead to persistently high stress levels, resulting in behavioral disorders such as fear and anxiety (Clay et al., 2019). In these cases, modifying inappropriate behavior is often the only viable solution for fearful or aggressive animals to become adoptable.

Currently in Brazil, there are 265 registered shelters according to the MVAbrigos database (2025), and the Brazilian Pet Institute (IPB, 2022) reports that approximately 480 non-governmental organizations (NGOs) provide shelter for abandoned animals. Many shelter dogs remain in the same facility for years without any chance of adoption due to behaviors considered inappropriate by shelter managers. When a dog exhibits such behaviors, particularly those deemed dangerous, the likelihood of prolonged shelter stay increases significantly (McGuire et al., 2021).

Chronic stress caused by ongoing fear or anxiety has detrimental effects on a dog's health and longevity, especially in cases involving fear of strangers (Dreschel, 2010). Dogs that already present behavioral issues upon entering the shelter may experience worsening symptoms due to adverse environmental conditions (Tod et al., 2005). Fear may develop when animals are exposed to stimuli perceived as negative and that exceed their threshold of tolerance (Rooney et al., 2016). Anxious or fearful dogs often react to routine stimuli with elevated stress responses and are likely to experience chronic physiological stress (Dreschel, 2010). These responses may manifest through subtle behavioral signs, such as gaze avoidance, ears held back, crouched or withdrawn body posture, lip licking, and other indicators of stress (Riemer et al., 2021).

Canine aggression poses a serious public health risk and may result in harm to caregivers and other dogs. It is also one of the leading causes of dog relinquishment and, in some U.S. shelters, may be a reason for euthanasia (Powell et al., 2021). Before labeling a dog as aggressive, it is essential to assess its health status, genetics, socialization history, trauma exposure, and learning experiences (Schöning, 2020).

Many behavioral systems in humans and non-human animals are shaped during specific developmental stages, but the mechanisms that influence them remain active throughout life (Bateson, 1979). Behavioral modification relies on six core learning strategies: habituation, extinction, desensitization, counterconditioning, flooding, and aversive/avoidance conditioning (Overall, 2006).

Changing behavior is not a simple task; it requires identifying which elements need modification and understanding how to modify them. This complexity lies in accurately applying behavioral modulation techniques and intelligently recognizing the

right timing for a behavioral response (Overall, 2006). This study aims to describe appropriate techniques used to modulate fear and aggression in shelter dogs and ensure positive and lasting behavioral change that enables them to become adoption candidates.

## 3.2 MATERIALS AND METHODS

### 3.2.1 Ethics Statement

This study is approved by the Ethics Committee on the Use of Animals of the Agricultural Sciences Sector of the Federal University of Paraná under number 015/2022 (05/04/2022).

### 3.2.2 Subjects and Locations

Behavioral modulation was applied in seven permanent shelters located across three Brazilian states—Paraná, Minas Gerais, and São Paulo—as well as in one emergency shelter in Rio Grande do Sul state, which housed dogs rescued from the environmental disaster caused by the May 2024 floods.

The dogs were selected based on behavioral disorders identified by shelter managers. Dogs exhibiting fearful behavior included three males and one female, housed across four different shelters in three states. Dogs showing aggression totaled eight, seven males and one female, distributed across six shelters in four states as shown on Table 1. All dogs were spayed or neutered, vaccinated, dewormed, and microchipped. The group consisted of 11 adult dogs and one senior dog.

Shelter type	State of Brazil	Behavior
A - Municipality	Paraná	Fear and Aggression
B - NGO*	Paraná	Fear
C - TAS**	Minas Gerais	Aggression
D - NGO	São Paulo	Aggression
E - NGO	São Paulo	Aggression
F - NGO	São Paulo	Fear
G - Municipality	Paraná	Aggression
H - Emergency	Rio Grande do Sul	Fear and Aggression

\*Non-Government Organization (NGO) \*\*Temporary Animal Shelter (TAS)

**Table 1:** The behaviors displayed by dogs according to the type of shelter and the corresponding states.

### 3.3 BEHAVIORAL MODULATION

Behavioral modulation consisted of selecting and applying the most appropriate evidence-based techniques at the correct timing for each individual case. In this study, we implemented counterconditioning, extinction, and habituation, integrating core learning theory principles such as reinforcement, desensitization, and overlearning. Techniques were applied either independently or in combination depending on whether the primary behavioral issue involved fear or aggression. Sessions were conducted for 10–20 minutes per day during the first week, and subsequently two to three times per week, with personalized adjustments based on each dog's progress.

a) Counterconditioning: The fear- or aggression-eliciting stimulus was systematically paired with a positive outcome (e.g., high-value food or social interaction) to promote a new emotional response that replaced the previously negative association.

b) Extinction: Undesirable behaviors were no longer reinforced by removing access to the maintaining stimulus (e.g., attention, distance-increasing outcomes). This process aimed to reduce the frequency of such behaviors over time.

c) Habituation: Dogs were gradually exposed to repeated and controlled presentations of the triggering stimulus. Positive reinforcement was delivered whenever a calm or desirable response was observed, facilitating reduced reactivity and improved emotional resilience.

#### 3.3.1 Fear

To address fearful behavior, the first step was to identify the trigger stimulus before selecting the appropriate technique. For all four cases, a combination of counterconditioning, habituation, and extinction was applied as described in Table 2. Approaching the dog had to be gradual, always from a crouched posture, maintaining a safe distance, and initially avoiding direct eye contact. Food treats were presented alongside the aversive object—such as a leash or collar—to which the dog showed aversion. For dogs afraid of human presence, treats were offered while maintaining a non-threatening posture.

The modulation process followed a stepwise progression: moving to the next exercise only when a positive response was achieved. For example, in the case of leash aversion as shown in Figure 1, the leash was first placed on the ground with treats. Once the dog tolerated the object, the researcher held the leash in hand while continuing to offer treats. This continued until the dog no longer showed fear when the researcher held the leash open, ready to place it around the dog's neck.

If a dog regressed at any point, displaying fear again, the process was restarted from the most recent step at which the dog showed no signs of aversion.

For dogs in emergency shelters, fear modulation had to account for heightened emotional arousal and elevated aggression thresholds due to confinement stress and trauma from rescue conditions. The same behavioral techniques were applied, though with additional caution.

The duration of the modulation process ranged from one week to several months, depending on the severity of trauma and each dog's individual recovery pace. The number of treatment days varied based on the dogs' responses and the shelter's capacity to provide continuous care.

<b>Sex and Age</b>	<b>Description of Fear</b>	<b>Modulation Technique</b>
Dog 1 - F adult	Fear of leash/collar	Counterconditioning, Habituation, and Extinction and Treats. Enter the kennel and place the leash/collar on the floor. Place a treat near and inside the leash for the dog to pick up and associate it with the leash as something non-aversive. Continue this process until the dog can calm down when the leash is placed around its neck.
Dog 2 - M adult Dog 3 - M adult Dog 4 - M senior	Fear of humans	Habituation and Extinction and Treats. Enter the kennel and sit without looking directly at the dog, then try to offer a treat from a distance. If the dog doesn't accept treats, don't insist; simply remain in the kennel for a few minutes without eye contact or sudden movements. Try the same exercise day after day until the dog accepts the treats and accepts visual and physical contact.

**Table 2:** Description of fearful dogs that have undergone behavioral modulation along with the techniques used to help extinguish fearful behavior.



**Figure 1:** Following photos: the leash was first placed on the ground with treats, held the leash in hand while continuing to offer treats, continued until the dog no longer showed fear when the researcher held the leash open, ready to place it around the dog's neck.

### 3.3.2 Aggression

Modulating aggression begins with obtaining the dog's behavioral history when possible and identifying the primary trigger of the aggressive behavior. Once identified, the appropriate technique was selected and the modulation process initiated. Due to the potential risks involved, aggression cases were handled exclusively by trained professionals to ensure the safety of both humans and animals.

Counterconditioning, habituation, and extinction were applied across all eight aggression cases. The process began with removing the dog from the kennel—often requiring the use of a catch pole—and moving the animal to an outdoor exercise area. This space was enriched with a variety of toys, such as rope bones and balls, to reduce confinement stress and promote positive interaction in a novel environment. Once in the prepared environment, the dog received food treats and gentle petting whenever the dog approached the researcher in a non-aggressive, friendly manner. This initiated the habituation process using positive reinforcement for each favorable response. Petting was never forced; it was offered only when the dog approached willingly (Figure 2).

Subsequently, counterconditioning and extinction techniques were added, alongside ongoing habituation. The goal was to present the dog with a slip lead to prepare for future participation in the Training (TR) protocol, which involves basic obedience commands (Baldan et al., 2023). This phase was critical for transitioning dogs from requiring aversive tools (e.g., catch poles) to calmly accepting leashing.

The duration of aggression modulation ranged from one week to several months, depending on each dog's triggers and behavioral history. As in fear cases, every situation required an individualized approach, and variation in treatment duration was expected based on behavioral responses and the shelter's capacity for ongoing care.



**Figure 2:** Space enriched with a variety of toys, such as rope bones and balls, after moving the animal to an outdoor exercise area, gentle petting whenever the dog approached the researcher in a non-aggressive, friendly manner.

### 3.4 RESULTS

The dogs included in this study initially presented marked behavioral challenges that compromised their adoptability. Fearful individuals often displayed withdrawal, freezing, trembling, and avoiding human contact, while aggressive dogs showed threatening postures, vocalizations, and attempts to lunge or bite when approached. Such behaviors not only reduced the animals' welfare but also represented a risk for handlers and potential adopters. Following the implementation of structured behavioral modulation strategies—including positive reinforcement, desensitization, and controlled human–dog interactions—progressive improvements were observed. Aggressive responses gradually diminished as dogs began to redirect their attention toward food rewards and accept proximity and handling, while fearful dogs exhibited increased tolerance, exploratory behavior, and reduced reactivity to environmental and social stimuli.

The results indicate that interventions aimed at modulating fear or aggression related behaviors in dogs can be effective. The use of systematic methods for situation assessment, behavioral diagnosis, and management strategies led to positive responses from the animals to the evaluated stimuli, promoting improvement in their behavioral state and increasing their chances of being cleared for adoption.

During the behavioral modulation of aggressive responses, the use of food rewards combined with structured human–dog interactions markedly improved the responsiveness of an aggressive dog housed in an emergency shelter; in this case, the modulation process required approximately one month to achieve positive results, as shown in Figure 3.

All dogs that underwent behavioral modulation—whether for fear or aggression—showed positive responses to the applied techniques and became suitable for

the adoption process. Each dog had its own individual response time, as shown in Table 3.



**Figure 3:** Sequence showing the behavioral modulation process: the dog initially displaying aggression toward humans, then being taken to an open area outside the kennel, subsequently receiving treats and gentle petting, and finally exhibiting the expected interaction after the applied modulation.

Dog	Shelter	Behavior	Response Time
1	A	aggression	one month
2	A	fear	two months
3	B	fear	three days
4	C	aggression	five days
5	D	aggression	four days
6	E	aggression	three days
7	F	fear	five days
8	G	aggression	three days
9	G	aggression	three days
10	H	aggression	one month
11	H	aggression	one month
12	H	fear	four days

**Table 3:** Description of the dogs, shelters, behaviors, and respective response times for fear and aggression cases.

Response times varied according to the predominant behavioral issue and individual progression. When converting response times into days for comparison, the overall mean duration of behavioral modulation was 15 days. Dogs exhibiting primarily aggressive behaviors responded faster on average (mean: 13.5 days,  $n = 8$ ), whereas dogs with fear-related behaviors showed a slightly longer adjustment period (mean: 18 days,  $n$

= 4). Despite this variability, 100% of the dogs demonstrated meaningful behavioral improvement and reached the criteria required for adoption suitability.

Notably, cases requiring one or two months involved either severe fear or chronic aggression, suggesting that prolonged intervention may be necessary when behavior is deeply conditioned or has a strong emotional component. Conversely, most cases of moderate fear or aggression responded within three to five days, indicating that even brief, targeted interventions can generate rapid and clinically relevant change in a shelter environment.

These findings support the feasibility and practical impact of behavioral modulation protocols in improving the adoptability and welfare of sheltered dogs, even under the operational constraints typical of Brazilian shelter settings.

### **3.5 DISCUSSION**

Behavioral issues in animals have received increasing attention in literature, particularly due to their association with adverse experiences faced by the animals (Scarlett et al., 1999; Camps et al., 2019). Behavioral problems such as fear or aggression may be perceived as annoying or even dangerous by guardians, other animals, or the affected animal itself. These issues can negatively impact the animal's welfare and may stem from medical conditions or from normal behaviors that are considered problematic by the guardians (Camps, Amat, & Manteca, 2019). Furthermore, behavioral issues are among the main reasons for pet abandonment in various regions of the world (Scarlett et al., 1999; Salman et al., 2000; Jensen et al., 2020). Abandoned animals may end up living on the streets or being taken in by shelters (Garcia, 2019).

Shelter dogs face numerous challenges, beginning with their arrival into unfamiliar environments, new people, and other animals. Over time, they may develop behaviors associated with frustration and depression (Cozzi et al., 2016). Although the shelter environment restricts opportunities for social contact, dogs are capable of forming affiliative bonds with humans within minutes of interaction (Baldan, 2021; Baldan, 2022; Baldan et al., 2023; Boada & Wirobski, 2024). This capacity for rapid social bonding underscores the potential effectiveness of implementing structured behavioral modulation programs.

It is essential that shelters have trained professionals capable of identifying behavioral changes, particularly within the first five days after the animal's arrival. Early detection of inappropriate behaviors allows for quicker intervention, facilitating behavioral modulation and improving the dog's responsiveness to management (Clay et al., 2019). One key tool in this process is behavioral assessment, as dogs exhibiting behaviors considered dangerous tend to remain significantly longer in shelters (McGuire et al., 2021). According to Schöning (2020), every behavioral problem—not only aggression—has an underlying cause and a trigger. Therefore, resolving these issues requires individual evaluation and a tailored intervention plan for each dog. It is also

important to emphasize that aggressive behavior is part of the natural communicative repertoire of dogs; thus, the goal is not to eliminate aggression, but rather to understand and manage it appropriately.

The findings of this study demonstrate that fear and aggression in shelter dogs can be effectively addressed through targeted behavioral modulation. However, the outcomes varied depending on environmental conditions. For example, in the emergency shelter, the small kennel size and the use of chaining intensified stress and aggression, resulting in a longer intervention period—approximately one month—to achieve positive behavioral changes. By contrast, dogs in shelters with more enriched environments required shorter intervention periods to display improved behaviors. This highlights the importance of considering the shelter environment itself as a modifiable factor when implementing behavioral protocols.

Our results align with previous research, demonstrate that behavioral modulation protocols improve adaptability and increase adoption rates in shelter dogs (Luescher & Medlock, 2009). This reinforces the need for individualized strategies developed and implemented by professionals trained in animal behavior. Although the small sample size and absence of a control group limit generalizability, the consistent positive outcomes observed here support the conclusion that even in diverse shelter contexts, targeted behavioral interventions can produce tangible benefits.

From a practical perspective, these findings support incorporating behavioral modulation into the routine management of both public and private shelters. Veterinarians and shelter staff with expertise in animal behavior are key to developing individualized plans and ensuring success of intervention. Furthermore, public policies that encourage and regulate such practices could significantly enhance the rehabilitation and social reintegration of institutionalized dogs.

Future studies should explore the comparative effectiveness of different behavioral approaches, larger sample sizes, diverse regional contexts, and the long-term outcomes of interventions following adoption. The present case study underscores the importance of early, individualized behavioral assessment and targeted modulation to increase the chances of successful adoption and improve the overall welfare of shelter dogs.

### **3.6 CONCLUSION**

This study demonstrates that targeted behavioral modulation can effectively reduce fear- and aggression-related behaviors in shelter dogs, including cases considered challenging. Individualized interventions, based on structured human–dog interactions and positive reinforcement, consistently promoted measurable improvements, with substantial progress observed within one month in more severe cases. These results emphasize the importance of early behavioral assessment and tailored intervention strategies for enhancing animal welfare and adoption prospects. Integrating evidence-

based behavioral modulation into routine shelter practices has the potential to reduce risks associated with problematic behaviors, improve rehoming success, and contribute to more sustainable shelter management strategies.

### **Conflict of Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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#### 4 CAPÍTULO 3: THE IMPACT OF SHELTER DOGS SLEEP OUTSIDE THEIR ENVIRONMENT: A BRAZILIAN STUDY<sup>3</sup>

##### RESUMO

Para cães domésticos, o sono é uma função essencial durante a qual ocorrem processos como a consolidação da memória e a restauração de energia. Animais com baixa qualidade de sono podem apresentar prejuízos cognitivos e redução na resposta imunológica. Alterações na composição do sono ou na duração de cada fase podem ocorrer em decorrência de experiências vividas durante o estado de vigília e podem refletir o nível de bem-estar do animal. Cães de abrigo estão expostos a inúmeros fatores estressantes, como um ambiente novo, ruídos altos, presença de pessoas ou cães desconhecidos, espaço restrito e alterações no ciclo claro-escuro, os quais podem afetar o ciclo circadiano. O objetivo deste estudo foi avaliar o comportamento de sono de cães de abrigo em resposta a um ambiente novo, comparando a qualidade do sono e as mudanças comportamentais. A coleta de dados foi realizada com dezoito cães, cada um monitorado por duas noites, uma no abrigo e outra na casa de um voluntário, além do preenchimento de um formulário pelo voluntário, avaliando o comportamento do cão na chegada e durante o sono noturno. Embora as médias nos diferentes ambientes revelem pouca diferença — 66,2% no abrigo e 74,8% na casa do voluntário —, uma associação estatisticamente significativa entre o comportamento inicial e a profundidade do sono apresentou valor de  $p = 0,0055$ , indicando que a resposta comportamental inicial na casa do voluntário é muito importante. Portanto, a importância da interação social, tanto dentro quanto fora do abrigo, corrobora com a qualidade do sono e, mais importante, com o bem-estar desses cães.

**Palavras-chave:** cão de abrigo, bem-estar, comportamento, ambiente, sono, interação, medicina de abrigos.

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<sup>3</sup> CAPÍTULO 3 – SUBMETIDO

## ABSTRACT

To domestic dogs, sleep is an essential function during which processes such as memory consolidation and energy restoration occur. Animals with poor sleep quality may experience impaired cognition and decreased immune response. Changes in sleep composition or the duration of each phase can occur due to experiences while awake and may reflect the animal's welfare level. Shelter dogs are exposed to numerous stressors, such as a new environment, loud noises, the presence of unfamiliar people or dogs, restricted space, and light–dark alterations, all of which are likely to affect their circadian cycle. The aim of this study was to evaluate shelter dogs' sleep behavior in response to a novel environment, comparing the quality of their sleep and behavior changes. Data collection was conducted with eighteen dogs, each monitored for two nights, one in the shelter and another in a volunteer's home, and through a form filled out by the volunteer evaluating the dog's behavior upon arrival home and during the night's sleep. Although the mean values in the different environments show little difference, in the shelter it is 66.2% and in the volunteer's home it is 74.8%, a statistically significant association between the initial behavior and sleep depth showed a p-value of 0.0055, indicating that the initial behavioral response in the volunteer's home is very important. Therefore, the importance of social interaction both inside and outside the shelter environment corroborates the quality of sleep and, most importantly, the well-being of these dogs.

**Keywords:** shelter dog, welfare, behavior, environment, sleep, interaction, shelter medicine

## 4.1 INTRODUCTION

Sleep is a fundamental biological process; however, it is often overlooked when compared to wakefulness (Kis et al., 2017). It is considered an essential process for domestic dogs, and factors that affect sleep quality can impact the animal's health. During sleep, processes such as memory consolidation, energy restoration, and the elimination of potentially neurotoxic substances accumulated in the brain occur. Therefore, sleep deprivation can impair cognition, decrease immune response, and increase the risk of obesity and cardiovascular diseases (Mondino et al., 2021). Sleeping in mammals is a species-specific process, related to specific environmental signals such as periods of activity, feeding cycles, and reproductive cycles. Sleep impacts behavior, and the reverse is also true; mammalian sleep generally alternates between two phases: NREM sleep and REM sleep (Schork et al., 2022).

Domestic dogs have polyphasic sleep, with the sleep-wake cycle consisting of three phases: the non-rapid eye movement (NREM) phase, also known as slow-wave sleep, and the rapid eye movement (REM) phase. The states that make up the sleep-wake cycle can be distinguished by their electrophysiological and behavioral characteristics (Mondino et al., 2021). Each phase is responsible for restoring different physiological and cognitive functions. NREM sleep, for example, is associated with energy homeostasis, the immune system, and the regulation of metabolic functions, while REM sleep is related to neural plasticity, memory consolidation, and emotional processing (Schork et al., 2022). Under normal circumstances, domiciled dogs exhibit three sleep cycles, each lasting about 16 to 20 minutes, and spend approximately 98% of the night resting (Adams and Johnson, 1993). Changes in the composition of sleep, such as in the duration of each phase, occur as a result of experiences living during wakefulness and may indicate the level of animal welfare (Owczarczak-Garstecka and Burman, 2016).

In a study van der Laan et al. (2023) demonstrated that domiciled dogs spent 94% of the night resting, while shelter dogs, during their first night of sleep at the shelter, spent on average only 75%, highlighting a significant difference in sleep patterns when comparing domiciled dogs to those living in shelters. Hoffman and colleagues (2019) showed that shelter and domiciled dogs present significant differences in activity levels. In the study, shelter dogs exhibited higher activity during the first three quarters of the day, which coincided with the shelter's operating hours, while domestic dogs showed increased activity during the last quarter of the day, when their guardians were at home. This suggests that human presence may influence dogs' activity patterns (Hoffman et al., 2019).

Dogs experience a sudden change in their environment and routine when placed in shelter, and their welfare can be seriously compromised (van der Laan et al., 2021). A dog in a shelter faces various stressful situations, not only social separation and exposure to a completely new environment, but also exposure to noise, restricted space, and changes in light-dark cycles, which are likely to affect their circadian rhythm (Hennessy et al., 1997). The stress response in shelter dogs can last from days to weeks, varying between individuals (van der Laan et al., 2021), and one of the most prevalent behavioral problems causing distress in dogs is social fear, such as fear of specific or unfamiliar

people (Puurunen et al., 2020). Owczarczak-Garstecka and Burman (2016) showed that dogs who spent a greater part of the day resting performed better in cognitive bias tests, exhibited less repetitive behavior in the kennel, and were characterized as more “relaxed” by the staff. Bunford and colleagues (2018) showed that after an active day, dogs slept more and were more likely to exhibit sleepiness, earlier onset of NREM sleep, and longer durations of both REM and NREM sleep.

This research aims to evaluate the sleep behavior of shelter dogs, with one night spent at the shelter and another in a volunteer home, in order to compare whether there is a significant difference in sleep quality related to the change in environment, as well as changes in behavior as perceived by the volunteer home. The purpose of this study is to contribute to animal behavior research with the aim of promoting improvements in the shelter dog’s welfare, especially to understanding the relationship between sleep and adaptation of these dogs and their new owners.

## 4.2 METHODS

### 4.2.1 ETHICS STATEMENT

This study is approved by the Ethics Committee on the Use of Animals of the Agricultural Sciences Sector of the Federal University of Paraná under number 015/2022 (05/04/2022). Research Ethics Committee (CEP-SD), of Health Sciences Sector of the Federal University of Paraná under number 5.389.529 (21/08/2022).

### 4.2.2 SUBJECTS AND HOUSING

This study was conducted in a municipal shelter, Center of Reference for Animals at Risk (CRAR) in Curitiba, Paraná. It included 18 dogs of various ages – young, adult, and senior - but not less than 6 months years old (precise ages are unknown, most shelter dogs are strays). All dogs were vaccinated, dewormed, neutered or spayed, and in good health. They were housed in kennels with approximately  $3 \times 10$  m<sup>2</sup>, made of concrete, half covered, and another half open as a solarium (Fig. 1). Males and females were housed together with 4-6 dogs per kennel; food was offered twice a day and water was provided *ad libitum*. Dogs with infectious or contagious diseases, as well as those that exhibited high levels of aggression toward people or other dogs, were excluded from the study.



**Figure 1:** the kennels where the dogs were housing showing the two areas, one cover and other open as solarium

#### 4.2.3 DATA COLLECTION

The sleeping data was collected using a monitor with smart GPS and health tracker from the company Tractive (<https://tractive.com/>), which was attached to each dog's collar (Figure 2) and analyzed through an application downloaded onto the research cell phone. As the dogs were not usual to wear collars, an acclimation period was implemented. Each dog was fitted with a collar three days prior to the beginning of data collection, allowing them to gradually become accustomed to the sensation and presence of the device. This precaution helped to minimize any stress or behavioral changes that might arise from the sudden introduction of the collar, ensuring that the recorded sleep data reflected the dogs' typical patterns as accurately as possible.



**Figure 2:** The GPS monitor attached to dog's collar. A: the dog at the shelter and B: dog at volunteer home.

To ensure consistency in data collection, two distinct sleep monitoring sessions were conducted: one while the dogs were at the shelter and another during their stay in the volunteer's home. The Tractive monitor was placed on each dog at 1 pm to begin capturing their sleep patterns for the night at the shelter. Following their transition to the volunteer home, the device remained in place throughout the subsequent night, only being removed after the dogs' morning routine, specifically at 10 am back at the shelter. For each phase, a printout of the sleep data was generated at the same time every morning, precisely at 9 am, thereby standardizing the point of data retrieval and ensuring comparability between the two environments. This rigorous protocol allowed for a reliable assessment of changes in sleep quality, patterns, and interruptions associated with the environmental shift.

To monitor the sleep data collection also aimed to assess the quality of the dogs' sleep in three categories: low, medium, and high, each expressed as a percentage (%) as in Table 1. This approach allowed for a quantitative comparison of how the change in environment affected not only the duration and patterns of sleep, but also the proportion of time the animals spent at each quality level during the nights analyzed.

**Table 1:** Each dog was described in letters. The quality of sleep was described in three categories, low, medium and high in %.

Dog	Place	Night Sleep Quality	Night Sleep Quality (%)
A	Shelter	Low	32%
	Home	High	92%
B	Shelter	Low	19%
	Home	High	71%
C	Shelter	High	77%
	Home	Medium	52%
D	Shelter	Low	31%
	Home	High	89%
F	Shelter	Low	17%
	Home	High	75%
G	Shelter	Medium	39%
	Home	High	70%
H	Shelter	Medium	51%
	Home	High	80%
I	Shelter	High	92%
	Home	Low	27%
J	Shelter	High	61%
	Home	High	83%
K	Shelter	High	97%
	Home	High	78%
L	Shelter	High	69%
	Home	High	78%
M	Shelter	High	87%
	Home	High	93%
N	Shelter	High	97%
	Home	High	93%
O	Shelter	High	97%
	Home	High	73%
P	Shelter	High	64%
	Home	Medium	52%
Q	Shelter	High	84%
	Home	High	85%
R	Shelter	High	86%
	Home	High	77%
S	Shelter	High	92%
	Home	High	94%

To evaluate the volunteer home perception regarding the dog's night of sleep, a questionnaire was sent out, created via Google Forms, with questions about the dog's arrival at home and about its night of sleep. There was no prior training on canine behavior to the members of volunteer home, and the evaluation was conducted subjectively, observing the dog's general behavior in the new environment and the quality of sleep. See the questions in Table 2.

**Table 2:** Questions and answers from the volunteers' home perception to help which helps to elucidate the behavior of dogs when they arrive home and while sleeping.

Questions	Answers
1. Dog's name	discursive
2. How did the dog behave in the first hours after arriving at your home?	a) Showed curiosity about the place (explored the environment) b) Showed fear (tail between the legs, trembling, or remaining still without moving) c) Was interested and interacted with everything (people and environment) d) Showed no interest but also no fear
3. How was the dog's beginning of the night's sleep?	a) Was restless for a long period b) Was restless for a short time, but calmed down as the night went on c) Remained calm
4. In your opinion, did the dog sleep deeply or was it easily awakened by sounds and or movements around?	a) Slept deeply b) Easily awakened by sounds and or movements around

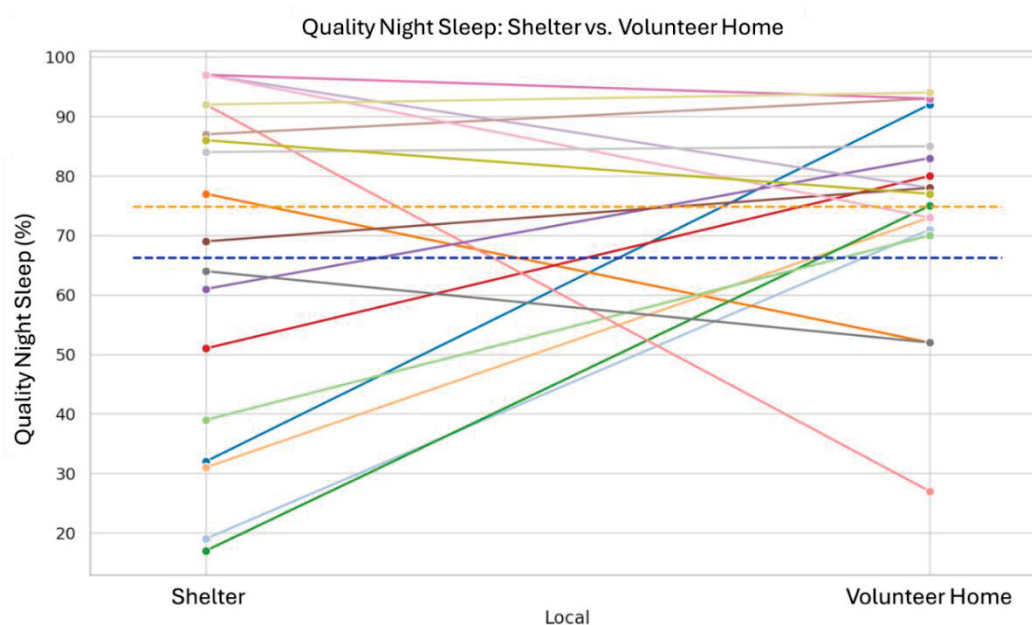
### 4.3 STATISTICAL ANALYSIS

To perform the statistical analysis, the paired t-test and the Wilcoxon test (non-parametric) were used to reach a p-value ( $p\text{-value} > 0,05$ ). To illustrate this analysis a paired line graph was created showing sleep quality in the shelter versus the volunteer home.

Using qualitative data from the forms, a basic descriptive and statistical analysis was conducted to assess behavior and sleep in a new environment, the foster home. The analysis focused on behavior during the first hours, the beginning of the night's sleep, and the perception of sleep depth. A boxplot was generated, and a Chi-square test showed the p-value ( $p\text{-value} > 0.05$ ) to investigate whether there is an association between initial behavior and perception of sleep depth.

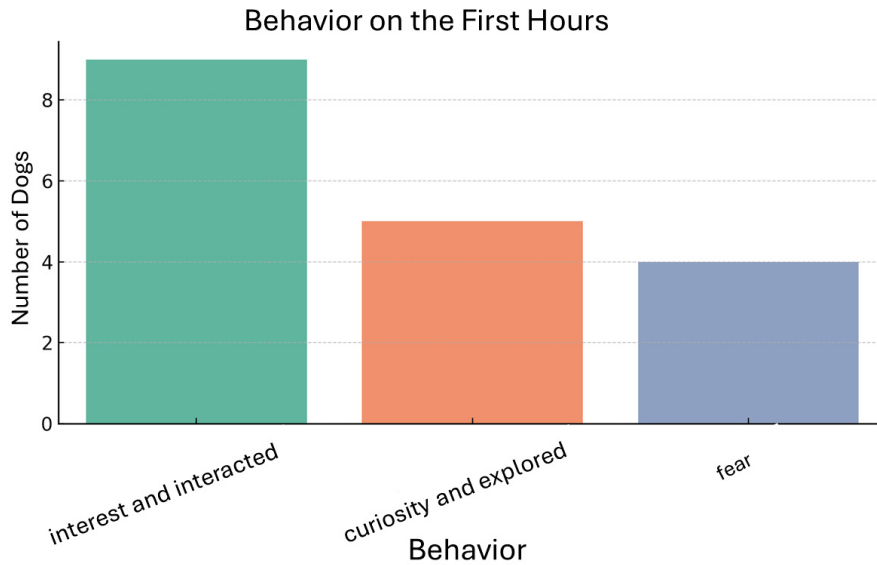
#### 4.4 RESULTS

When we look at the average regarding the analysis of sleep percentage in shelter and in the volunteer home, we notice that there is a difference: the mean in the shelter is 66.2%,  $p$ -values:0.287 while the mean in the volunteer home is 74.8%,  $p$ -values:0.347. Tests indicate that there is no statistically significant difference between sleep quality in the shelter and in the foster home ( $p$ -value  $> 0.05$ ), even though the average is higher in the volunteer home. On Fig.3 the paired line graph, each line represents an individual dog, and most lines rise from left (shelter) to right (volunteer home), suggesting an improvement in sleep quality at volunteer home. The bold lines represent the means of each group – the blue line (shelter): 66.2%, and the orange line (volunteer home): 74.8%.



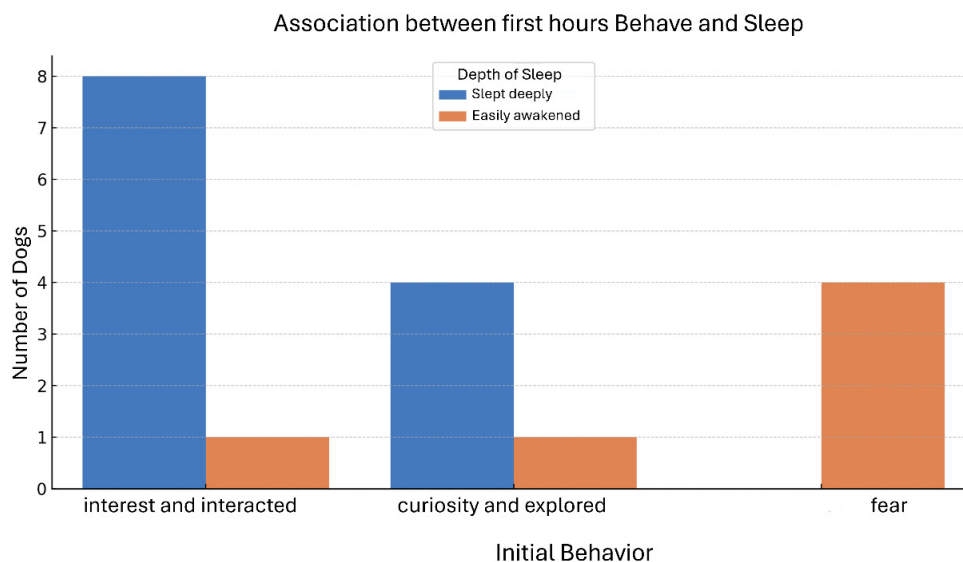
**Figure 3:** Comparison of sleep quality between the night spent in the shelter and the night spent in the volunteer home.

For the results of the basic descriptive and statistical analysis of the qualitative data on the behavior and sleep of dogs in a new environment, three distinct analyses were initially carried out as shown in Fig.4, behavior during the first hours from 18 dogs observed, 9/18 (50%) showed interest and interacted with the environment, 5/18 (27.8%) displayed curiosity and explored the location, while 4/18 (22.2%) showed fear. At the beginning of the night's sleep from 18 dogs were observed, 9/18 (50%) remained calm, 7/18 (38.9%) restless for a short time, but calmed down as the night went on and only 2/18 (11.1%) restless for a long period. The perception of sleep depth, 13/8 (72.2%) slept deeply and 5/18 (27.8%) were easily awakened by sounds and or movements around.



**Figure 4:** Describe the perception on behavior in the first hours at volunteer home where 9 dogs showed interest and interacted, 5 dogs displayed curiosity and explored, and 4 dogs showed fear.

The Chi-square test evaluated the association between the dog's initial behavior and the perceived depth of sleep where Chi-square value ( $\chi^2$ ): 10.40 and p-value: 0.0055 ( $p\text{-value} > 0.05$ ). The  $p\text{-value} < 0.05$  indicates a statistically significant association between initial behavior and depth of sleep. This suggests that the way a dog behaves upon arrival—whether through interaction, fear, or curiosity—significantly influences whether they experience deep or light sleep. Fig. 5 indicates that dogs who exhibited fear were more likely to experience lighter sleep which were easily awakened.



**Figure 5:** Association between behavior during the first hours after arrival at the volunteer home and deep sleep.

## 4.5 DISCUSSION

The variation in sleep percentages—71.6%, 89%, and 88%—found in various studies with shelter dogs supports the idea that the quality of different environments and the stressors faced by dogs in shelters greatly influence their welfare (Owczarczak-Garstecka and Burman, 2016; Hoffman et al., 2019; van der Laan et al., 2023). Everything in the shelter can be a source of stress for a newly arrived dog — a new environment, unfamiliar dogs, unfamiliar people (Hennessy et al., 1997), and having to cope with new sounds, such as the chorus of barking before any training for silence has taken place (Baldan, et al., 2023a).

According to Harding et al. (2019) exposure to noise during the night is also a factor that affects sleep, causing the animal to take longer to fall asleep, leading to sleep interruptions and increased stress responses. Additionally, another external factor that influences sleep is temperature, mammals have behavioral and neurological mechanisms that coordinate thermoregulation cycles and sleep. In both humans and other mammals, direct skin warming can shorten sleep latency and promote NREM sleep (Harding et al., 2019).

One of the greatest stressors for shelter dogs is social isolation (Gunter et al., 2019). To help relieve this stress, adoption programs such as foster care have shown that when dogs sleep outside the shelter and have regular interaction with humans, their stress levels decrease and their chances of adoption increase (Baldan and Garcia, 2024). Even a single 20-minute interaction and training session outside the kennel can lead to behavioral improvements, making dogs more prepared for permanent adoption (Baldan, 2021; Baldan, 2022; Baldan et al., 2023b).

The volunteer's homes perception of the dogs' behavior upon arrival helps to explain the beginning of their adaptation process when they are adopted (Baldan and Garcia, 2024) and the majority of dogs (77.8%, 14/18) showed interest and interacted with people and the environment, while a smaller portion (22.2%, 4/18) displayed fear, which may be linked to later sleep difficulties. Most dogs (88.9%, 16/18) remained calm or settled down quickly at night, with only two (11.1%, 2/18) showing prolonged agitation—both of which had previously exhibited signs of fear. Additionally, the majority (72.2%, 13/18) slept deeply, whereas those who were easily awakened tended to have a history of fear or initial nighttime agitation.

Dogs have memories, and Walker (2008) demonstrated in his study that there is a bidirectional and symbiotic relationship between sleep and memory. Memory plays an important role in the human–dog interaction and in the socialization of dogs while they are in shelters, which in turn influences their behavior and how they are introduced to a new environment outside the shelter (Baldan, 2022; Baldan et al., 2023b). Socialization is the key to indicating a dog sociability degree and how important this behavior is for its welfare and even for a successful adoption (Feuerbacher and Wynne, 2015; Baldan and Garcia, 2024).

This study highlights the relevance of observing dogs' behavior during the adaptation phase to new environments, as both the quality and quantity of nighttime sleep, in shelters as well as adoptive homes, directly reflect the well-being of these animals. The results indicate that the way a dog behaves upon arrival—showing interaction, fear, or curiosity—significantly influences the sleep pattern (deep or light) it will present. It is also important to emphasize, however, that this work had limitations related to the small number of dogs evaluated, the limited number of volunteer homes participating, and the difficulty in using monitoring collars, since many dogs were not accustomed to wearing them, even damaging or destroying them during the study.

#### **4.6 CONCLUSION**

The human–dog interaction is a key indicator of a dog's increasing sociability, and work this in shelter dogs improves their chances of successful adoption. This study demonstrated that the depth of sleep—whether deep or light—has a significant influence on how dogs behave when arriving in a new home. Future studies with a larger number of dogs and longer observation periods in volunteer homes may provide clearer insights into the relationship between behavior and sleep.

#### **CRedit authorship contribution statement**

**Ana Lucia Baldan:** Conceptualization, Data curation, Methodology, Writing – original draft, Writing – review and editing, Validation, Visualization, Project Administration. **Nicole Garcia Rubini:** Writing – original draft, Visualization. **Rita de Cassia Maria Garcia:** Formal analysis, Writing – review and editing, Supervision.

#### **Ethical statement**

This study is approved by the Ethics Committee on the Use of Animals of the Agricultural Sciences Sector of the Federal University of Paraná under number 015/2022 (05/04/2022). Research Ethics Committee (CEP-SD), of Health Sciences Sector of the Federal University of Paraná under number 5.389.529 (21/08/2022).

#### **Declaration of Competing Interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## 5 CAPÍTULO 4: STRATEGIES TO INCREASE THE NUMBER OF DOG ADOPTION IN A BRAZILIAN SHELTER <sup>4</sup>

### RESUMO

Animais em situação de rua é uma realidade muito triste no Brasil e sabe-se que o abandono é um problema multifatorial e que gera impacto negativo no bem-estar dos animais e riscos à saúde pública. Animais abandonados são acolhidos, na sua maioria, por Organizações Não Governamentais (ONG), Organizações da Sociedade Civil (OSC) espalhadas pelo país. Para mitigar a problemática do abandono essas organizações buscam a promoção de eventos de adoção para tentar sanar o número cada vez mais crescente de animais nesses locais. Mas todo evento de adoção precisa ser realizado de forma adequada e criteriosa, e o acompanhamento da nova família ou novo tutor no pós-adoção é fundamental para identificar riscos de um novo abandono. A literatura mostra que a adoção mal-sucedida está associada a problemas da interação entre tutores e cães, que podem resultar em comportamento indesejáveis. Este estudo teve como objetivo trazer e aplicar pela primeira vez no Brasil dois programas internacionais, adaptados para nossos abrigos, o Passeio para Adoção (PA) e o Lar Adotivo (LA). Os dois programas permitem que famílias pré-cadastradas possam interagir com os cães fora do abrigo, seja em passeios nos parques, lojas e restaurantes ou passando uma ou mais noites com os cães em suas casas. Essa interação fora do abrigo propicia uma aproximação melhor para o futuro adotante e o cão, aumentando a chance de adoção que é o objetivo principal desse projeto de pesquisa. A cidade brasileira escolhida para aplicar o estudo foi Curitiba, no estado do Paraná. As coletas foram realizadas de outubro de 2022 a setembro de 2023 com 22 cães participantes, 7 nos dois programas, com 17 cães do PA adotados e 9 do LA. Muitos cães foram adotados pela família voluntária, um do PA e 7 do LA, o que comprova um resultado positivo para aplicação dos programas principalmente o LA.

**Palavras-chave:** cães de abrigo, programas para adoção, abandono

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<sup>4</sup> CAPÍTULO 4. PUBLICADO e apresentado de acordo com a revista BJVRAS

## ABSTRACT

Stray dogs are a very sad reality in Brazil, and it is known that abandonment is a multifactorial problem that generates a negative impact on animal welfare and risks to public health. Abandoned animals are mostly taken in by Non-Governmental Organizations (NGOs) and Civil Society Organizations (CSOs) spread across the country. To mitigate the abandonment problem, these organizations seek to promote adoption events to try to remedy the increasing number of animals in these places. However, every adoption event needs to be carried out appropriately and carefully and monitoring the new family or new guardian post-adoption is essential to identify risks of new abandonment. The literature shows that unsuccessful adoption is associated with problems in the interaction between owners and dogs, which can result in undesirable behavior. This study aimed to bring and apply for the first time in Brazil two international programs, which were adapted for our shelters, the Field Trip (Passeio para Adoção – PA) and the Sleepover (Lar Adotivo - LA). The two programs allow pre-registered families to interact with the dogs outside the shelter, whether through walks in parks, stores, and restaurants or by spending one or more nights with the dogs in their homes. This interaction outside the shelter provides a better approach to the future adopter and the dog, increasing the chance of adoption which is the main objective of this research project. The Brazilian city chosen to apply the study was the Curitiba state of Paraná. Data was collected from October 2022 to September 2023 with 22 participating dogs, 7 in both programs, with 17 dogs adopted from PA and 9 from LA. Many dogs were adopted by the volunteer family, one from PA and 7 from LA, which proves a positive result for applying the programs, especially from LA.

**Keywords:** shelter dogs; programs for adoption; abandonment

## 5.1 INTRODUCTION

In Brazil, there are many homeless animals, dogs and cats, that may have been abandoned or may be lost, or even community and semi-domiciled, living in a vulnerable situation (Oliveira, 2019). According to Oliveira (2019), animal abandonment is a multifactorial problem that generates a negative impact on animal welfare and risks to public health.

Brugnerotto and his collaborators (2022) defined, in their studies, terminologies to be used better to understand the abandonment of domestic animals in Latin America and described donation as when the owner gives their animal to another individual, and that return is when the animal is returned to the same institution from which it was adopted, the adoption process is when the animal is sent to a home through a selection process and finally abandonment is when the guardian intentionally leaves the animal in any place without supervision and the necessary care.

The problem of abandonment becomes more aggravating when efficient programs for the population management of dogs and cats are absent in municipalities. Having a complete program that, in addition to controlling animal reproduction, can raise awareness among the entire population about responsible ownership, will be able to support actions to combat this problem that plagues many municipalities in our country (Garcia, R. C. M. et al., 2019).

The abandonment of animals along with inefficient population control programs corroborates the exponential increase in overcrowded shelters with different reception capacities, from hundreds to more than a thousand animals and according to Institute Pet Brasil (Instituto Pet Brasil, 2019) more than 170 thousand animals are crowded together in 350 Civil Society Organizations (CSOs) spread across Brazil.

In most shelters and entities that take in abandoned animals, whether official or not, the promotion of adoption events occurs as an attempt to increase the number of animal departures. But every adoption event needs to be carried out appropriately and carefully, and monitoring the new family or new guardian post-adoption is essential to identify risks of new abandonment (Bastos et al., 2019).

The literature shows that unsuccessful adoption is associated with problems in the interaction between owners and dogs, which can result in undesirable behavior. In a “post-adoption” follow-up survey, it was found that 70% (40/57) of the failures were due to the dog's behavior (according to the adopters' report), with 40% (16/40) of these being due to

bad behavior-modes and 30% (12/40) by the destruction of furniture (Gates et al., 2018). Animals that are prepared before adoption can develop a behavioral repertoire more suitable for coexistence with humans and other animals (Protopopova et al., 2012; Luescher & Tyson Medlock, 2009), being able to avoid future returns. Behavior has been shown to be a more important aspect than the appearance of the dog for future adopters (Wells & Hepper, 1992).

Developing programs with strategies aimed at increasing the number of adoptions and estimating that adoptions are permanent requires a look at guidelines involving animal welfare within shelters (Galdioli & Garcia, 2022). Knowing the behavior of animals, maintaining a constant routine, letting animals socialize, having a good sleep, interacting with humans, and exploring different environments and smells, according to association of shelter veterinarians (Newbury et al., 2018) are important aspects and should be applied in a shelter environment. (Baldan, 2021) demonstrated in her master's thesis, that dogs that interact with humans, explore different environments, and are trained with basic commands for a total period of 20 minutes outside the stall, have a greater chance in the adoption process and decreased exponentially the chance of return.

The adoption process is not easy in Brazil, it is always through events with dogs exposed in enclosures in an environment completely unknown to these animals and these events happen because the population is not accustomed to visiting dogs in shelters, and when a visit to shelters occurs, people do not interact with the dogs that are offered for adoption (Travnik & Baldan, 2022) and this contributes to the chances of adoption being small and sometimes zero.

International studies (Gunter et al., 2021; Gunter et al., 2019) showed alternatives to increase the chance in the process of adopting dogs in shelter situations and together with the Maddie's® Foundation, an international NGO, they applied two programs, the Field Trip and Sleepover are programs where volunteer families can take a dog for a walk or can take a dog to sleep outside the shelter participating in the programs. Baldan (2021) applied Sleepover as a pilot project in the city of Pirassununga in the interior of São Paulo with positive results, where the dogs selected to participate in the program were adopted.

The objective of this study was to adapt and apply the two international programs in Brazil with different names, Field Trip was renamed Passeio para Adoção (PA) and Sleepover is Lar Adotivo (LA). These programs were officially launched in October 2022 in the city of Curitiba, in the state of Paraná, to increase the adoption rate and decrease the return rate of dogs from a municipal shelter.

## 5.2 MATERIALS AND METHODS

This study was carried out at CRAR (Center of Reference for Animals at Risk), a municipal shelter that belongs to the city of Curitiba in the state of Paraná. Data collection was carried out from October 2022 to September 2023. During this period, the study included 68 dogs that were previously prepared with two protocols (Baldan et al., 2023; Baldan, 2021), human-dog interaction and training (IHC and TR) to have dogs ready for walks and sleeping outside without putting any participating family at risk. We were able to count on 20 dogs which actively participated in the programs due to the choices of the participating shelter. It is worth mentioning that the process of adopting the 68 trained dogs was constant within the shelter, and there was no impediment to them not being adopted because they were participating in the programs.

All the participating dogs were vaccinated, dewormed, neutered, spayed and not less the ages of 6 months years old (precise ages are unknown as most dogs arrive to the shelter as strays). These dogs in the programs were always chosen by a person designated at the shelter for this responsibility, without the researcher's involvement in this choice. The volunteer's family must fill in a form, and after analyzing this form, the person responsible contacts the volunteer family via WhatsApp to carry out the interview and only after that, the volunteer family was qualified to choose the dog and take it to one of the chosen programs.

The type of study was cross-sectional descriptive. Sampling was defined by participation in the programs, therefore being defined by convenience. The variables analyzed statistically were descriptions of dogs' behaviors by the volunteers, dogs' encounters with other animals and children and the preferences of these dogs during walks. These variables were analyzed with simple and relative frequencies, where N is the number of elements observed, % percentage and 95% CI is the 95% confidence interval. To better visualize these analyses, tables were produced, and all analyses were carried out in the R environment (R Core Team, 2021).

### 5.2.1 ADOPTION PROGRAMS

The Passeio para Adoção (PA) is the program in which volunteer families register through Google Forms (<https://forms.gle/Jvg8vVHQuWCfr5mt7>) available on the shelter and researcher's social media (Annex I). After acceptance by the shelter manager and scheduling, the volunteer goes to the shelter to pick up a dog to take it for a walk for

up to 4 hours in places in the city where dogs are accepted, such as parks, restaurants, and stores, such as Buba walking at Barigui park (Figure 1) and Clotilde relaxing in a restaurant (Figure 2). Dogs leave the shelter wearing a vest that says, “Adopt me” (Figure 3) and in this way they can be seen by society, thus increasing their chance of adoption.

To monitor and collect data from the PA program, the volunteer fills out a physical report (Figure 4), adapted from the “Animal Care and Adoption Center”, a shelter in Montgomery County, state of Virginia-USA (<https://montva.com/departments/acac>). The report consists of 18 items, including whether the dog knows how to walk on a leash, whether the dog is sociable, and whether he has met other dogs, all of this is to map the dog's behavior and provide the basis for finding a future adopter with the dog's profile described. The descriptions made in the report were transcribed into a table to analyze the results collected. It is worth mentioning that the volunteers were not previously trained to respond to the report applied, the answers were by the perception of each one during the tour, signaling the drawings that were considered YES and those that were not flagged were considered NO.

The Lar Adotivo (LA) is the program in which the dog can leave the shelter to sleep outside, sleeping in the home of volunteer families who registered through Google Forms (Annex I) available on the shelter's and the researcher's social media (<https://forms.gle/84PeLMCq7MuQn6Ds9>) and which have been accepted by the person responsible for the shelter. In LA, the dog can sleep up to 7 nights outside the shelter. This program allows the dogs and the volunteer family to get to know each other better, allowing the animals to live together outside the shelter, at the same time as the family gets to know it better, which can make the decision for the adoption process easier. The volunteer family signs a term of commitment to participate in the LA (Figure 5) which states the date of departure and return of the dog to the shelter. If the animal is adopted by this family, the definitive adoption term is generated by the shelter to confirm the adoption process. For greater safety, dogs are monitored using a device with a global positioning system (GPS), Tractive® satellite locator attached to the collar and accompanied by an application on the cell phone (Figure 6).

### 5.3 RESULTS

Four dogs participated in both programs, 15 dogs participated only in PA with 80% (12/15) resulting in adoptions, and 9 dogs participated only in LA with 100% adoptions, totaling 20 dogs participating.

For the Passeio para Adoção program, data was collected from the report (Figure 4) and the analysis of the volunteers' perception during the walk was able to describe various behavioral aspects of the dogs that help in a possible adoption. One of the

questions in the report was how volunteers could define dogs in a few words. It was described in Table 1 that 73.33% (11/15) of the dogs were considered Docile/Loving/Affectionate/Cute and that 40% (6/15) were considered Sociable/Sympathetic/Friendly.

**Table 1.** Frequencies of the variable of descriptors (words) that define the dog's behavior by volunteers.

Descriptors	N	%	IC 95%	
			Inf	Sup
Docile/Loving/Affectionate/Cute	11	73,33	48,05	89,1
Sociable/Sympathetic/Friendly	6	40	19,82	64,25
Obedient/Polite/Behaved	9	60	35,75	80,18
Calm/Tranquil	7	46,67	24,81	69,88
Joyful/Happy	4	26,67	10,9	51,95
Strong	1	6,67	1,19	29,82
Dear/Good	3	20	7,05	45,19
Playful	2	13,33	3,74	37,88
Needy	1	6,67	1,19	29,82
Fearful/Shy	2	13,33	3,74	37,88
Busy/Excited	2	13,33	3,74	37,88
glutton	1	6,67	1,19	29,82
Centered/Smart	2	13,33	3,74	37,88
Explorer/Curious	4	26,67	10,9	51,95

N= absolute frequency; %= relative frequency; Inf= lower limit; Sup= upper limit.

Another question that the volunteers answered in the dog's report during the walks was about interaction with other people and other animals, 86.67% (13/15) of the dogs met other dogs, 60% (9/15) met children and 6 67% (1/15) of dogs encountered cats (Table 2).

Some notes transcribed about the observations of these meetings during the walks were: “I loved playing with the children, I behave very well at home, I didn't make a mess, I like lying down close to humans and getting a lot of affection”; “He met children in the park and loved it. It was fine with my cat, he just got into trouble with a friend's 2 dogs who drank the water from his bowl. Very sociable with people and children, doesn't get along very well with other dogs.” Note in this table the yes/no description that is the result of the perception of different volunteers walking the same dog.

**Table 2.** Frequencies of variables I found dogs, cats and children.

Variable		N	%	IC 95%	
				Inf	Sup
Meet Other dogs	Yes	13	86,67	62,12	96,26
	No	0	0	-	-
	Yes/No	2	13,33	3,74	37,88
Meet cats	Yes	1	6,67	1,19	29,82
	No	13	86,67	62,12	96,26
	Yes/No	1	6,67	1,19	29,82
Meet children	Yes	9	60	35,75	80,18
	No	4	26,67	10,9	51,95
	Yes/No	2	13,33	3,74	37,88

N= absolute frequency; %= relative frequency; Inf= lower limit; Sup= upper limit.

Regarding the dogs' preferences during the walk, 73.33% (11/15) of the dogs liked going for a ride in the car, 86.67% (13/15) liked being outdoors, and 33.33% (5/15) dogs liked running (Table 3). When the dog went on a walk with different volunteers, the result was different and was marked as yes/no.

**Table 3.** Frequencies of dog preferences during the walk

Variable		Adopted				p-value
		N	col %	N	col %	
I like to go for a ride	Yes	9	75	2	66,67	1,000
	No	1	8,33	0	0	
	Yes/No	2	16,67	1	33,33	
I like the outdoors	Yes	10	83,33	3	100	1,000
	Yes/No	2	16,67	0	0	
I like hiking	Yes	8	66,67	2	66,67	0,440
	No	3	25	0	0	
	Yes/No	1	8,33	1	33,33	
I like to swim	Yes	1	8,33	1	33,33	0,517
	No	10	83,33	2	66,67	
	Yes/No	1	8,33	0	0	
Love toys	Yes	2	16,67	0	0	0,637
	No	9	75	2	66,67	
	Yes/No	1	8,33	1	33,33	
I like to run	Yes	4	33,33	1	33,33	0,949
	No	5	41,67	1	33,33	
	Yes/No	3	25	1	33,33	
I like lying down	Yes	5	41,67	1	33,33	1,000
	No	5	41,67	2	66,67	
	Yes/No	2	16,67	0	0	

\*Chi-square/Fisher's exact test; N= absolute frequency; col %= relative frequency.

A comparative analysis was carried out to relate the dogs that went for the Adoption Walk with the total number of adoptions, and 80% (12/15) of the dogs that went for a walk were adopted (Table 4). We can notice that some dogs (4/11) went out for a walk more than once, which did not necessarily support their adoption.

**Table 4.** Frequencies of the number of walks and dogs adopted.

Variable		N	%	IC 95%	
				Inf	Sup
Numbers of walking	1	11	73,33	48,05	89,10
	3	4	26,67	10,90	51,95
Was adopted	Sim	12	80	54,81	92,95
	Não	3	20	7,05	45,19

N= absolute frequency; %= relative frequency; Inf= lower limit; Sup= upper limit.

The result of the Lar Adotivo program was surprising, of nine dogs that left the shelter to sleep outside with volunteer families, all were adopted and of these nine, seven were adopted by the same family participating in the program. This corroborates the objective of this program, which is to promote and strengthen the dog's interaction and experience with the future adoptive family during the days and nights in the future home (Table 5).

**Table 5.** Frequencies of dogs from the foster home that were adopted and that were adopted by the same family.

Variable	Yes		No	
	N	%lin	N	%lin
Adopted	9	100	0	0
Adopted from the same family	7	77,8	2	22,2

N= Absolute frequency; %lin= Relative frequency

## 5.4 DISCUSSION

It is important to highlight that the shelter itself is a very stressful experience for the dogs confined there and the lack of interaction with humans is an important factor in this (Shiverdecker et al., 2013; Galdioli & Garcia, 2022). Promoting human-dog interactions outside the kennels, where dogs are sheltered, improves behavior, reduces stress, and thus achieves the well-being of these sheltered dogs (Patronek GJ et al., 1996; Luescher & Tyson Medlock, 2009; Perry et al., 2020; Gunter et al., 2021). Both the Adoption Walk and the Foster Home were able to provide, in addition to human-dog interaction, animal welfare for these dogs.

Dogs are social beings interacting, in addition to our species, with other animals and they are classified as one of the most skilled species in solving cognitive tasks (Savalli & Albuquerque, 2017). Bringing the gaze awareness of volunteers who were interacting with a shelter dog outside of the kennel and in entirely new and possibly strange places to a shelter dog was important so that the dogs could demonstrate that they could behave outside of the shelter, but also capable of solving every challenge imposed on them.

The programs contributed greatly to the adoption process because research shows that the adopter can decide to adopt a dog based on its appearance and even the position in which that dog is positioned within the kennel but can change their mind when they

notice the behavioral aspects from that same dog (Wells & Hepper, 1992; Coe et al., 2014; Protopopova & Wynne, 2014). In other words, when the volunteer takes a dog from the shelter for a walk or when takes it to sleep at home, the volunteer can notice its behavior and interaction and coexistence are tested.

In all the results shown in Tables 1, 2, and 3, we were able to see that the volunteers' interaction with the dogs was positive in general and that letting the dog show its behavioral attributes increases the chance of adoption because 12 out of 15 dogs from PA had a happy ending (table 4). In LA the results were even more surprising, as out of 9 participating dogs, all were adopted and even better, 7 were adopted by the families who took the dog into their homes (table 5).

The adoption programs were conducted in an unprecedented way in Brazil over one year, between October 2022 and September 2023, with very positive results and, therefore, the objective is for the shelter to implement these new adoption strategies permanently in its administration. and that the PA and LA programs are copied by all shelters in the country.

## **5.5 CONCLUSIONS**

The contribution of the Passeio para Adoção program as another strategy in increasing the adoption of dogs in shelter situations attested to its efficiency not only in terms of adoption but also showed that it is an important aspect of the well-being of sheltered dogs. The fact that dogs left the shelter and were seen by society not only increased the chance of adoption but also contributed to these dogs being able to alleviate the stress of confinement, experience new airs, and new textures, and interact with new people, new dogs and even other animals.

The Lar Adotivo proved to be an efficient program in facilitating coexistence and the experience of spending time with a dog that is intended to be adopted, and the dog being able to sleep outside the shelter, which proved to be excellent for the well-being and alleviated the stress of confinement.

The two programs also encourage an increase in the number of sheltered dogs, and more adoptions, and consequently support the shelter's justification as a halfway house.

**Ethical approval:** This study is approved by the Ethics Committee on the Use of Animals of the Agricultural Sciences Sector of the Federal University of Paraná under number 015/2022 (05/04/2022).

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## ANEXOS

### Annex I - google forms transcription

Nome, idade e telefone de contato (preferencialmente whatsapp) / Name, age, telephone (preferably WhatsApp)

E-mail / e-mail

Endereço completo/ Completely address

Você participará de qual programa? Which program you will participate?

- Lar Adotivo / Sleepover
- Passeio para Adoção / Field Trip
- Os dois / both

Onde você mora? Where do you live?

- Casa/ Home
- Apartamento / Apartment
- Chácara ou sítio / Country house or Farm

Onde você mora permite cães? Where do you live allows dogs?

- Sim / Yes
- Não / No

Você mora com outros animais? Do you with others animals?

- Sim / Yes
- Não / No

Se sim, quais animais já moram com você? If yes, wich animals already live with you?

- Cão / Dog
- Gato / Cat
- Outros / Others
- Não tenho animais em casa / Do not have animals at home

Todos da sua família concordam em participar do(s) programa(s)? Does everyone in your family agree to participate in the program (s)?

Sim / Yes

Não / No

Quando participar do programa **Lar Adotivo**, como e onde você pretende deixar o cãozinho na sua casa? When participate in the Lar Adotivo program, how and where you intend to leave the dog in the house?

Interagindo com a família normalmente, com acesso a casa toda e a todos / Interacting with the family normally, with access to the entire house and everyone

Separado da família, somente com acesso no quintal / Separated from the family, only with access to the backyard

Preso em canil o dia todo e solto somente a noite / Locked in a kennel all day and only released at night

Não estou participando do Lar Adotivo / I am not participating in the Lar Adotivo program

Quando participar do programa **Lar Adotivo**, quantas noites/dias gostaria de ficar com o cãozinho na sua casa? When you participate at the Lar Adotivo program, how many night/days would you like to stay with the dog at your home?

Uma noite/dia – One night/day

Um final de semana – A weekend

Até 7 noites/dia – Until 7 nights/days

Quando participar do **Passeio para Adoção** você irá cuidar do cãozinho que escolher como se fosse seu? Com todo cuidado, amor e carinho? When you participate in the Passeio para Adoção program, will you take care of the dog you choose as your own? With all the care, love and affection?

Sim, claro – Yes, of course

Não estou participando do Passeio para Adoção – I'm not participating on the Passeio par Adoção program

Quando participar do **Passeio para Adoção**, que horas gostaria de buscar o cãozinho para passear? When participating in the Adoption Walk, what time would you like to pick up the dog for a walk?

Sábado das 9 às 15:30 horas / Saturday from 9am to 3:30pm

Domingo das 9 às 15:30 horas / Sunday from 9am to 3:30pm

Animais resgatados, que vivem em abrigos, as vezes ficam com alguns traumas, tendem a sentirem medo. Necessitam de mais tempo e paciência da sua parte. Podem fazer xixi ou cocô em locais inapropriados. Você entende e tem essa paciência e disponibilidade? Rescued animals, who live in shelters, sometimes experience some trauma and tend to feel afraid. They need more time and patience on your part. They may pee or poop in inappropriate places. Do you understand and have this patience and availability?

Sim / Yes

não / No

Esse projeto é monitorado para acompanharmos a adaptação e talvez uma futura adoção. O contato será feito por whatsapp, por mensagem, áudio e até vídeo. Você está de acordo? This project is monitored to monitor adaptation and perhaps future adoption. Contact will be made via WhatsApp, message, audio and even video. Are you in agreement?

Sim / Yes

Não / No

**Figure 1.** A dog call Buba walking in Barigui park with the volunteer family.



Source: author

**Figure 2.** A dog call Clotilde at a restaurant with the volunteer family.



Source: author

**Figure 3.** A vest with the words “ADOPT ME” was worn by one of the dogs during the PA.



Source: author

Figure 4. Report to be completed by the volunteer during the PA.

## Passeio para Adoção


### Relatório do passeio:


Data:


Nome do Cão:

ID:


Hoje eu fui para:


  
 Sou sociável e engraçado


  
 Gosto de passear de carro


  
 Sei andar de guia


Três palavras que me descrevem:


  
 Gosto de ar livre

  
 Gosto de caminhadas


  
 Gosto de nadar


  
 Faço arte


  
 Amo brinquedos


  
 Gosto de correr


**Encontrei:**


  
 Outros cães

  
 Gatos

  
 Crianças

  
 Sou Legal

  
 Gosto de ficar deitado

  
 Faço truques


Eu fiz: \_\_\_\_\_

NOTAS: \_\_\_\_\_

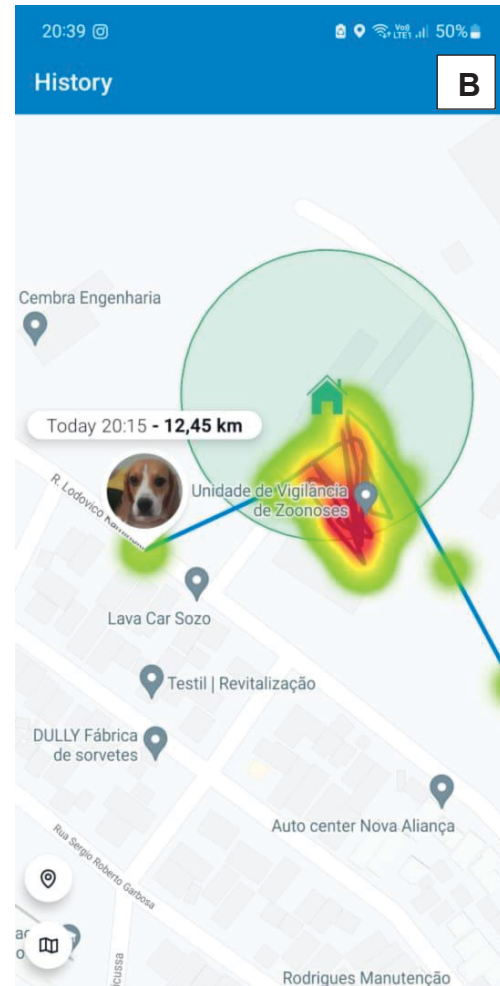
\_\_\_\_\_

\_\_\_\_\_

Figure 5. Commitment form to be filled out for volunteers participating in the LA.

<b>TERMO DE RESPONSABILIDADE E COMPROMISSO</b>	
	<h2 style="color: #0070C0;">LAR ADOTIVO</h2> <p><b>NOME:</b> <b>ENDEREÇO:</b></p> <p><b>BAIRRO:</b> <b>RG/CPF:</b></p> <p style="text-align: center;"><i>Lar adotivo, leve amor e carinho para sua casa por quantas noites você desejar, sempre com muita responsabilidade!</i></p>
<p><b>NOME:</b> GORGONZOLA</p> <p><b>IDADE:</b> 2 anos, porte pequeno <b>Macho</b></p> <p><b>PERFIL</b> Eu sou treinado!! Eu sei andar junto, sei <u>sentar</u>, deitar e ficar. Sou super obediente! Gosto muito de pular!</p> <p><b>PASSATEMPOS</b> Adoro brincar! Adoro jogar bolinha Adoro carinho! Adoro petisco!</p> <p><b>CONTATO</b> <b>TELEFONE:</b> (41)85342158 whatsapp</p> <p><b>EMAIL:</b> <a href="mailto:projetoabrigo@doutorado@gmail.com">projetoabrigo@doutorado@gmail.com</a></p>	<p><b>TERMOS:</b></p> <ul style="list-style-type: none"> <li>- A pessoa que assina este termo, o faz por livre e espontânea vontade e ciente dos riscos inerentes ao convívio com cães, assume a responsabilidade de proporcionar ao cão que levará para a casa, pelo programa sleepover, bem-estar de qualidade. Isto inclui o fornecimento de alimentação adequada, abrigo para dormir protegido do frio e do calor, limpo e seco e condições para que ele faça suas necessidades fisiológicas. O uso de correntes é proibido.</li> <li>- Para passear na rua, é necessário o uso de coleira apropriada ao tamanho do cão, guia e uso da placa de identificação. A placa de identificação deverá permanecer no cão até que ele retorne para o abrigo.</li> <li>- O abandono de cães é crime previsto na lei 14.064/20.</li> <li>- Ao assinar este termo o responsável também se compromete em não doar ou deixar o cão sob cuidado de terceiros.</li> <li>- Junto com o cão, o responsável está recebendo um kit do programa, que contém ração, duas vasilhas (água e ração), uma coleira com placa de identificação, uma guia e um local para dormir. O kit será devolvido no retorno do cão ao abrigo, na data e horário estabelecidos neste termo. - Esse compromisso, estabelecido e aceito pelo responsável e pelo CRAR, que assinam juntos este termo, deverá ser cumprido de forma incondicional.</li> <li>- Em caso de acidente com o cão, o responsável deverá entrar em contato imediatamente com o CRAR, por telefone, pelo número abaixo indicado.</li> <li>- Caso o responsável por este termo resolva adotar o cão, ele deverá informar ao CRAR e comparecer ao abrigo para que assine um outro termo de compromisso, chamado termo de adoção permanente.</li> <li>- As partes concordam com este termo e assinam em duas vias.</li> </ul> <p style="text-align: center;"> <span style="margin-right: 100px;">_____</span> <span>_____</span>  <span style="margin-right: 100px;">Responsável</span> <span>CRAR</span> </p> <p><b>SAÍDA DO ABRIGO:</b> _____ <b>HORA:</b> _____</p> <p><b>CHEGADA NO ABRIGO:</b> _____ <b>HORA:</b> _____</p>

**Figure 6.** In A, Clotilde using a collar with the GPS monitor at a volunteer family home. In B, how the application is shown on the cell phone.



## 6 CAPÍTULO 5: APLICAÇÃO DO ACOMPANHAMENTO PÓS ADOÇÃO (APA) COMO ESTRATÉGIA PARA REDUZIR A DEVOLUÇÃO DE CÃES EM SITUAÇÃO DE ABRIGO <sup>5</sup>

### RESUMO

O abandono e a devolução de cães adotados continuam sendo desafios enfrentados por abrigos em todo o Brasil. Este estudo teve como objetivo avaliar a eficácia do Acompanhamento Pós-Adoção (APA) como estratégia para mitigar a taxa de devolução de cães adotados. Foram analisados dois grupos: um composto por cães que passaram por treinamento comportamental em abrigos (Grupo Treinado) e outro por cães que não passaram por nenhum tipo de treinamento (Grupo Controle). Os tutores dos cães foram entrevistados por meio de um questionário estruturado antes da realização do APA, com o intuito de identificar dificuldades comportamentais e principais queixas nos momentos de 3 dias, 3 semanas ou 3 meses após a adoção. Posteriormente, foi realizado o acompanhamento presencial ou on-line, seguido por suporte contínuo via aplicativo de mensagens por 30 dias. As queixas mais frequentes estiveram relacionadas a comportamentos inadequados, dúvidas gerais e sinais de agressividade ou medo. A análise estatística não demonstrou associação significativa entre o grupo (Treinado vs. Controle) e o tipo de queixa ou o momento do contato para o APA ( $p > 0,05$ ), embora o grupo treinado tenha demonstrado tendência a buscar auxílio mais precocemente. Todos os tutores mantiveram os cães após o acompanhamento, resultando em zero devoluções. Os resultados indicam que o APA pode ser uma ferramenta promissora para promover adoções bem-sucedidas e duradouras.

**Palavras-chave:** Devolução; Bem-estar animal; Comportamento canino; Tutores de cães; Relação humano-cão.

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<sup>5</sup> CAPÍTULO 5 - NÃO SUBMETIDO

## ABSTRACT

Abandonment and the return of adopted dogs remain ongoing challenges faced by shelters throughout Brazil. This study aimed to evaluate the effectiveness of Post-Adoption Counseling (PAC) as a strategy to reduce the return rate of adopted dogs. Two groups were analyzed: one composed of dogs that underwent behavioral training in shelters (Trained Group) and another composed of dogs that received no training (Control Group). The adopters were interviewed using a structured questionnaire prior to the PAC to identify behavioral difficulties and primary complaints at 3 days, 3 weeks, or 3 months post-adoption. Follow-up was then conducted either in person or online, followed by 30 days of continuous support via a messaging app. The most frequent complaints were related to inappropriate behaviors, general questions, and signs of aggression or fear. Statistical analysis did not show a significant association between the group (Trained vs. Control) and the type of complaint or the timing of the PAC contact ( $p > 0.05$ ), although the trained group showed a tendency to seek support earlier. All adopters kept their dogs after the follow-up, resulting in zero returns. The results suggest that PAC may be a promising tool for promoting successful and lasting adoptions.

**Keywords:** Return; Animal welfare; Canine behavior; Dog adopters; Human dog interaction.

## 6.1 INTRODUÇÃO

O abandono e a devolução de cães representam um problema crescente nas áreas urbanas, causando impactos negativos para o bem-estar dos animais, para a saúde pública e para a sociedade como um todo. No Brasil, fatores como superpopulação, falta de políticas públicas e desconhecimento sobre guarda responsável agravam ainda mais a situação (Brugnerotto et al., 2022). Estima-se que milhões de cães vivem em situação de rua no Brasil, expostos a riscos como doenças, fome, maus-tratos e violência (IPB, 2022).

A devolução de animais após a adoção é uma situação recorrente que apresenta uma quebra de vínculo humano-animal e tem sido associada a diversas causas: mudanças de moradia, problemas financeiros, doenças dos tutores, e principalmente, comportamentos indesejados por parte do animal (Brugnerotto et al., 2024; Brugnerotto et al., 2022). A falta de preparação dos adotantes e a falta de suporte no pós-adoção tornam o retorno ao abrigo uma solução comum, ainda que traumática para o cão e frustrante para o adotante (Buckland et al., 2025)

Entender porque os adotantes devolvem seus cães aos abrigos é um passo importante para tentar minimizar as devoluções e, assim, otimizar as adoções. Em um estudo de Mondelli e seus colaboradores (2010) quase todos os cães foram devolvidos devido a problemas comportamentais, e a maioria tinha mais de 6 meses de idade. Ainda nesse estudo alguns cães foram devolvidos mais de uma vez, com 20% das pessoas que adotaram o mesmo cão em momentos diferentes relatando o mesmo problema comportamental. Metade dos adotantes tinha experiência anterior como cuidador de cães em comparação com os adotantes que não tinham experiência anterior, no entanto, devolveram seu animal de estimação após um período mais curto e por motivos comportamentais. Em um estudo no Reino Unido, Stephen e Ledger (2007) apontaram que os motivos comportamentais mais comuns para a devolução de cães aos abrigos incluem agressão contra pessoas (21%), comportamento destrutivo ou vocalização quando deixados (12%), excitabilidade (10%) e agressão contra outros cães (7%).

Analisar as principais razões pelas quais os cães se comportam de forma diferente em novos lares pode ser a chave do sucesso para evitar devoluções. Entender que os cães enfrentam situações adversas ao abrigo, como diferenças nas características do lar e do novo tutor, a experiência de estar fora do abrigo, a falta de familiaridade com um novo lar, todas com potencial para afetar o comportamento de um cão em seu novo lar. É possível que o tempo de permanência do cão no abrigo antes da adoção tenha um efeito duradouro sobre o seu comportamento em um novo lar. Enquanto alguns cães lidam bem com a vivência no abrigo, outros apresentam evidências comportamentais e fisiológicas com baixo nível de bem-estar emocional (Clay et al., 2020; Stephen e Ledger, 2007).

Diferentemente do Brasil, a avaliação comportamental na chegada do cão no abrigo é uma realidade em outros países, o que contribui para que o novo morador do abrigo seja alocado em ambiente correto para que o estresse da chegada seja o menor possível e para que o novo adotante possa ser encontrado mais facilmente (Clay et al., 2020; Stephen e Ledger, 2007). Os comportamentos indesejáveis podem estar presente

nos primeiros quatro meses após a adoção segundo os estudos de Powell et al. (2022) e Powell et al. (2021) e, fazer uso contínuo de aconselhamento pós adoção pode garantir que os adotantes desenvolvam expectativas adequadas em relação ao relacionamento humano-cão.

Esse estudo tem como objetivo aplicar o acompanhamento pós adoção (APA) como uma nova estratégia para promover a permanência dos cães em seus novos lares, visando fortalecer o vínculo afetivo e reduzir as chances de devolução.

## 6.2 MATERIAL E MÉTODO

A aplicação do APA ocorreu em abrigos municipais, ONGs (Organização Não Governamental) e ou protetores independentes, do estado do Paraná, que aceitaram participar desse estudo e, a amostra foi composta por casos que os próprios abrigos, ONGs e ou protetores independentes sinalizavam e por tutores que buscaram ajuda por dificuldades com o cão recém adotado apresentando comportamentos indesejáveis que seriam passíveis de devolução. A média de cães que estavam alojados aguardando por adoção era de 40 a 150 animais distribuídos entre os participantes.

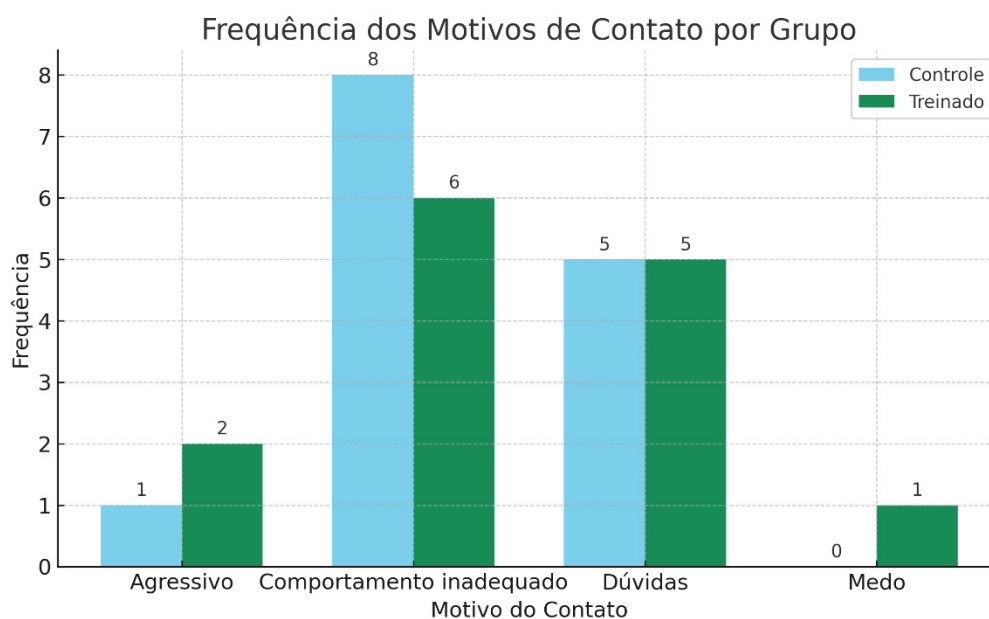
Os novos tutores eram entrevistados através de um questionário do google forms (anexo I) para entender as necessidades e suas justificativas para um possível retorno do cão ao abrigo. Os questionários foram aplicados em dois grupos distintos, o grupo de cães que não tinham recebido nenhum tipo de treinamento - Grupo Controle, e os que tinham recebido treinamento - Grupo Treinado, cada grupo com 14 cães. O questionário foi aplicado antes de realizar o APA, sendo apenas para detectar qual a principal dificuldade do adotante e sua queixa principal, e só após isso era agendada uma consulta para a realização do APA, presencial ou on-line, dependendo da localização do novo tutor e seu cão. Vale resaltar que o grupo de cães treinado são aqueles em que passaram por uma capacitação prévia, com comandos básicos, antes da adoção.

Durante o APA, foram 28 atendimentos, o tutor era questionado sobre sua relação diária com seu cão e, em que momento da adoção eles se encontravam, se era 3 dias, 3 semanas ou 3 meses, e qual era a sua principal queixa relacionada ao comportamento indesejável. Tudo sobre comportamento era explicado durante o acompanhamento e exercícios eram ensinados para que a convivência fosse harmoniosa. Após o APA, presencial ou online, era feito um acompanhamento por 30 dias através do aplicativo de mensagem (whatsapp) onde o tutor podia enviar mensagens, áudios e ou vídeos para que o pesquisador pudesse acompanhar o desempenho do cão e seu tutor.

Para analisar o questionário foi usado as variáveis categóricas nominais do tipo de chamado para o APA em relação aos dois diferentes grupos, o grupo treinado e o grupo controle, e com relação as variáveis do período em que se encontrava o cão nos dois diferentes grupos, ambas análises foram feitas com o teste qui-quadrado de independência ( $\chi^2$ ).

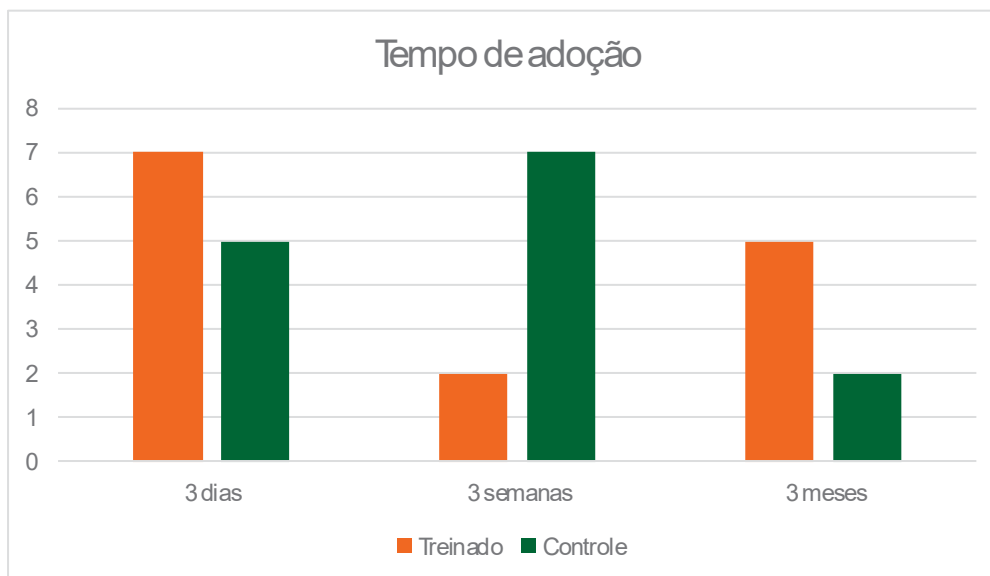
### 6.3 RESULTADOS

Foram feitas análises para apontar se há relação entre os grupos estudados e o tempo de adoção que o cão se encontrava e ainda que tipo de chamado foi feito para solicitar ajuda do APA. Com relação ao tipo de chamado verificado em cada grupo de estudo mostrado na figura 1, não houve evidência estatística de associação significativa entre o tipo de motivo da chamada e o grupo Treinado ou Controle, o  $p$ -valor = 0.655 é muito maior que 0.05. Isso significa que os dois grupos apresentaram tipos de queixa semelhantes — ou seja, o tipo de queixa não variou de forma significativa entre grupos.



**Figura 1:** Frequência dos motivos de chamados apresentado em cada grupo de estudo, o grupo treinado e o grupo controle.

A avaliação do tempo de adoção com relação aos diferentes grupos, Treinado e Controle mostrado na figura 2, mostra que não houve evidência estatística significativa de associação entre o momento da chamada (3 dias, 3 semanas, 3 meses) e o grupo (Treinado ou Controle), o  $p$ -valor = 0.111 é maior que 0.05. Ainda que as distribuições pareçam diferentes visualmente, essa diferença não é estatisticamente significativa com base nos dados disponíveis. O grupo Treinado teve mais contatos no início (3 dias) e no final (3 meses), enquanto o grupo Controle teve maior concentração de contatos por volta de 3 semanas. Esse padrão sugere que tutores dos cães treinados tendem a buscar suporte imediatamente ou após um tempo mais prolongado, enquanto os tutores do grupo controle enfrentam mais dificuldades logo após a fase inicial de adaptação.



**Figura 2:** Frequência do tempo de adoção apresentado em cada grupo de estudo, o grupo treinado e o grupo controle.

A avaliação teve como propósito apurar a satisfação do novo adotante com o acompanhamento pós adoção em relação a importância de ter participado, se o novo adotante indicaria o acompanhamento para um conhecido que havia acabado de adotar um novo cão e o mais importante, se o novo tutor tinha um o melhor entendimento do comportamento do cão, ver figura 3.



**Figura 3:** Resposta da avaliação dos novos tutores em relação a importância, indicação e entendimento do comportamento após o APA, respectivamente.

## 6.4 DISCUSSÃO

Milhões de animais são adotados por ano nos Estados Unidos, mas 15% são devolvidos, em um estado, South Carolina, 36% foram devolvidos por comportamentos inadequados e 18% por incompatibilidade com seus tutores. É possível que alguns tutores

que retornaram subestimaram o tempo necessário para que os cães se adaptassem ao novo lar e desenvolvessem um relacionamento forte e, portanto, podem ter ficado insatisfeitos e mais propensos a devolver o animal. Os tutores que retornavam tinham expectativas significativamente maiores em relação ao comportamento animal desejável e ao desenvolvimento do vínculo humano-cão (Powell et al., 2021; Powell et al., 2022).

A devolução de cães adotados configura um desafio recorrente enfrentado por abrigos e organizações de proteção animal, sendo uma realidade significativa e multifatorial (Brugnerotto et al., 2022). Diversos estudos apontam que comportamentos considerados indesejáveis, como latidos excessivos, destruição de objetos ou agressividade, são as principais justificativas apontadas pelos tutores para desistirem da adoção (Baldan et al., 2023; Powell et al., 2022; Herron et al., 2014; Mondelli et al., 2010; Stephen and Ledger, 2007; Takeuchi et al. 2001, Takeuchi et al., 2000).

Powell e seus colaboradores (2022), em seu estudo, aplicaram um questionário para melhor entender as expectativas de novos adotantes em relação ao comportamento de seus cães adotados, cerca de um terço dos tutores afirmou não ter tido problemas com o comportamento de seus cães dois dias após a adoção (n = 16, 29,1%), embora dois terços tenham dito ter tido problemas leves (n = 36, 65,5%) e 5,5% tenham dito ter tido problemas moderados (n = 3). As respostas dos tutores foram semelhantes duas semanas após a adoção, com 32,4% dos donos indicando não ter tido problemas com o comportamento de seus cães (n = 12), 59,5% tendo problemas leves (n = 22) e 8,1% tendo problemas comportamentais moderados (n = 3). Aos quatro meses, 33,3% dos donos disseram não ter tido problemas com o comportamento de seus cães (n = 9) e 66,7% estavam tendo apenas problemas leves (n = 18).

Gunter (2018) observou que ações pontuais, como envio de e-mails automáticos, têm pouco impacto, enquanto visitas presenciais e orientação direta aumentam significativamente a permanência dos animais nos lares adotivos. As evidências sugerem que o aconselhamento preventivo sobre comportamento, fornecido antes ou no momento da adoção, pode ter algum benefício na prevenção de problemas futuros (Buckland et al., 2025; Blackwell et al., 2016).

Os efeitos da devolução também impactam negativamente o bem-estar do cão. A reincidência em devoluções consecutivas, pode piorar o quadro do cão com estresse crônico, comportamento estereotipados e aumento da agressividade, diminuindo as chances de uma futura adoção bem-sucedida. A devolução é frustrante para os cães, que se tornam cada vez mais difíceis de serem readotados e para os adotantes, que se tornam resistentes a uma futura adoção (Powell et al., 2022; Gunter, 2018).

O uso contínuo de aconselhamento em adoção pode garantir que os adotantes desenvolvam expectativas adequadas em relação a relação humano-cão e prováveis ocorrência de comportamentos indesejáveis nos primeiros quatro meses após a adoção, como mostra o estudo feito por Poweell e seus colaboradores (2022) onde eles apontam que a prestação de serviços de apoio pós-adoção pode ajudar alguns tutores a superar desafios comportamentais.

Os resultados mostraram que não houve diferença significativa em relação as análises do tipo de comportamento que os cães apresentavam nas adoções nos diferentes grupos e igualmente com relação ao tempo de adoção que os tutores se encontravam, o que corrobora com a importância de prestar o serviço do APA em cães treinados e não treinados porque o APA ajuda o adotante a compreender o comportamento do cão no novo ambiente para evitar a devolução.

## **6.5 CONCLUSÃO**

O APA se mostrou eficiente na evitação de devoluções nos abrigos em que foi aplicado, mesmo que com um número reduzido de cães demonstrados. É importante ressaltar que essa aplicação deve ser sempre executada por profissionais da área de comportamento animal para que o futuro adotante possa ser direcionado de forma eficiente para sanar todos os desafios relacionados ao novo membro da família. Novos estudos são necessários e recomenda-se avaliar as adoções sem o uso do APA para resultados mais precisos.

### **Declaração de Ética**

Este estudo foi aprovado pelo Comitê de Ética no Uso de Animais do Setor de Ciências Agrárias da Universidade Federal do Paraná sob o número 015/2022 (05/04/2022). Comitê de Ética em Pesquisa (CEP-SD), do Setor de Ciências da Saúde da UFPR, sob o número de parecer 5.389.529

### **Agradecimentos**

Gostaria de agradecer a todos os abrigos parceiros e a todos os tutores e seus cães por acreditar que projeto daria certo.

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**ANEXOS**

## ANEXO I

**APA - Assessoria Pós Adoção (Grupo Treinado e Grupo Controle)**

Qual o nome do cãozinho que adotou? ABERTA

De qual estado do Brasil você o(a) adotou? ABERTA

A qual abrigo/ONG ele(a) pertencia?

- AMALO
- AMIGO ANIMAL
- APATA
- CRAR
- DNA
- MAXMELLO
- SEGUNDA CHANCE
- FICA COMIGO
- OUTRO (outro abrigo, protetor independente etc.)

Em qual desses períodos de adoção vocês se encontram no momento do chamado?

- 3 dias
- 3 semanas
- 3 meses

Qual o motivo da sua chamada para Assessoria Pós Adoção - APA?

- ele(a) está bem, só gostaria de tirar algumas dúvidas
- ele(a) está apresentando comportamento inadequado
- ele(a) está sendo agressivo com a gente e com visitas dentro de casa
- ele(a) está fazendo as necessidades fora do lugar
- ele(a) está demonstrando medo de qualquer pessoa e ou lugar, ruídos
- ele(a) chora muito ou late quando está sozinho
- ele(a) não se comporta bem quando colocamos a coleira/guia para passear

Caso o motivo de sua chamada não esteja nas opções acima, por favor a descreva aqui.  
ABERTA

## 7 CONSIDERAÇÕES FINAIS

A presente tese demonstrou que intervenções educacionais baseadas em fundamentos etológicos e estratégias práticas de modulação comportamental podem promover melhorias significativas no bem-estar de cães em situação de abrigo, aumentar as taxas de adoção e reduzir as devoluções. Os diferentes capítulos que compõem este trabalho evidenciam que o preparo adequado dos animais antes da adoção, o treinamento contínuo dos colaboradores e o suporte oferecido aos tutores após a adoção são pilares fundamentais para a construção de um modelo mais sustentável e ético de gestão de abrigos.

As evidências apresentadas, oriundas de estudos de campo realizados em diferentes regiões do Brasil, reforçam a importância de ações sistematizadas e individualizadas que contemplem o comportamento, a saúde emocional e o vínculo afetivo entre cães e humanos. Protocolos como o MECA, a modulação de medo e agressividade, a avaliação da qualidade do sono em diferentes ambientes, os programas de pré-adoção (Lar Adotivo e Passeio para Adoção) e o Acompanhamento Pós-Adoção (APA) mostraram-se eficazes na promoção de resultados positivos e replicáveis em abrigos distintos.

A adoção bem-sucedida de um cão não depende apenas do ato de levá-lo para casa, mas da construção de um processo de transição consciente, respaldado por conhecimento técnico, orientação profissional e apoio contínuo. Assim, esta tese reafirma que práticas baseadas na ciência do comportamento animal são essenciais para transformar a realidade dos abrigos brasileiros e garantir que mais cães tenham acesso não apenas a lares, mas a lares permanentes, seguros e afetivos.

As estratégias apresentadas neste estudo delineiam um novo direcionamento para o desenvolvimento da Medicina Veterinária de Abrigos no Brasil, evidenciando a necessidade da integração do conhecimento etológico como ferramenta fundamental para a promoção de adoções bem-sucedidas e duradouras. Recomenda-se que intervenções semelhantes sejam implementadas em abrigos públicos, privados e mistos, como parte das políticas de manejo e bem-estar animal. Ressalta-se, ainda, a importância da continuidade de pesquisas nessa área, de modo a fortalecer a base científica e adaptar as práticas às diversas realidades regionais do país.

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## ANEXO A



UNIVERSIDADE FEDERAL DO PARANÁ  
SETOR DE CIÊNCIAS AGRÁRIAS  
COMISSÃO DE ÉTICA NO USO DE ANIMAIS

## CERTIFICADO

Certificamos que o protocolo número 015/2022, referente ao projeto de pesquisa “Educação de cães e dos colaboradores de abrigos no Brasil para aumentar a probabilidade das adoções”, sob a responsabilidade de Rita de Cassia Maria Garcia, que envolve a produção, manutenção e/ou utilização de animais pertencentes ao filo Chordata, subfilo Vertebrata (exceto o homem), para fins de pesquisa científica ou ensino – encontra-se de acordo com os preceitos da Lei nº 11.794, de 8 de Outubro de 2008, do Decreto nº 6.899, de 15 de julho de 2009, e com as normas editadas pelo Conselho Nacional de Controle da Experimentação Animal (CONCEA), e foi aprovado pela COMISSÃO DE ÉTICA NO USO DE ANIMAIS (CEUA) DO SETOR DE CIÊNCIAS AGRÁRIAS DA UNIVERSIDADE FEDERAL DO PARANÁ - BRASIL, com grau 1 de invasividade, em 05/04/2022.

Finalidade	Pesquisa
Vigência da autorização	Maior/2022 até Setembro/2025
Espécie/Linhagem	<i>Canis lupus familiaris</i> (canino)
Número de animais	500
Peso/Idade	5 a 50kg/acima de 6 meses
Sexo	Macho e fêmea
Origem	Abrigos de animais diversas regiões do Brasil

\*A autorização para início da pesquisa se torna válida a partir da data de emissão deste certificado.

## CERTIFICATE

We certify that the protocol number 015/2022, regarding the research program “Education of dogs and shelter workers in Brazil to increase the likelihood of adoptions” under Ricardo Rita de Cassia Maria Garcia – which includes the production, maintenance and/or utilization of animals from Chordata phylum, Vertebrata subphylum (except Humans), for scientific or teaching purposes – is in accordance with the precepts of Law nº 11.794, of 8 October 2008, of Decree nº 6.899, of 15 July 2009, and with the edited rules from Conselho Nacional de Controle da Experimentação Animal (CONCEA), and it was approved by the ANIMAL USE ETHICS COMMITTEE OF THE AGRICULTURAL SCIENCES CAMPUS OF THE UNIVERSIDADE FEDERAL DO PARANÁ (Federal University of Paraná, Brazil), with degree 1 of invasiveness, on 2022, April 05<sup>th</sup>.

Purpose	Research
Validity	2022 May until 2025 September
Specie/Line	<i>Canis lupus familiaris</i> (canine)
Number of animals	500
Weight/Age	11.02lb to 110.23lb/6 months and older
Sex	Male and female
Origin	Animal shelters in several regions of Brazil

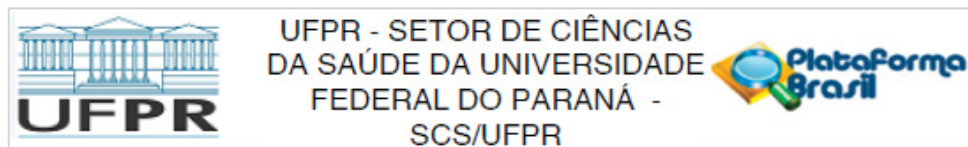
\*The authorization to start the research becomes valid from the date of issue of this certificate.

Curitiba, 05 de Abril de 2022

Documento assinado digitalmente  
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Verifique em <https://verificador.ifi.br>

Alex Maiorka  
Coordenador  
Comissão de Ética no Uso de Animais  
AG - UFPR

## ANEXO B



UFPR - SETOR DE CIÊNCIAS  
DA SAÚDE DA UNIVERSIDADE  
FEDERAL DO PARANÁ -  
SCS/UFPR

### PARECER CONSUBSTANCIADO DO CEP

#### DADOS DA EMENDA

**Título da Pesquisa:** Promoção da Ciência da Medicina de Abrigos no Paraná sob a estratégia de saúde única

**Pesquisador:** RITA DE CASSIA MARIA GARCIA

**Área Temática:**

**Versão:** 5

**CAAE:** 37064320.4.0000.0102

**Instituição Proponente:** Programa de Pós-graduação em Ciências Veterinárias

**Patrocinador Principal:** Financiamento Próprio

#### DADOS DO PARECER

**Número do Parecer:** 5.389.529

#### Apresentação do Projeto:

Trata-se da apresentação de nova emenda ao projeto de pesquisa em andamento intitulado "Promoção da Ciência da Medicina de Abrigos no Paraná sob a estratégia de saúde única", sob a responsabilidade da Profa. Dra. Rita de Cassia Maria Garcia, na condição de coordenadora da equipe de pesquisadores constituída por Lucas Galdioli, Yasmin da Silva Gonçalves da Rocha, Heloíse Zavattieri Polato, Luis Fernando Turozi Mausson, Michele Brugnerotto, Maria Isabel Mello Martins, Júlia Viana Kível e Ana Lucia Baldan, vinculado ao Programa de Pós-graduação em Ciências Veterinárias da Universidade Federal do Paraná.

O projeto de pesquisa em pauta foi aprovado por este Comitê, inicialmente, em reunião realizada no dia 21 de outubro de 2020, nos termos do Parecer Consubstanciado nº 4.352.075. Uma emenda à pesquisa em andamento foi aprovada nos termos do Parecer Consubstanciado nº 4.930.261, emitido por este Comitê em 25 de agosto pp., a fim de incluir a pós-graduanda Michele Brugnerotto no TCLE da vigilância do abandono animal, da adequação de alguns termos existentes na versão original do projeto de pesquisa e do TCLE da vigilância ao abandono animal, bem como, alguns ajustes de natureza metodológica.

A segunda emenda teve por justificativa a necessidade de novas inclusões e adequações de objetivos específicos referentes às políticas externas dos abrigos de cães e gatos e da metodologia da pesquisa em andamento, cuja aprovação por este Comitê foi emitida em 11 de novembro de

**Endereço:** Rua Padre Camargo, 285 - 1º andar

**Bairro:** Alto da Glória

**CEP:** 80.060-240

**UF:** PR

**Município:** CURITIBA

**Telefone:** (41)3360-7259

**E-mail:** cometica.saude@ufpr.br