Research Article

Forms of Animal Cruelty and Inadequate Animal Welfare Management in Thonburi District, Dao Khanong Subdistrict, Bangkok, Thailand

Athip Lorsirigool[1,2*] ⓘ, Yuttana Sudjaroen ⓘ[3] and Narong Kulnides ⓘ[1]

[1]Department of Forensic Science, Graduate School, Suan Sunandha Rajabhat University, Dusit District, 10300, Bangkok, Thailand
[2]TerdThai Love Pet Clinic, Thonburi District, 10600, Bangkok, Thailand
[3]Faculty of Science and Technology, Suan Sunandha Rajabhat University, Dusit District, 10300, Bangkok, Thailand
*Corresponding author: s65584938004@ssru.ac.th

ABSTRACT

Veterinary forensics is essential for investigating animal abuse and inadequate welfare, which encompass both physical abuse such as blunt force, sharp force, or penetrating trauma in addition to psychological abuse, including confinement with incompatible or unfamiliar animals. The nature of abuse and welfare inadequacies varies by region. This study analyses data from veterinary clinics in the Thonburi district of Thailand from 2018 to 2023, involving a total of 1,910 animals. Of these, 65 dogs and 114 cats met the study criteria. The average ages of the affected dogs and cats were 3.79 ± 3.26 years and 2.76 ± 2.26 years, respectively. Significant correlations were found between animal abuse, inadequate welfare, and factors such as gender, husbandry system, and breed ($P<0.05$). Animal hoarding was identified as the most prevalent form of abuse, followed by poisoning cases. The findings underscore the need for improved strategies and practices in animal welfare management. Enhancing these measures is crucial to ensure more effective protection and care for animals.

Key words: Animal, Cat, Cruelty, Dog, Welfare

INTRODUCTION

Animal cruelty is defined as any deliberate action or neglect toward an animal that causes pain, suffering, or distress, often for the perpetrator's personal gratification (Aleksic et al. 2023). The consequences of such abuse vary depending on its nature. Physical abuse causes direct harm, typically resulting in visible injuries (Kulnides and Lorsirigool 2023). Beyond physical damage, abuse can severely impact the animal's psychological well-being, leading to conditions such as depression, anxiety, or chronic stress (Hennessy et al. 2020). These psychological effects can gradually result in aggressive behaviour, social incompatibility with other animals, and an inability to function naturally in its environment (Rowan 2006).

Animal welfare encompasses the physical and psychological well-being of animals in response to various environmental conditions, whether these are human-induced or naturally occurring, such as hunger, overcrowding, and fear (Li et al. 2023). These conditions are expressed through the natural behaviours of different species (Blache and Maloney 2009). (Considerations for animal welfare involve practices related to animal husbandry, transportation, confinement, and other interactions, tailored to the specific needs and natural behaviours of the species (Gomes et al. 2021). The core elements of animal welfare, commonly referred to as the Five Freedoms, are: 1) Freedom from hunger and thirst; 2) Freedom from discomfort; 3) Freedom from pain, injury, and disease; 4) Freedom from fear and distress; and 5) Freedom to express normal behaviour (Carenzi and Verga 2009; Gomes et al. 2021). These universal principles serve as guidelines to ensure that pet owners practice appropriate animal welfare (Favre 2016; Voogt et al. 2023).

Veterinary forensic science encompasses examining animal cruelty prevention laws within the jurisdiction of the investigation (Parry and Stoll 2020). The field has gained prominence globally by adapting forensic methodologies traditionally used in human investigations to cases involving animals (Turkmen et al. 2022). This approach highlights the critical need to address animal cruelty, with the broader goal of enhancing animal welfare and quality of life (Kulnides and Lorsirigool 2023). Despite existing legislation aimed at preventing pet cruelty,

---

various forms of abuse persist, with each region encountering different manifestations. This study seeks to explore the patterns of pet cruelty and inadequate animal welfare practices in the Thonburi district of Bangkok, Thailand, an area that contains numerous pet markets.

MATERIALS AND METHODS

Ethical approval

This study entails retrospectively gathering data from veterinary clinics and does not involve direct interaction with animals, the use of laboratory animals, or any experimental procedures on animals. The research adheres to the Institutional Animal Care and Use Committee (IACUC) guidelines of Suan Sunandha Rajabhat University (SSRU). The researcher completed training in animal research, identified by training code U1-08960-2563. Details about the animals were disclosed with the consent of their owners.

Study area

This study was conducted at a veterinary clinic located in Dao Khanong, Thonburi, Bangkok, Thailand (license number 01-957/2562, coordinates: latitude 13.707529, longitude 100.478054).

Data collection

A total of 1,910 dogs and cats were admitted for treatment between 2018 and 2023, consisting of 1,020 cats and 990 dogs. Data were collected on species, age, gender, breed, husbandry, and physical examination. Forms of animal abuse and inadequate animal welfare were classified and modified based on the studies by Kulnides and Lorsirigool (2023) and Merck (2012). This classification comprises 13 categories: 1) blunt force trauma, consisting of injuries resulting from external impact; 2) penetrating injuries, consisting of injuries caused by objects penetrating the body from the outside; 3) burns, consisting of injuries caused by heat; 4) gunshot wounds, consisting of injuries caused by gunfire; 5) asphyxia or drowning, consisting of injuries resulting from a lack of oxygen or submersion in water; 6) poisoning, consisting of injuries caused by toxic substances; 7) starvation, consisting of conditions arising from prolonged food deprivation; 8) improper animal hoarding, consisting of conditions caused by inappropriate breeding or accumulation of animals; 9) heat stroke, consisting of conditions caused by heat stress; 10) hypothermia, consisting of conditions caused by exposure to low temperatures; 11) embedded collars, consisting of conditions resulting from improper use of collars; 12) demodicosis, consisting of conditions caused by demodectic mange; and 13) untreated injuries, consisting of injuries that were not treated by the owner.

Statistical analysis

Percentages and mean±SD were reported for age, gender, breed, and husbandry systems. The relationships between species, gender, breed, and husbandry systems with forms of animal abuse and inadequate welfare practices were analysed using Chi-Square test (χ^2). A significance level of $P<0.05$ was established. All statistical analyses were conducted using IBM SPSS Statistics version 29 (USA).

RESULTS

Age, gender, breed and husbandry system of dogs and cats

The data analysis revealed that 65 dogs (36.3%) and 114 cats (63.7%) were categorised as being subject to conditions associated with animal cruelty and suboptimal animal welfare practices. The occurrence rates were 3.41% for dogs and 5.96% for cats among the total cases treated at the veterinary clinic. The mean ages of the affected dogs and cats were 3.79±3.26 years and 2.76±2.26 years, respectively. Regarding gender distribution, 23 of the dogs (35.38%) were female, while 42 (64.62%) were male, while among the cats, 53 (46.49%) were female, and 61 (53.51%) were male. Details concerning the husbandry system and breed distribution are summarised in Table 1.

Table 1: Breed characteristics and husbandry system of dogs and cats

Species	Breed	Husbandry		Total
		Close	Open	
Dog	French bulldog	17	0	17 (26.15%)
	Golden retriever	1	0	1 (1.54%)
	Mixed	11	32	43 (66.15%)
	Poodle	2	0	2 (3.08%)
	Shih Tzu	2	0	2 (3.08%)
Total		33 (50.77%)	32 (49.23)	65 (100%)
Cat	British shorthair	1	0	1 (0.88%)
	Domestic shorthair	22	88	110 (96.48%)
	Persian	1	0	1 (0.88%)
	Scottish	1	0	1 (0.88%)
	Scottish fold	1	0	1 (0.88%)
Total		26 (22.81%)	88 (77.19%)	114 (100%)

Forms of animal abuse and inadequate animal welfare

The study identified five distinct categories of animal cruelty and inadequate welfare practices for dogs, including improper care by animal hoarders (n=43), blunt force trauma (n=1), poisoning (n=19), starvation (n=1), and untreated injuries (n=1). Similarly, five forms were observed in cats, including improper care by animal hoarders (n=84), blunt force trauma (n=3), penetrating injuries (n=4), poisoning (n=21), and untreated injuries (n=2). The data for each form of animal cruelty and inadequate welfare practices in dogs and cats are reported as percentages, as shown in Fig. 1. A detailed description of each form and the associated clinical signs in both dogs and cats is provided in Table 2.

The relationship between species, age, gender, breed, and husbandry systems with the occurrence of animal abuse and inadequate animal welfare management.

In this study, gender, breed, and husbandry systems were identified as having statistically significant associations with the incidence of animal abuse and inadequate animal welfare ($P<0.05$). Conversely, species and age did not demonstrate a statistically significant correlation with these outcomes, as indicated by the reported P-values (Table 3). Detailed analysis of the subtypes within each category revealed statistically significant differences ($\chi^2=895$, $P<0.001$). Among the observed patterns, animal hoarding was the most prevalent, followed by poisoning incidents affecting both dogs and cats.

Table 2: Descriptions of each form and clinical signs in both dogs and cats

Species	Forms	Descriptions	Clinical signs findings
Dog	Animal hoarders (n=43)	Heartworm infection (48.84%)	Coughing, dyspnea, and panting
		CPV infection (41.86%)	Depression, vomiting, diarrhea and dehydration
		Demodicosis (2.33%)	Dermatitis, emaciation, and dehydration
		Demodicosis with ectoparasite infections (2.33%)	Generalized tick infestation on the skin and dermatitis
		Ectoparasites with blood parasitic infection (2.33%)	Emaciation, ataxia, and pale mucous membranes
		Pyometra (caused by contraceptive injection administered by the owner) (2.33%)	Vaginal discharge, depression, and abdominal cramps
	Blunt force trauma (n=1)	Hit by the owner with a broom handle	Pain, ecchymosis, erosive wounds, and ataxia
	Poisoning (n=19)	Ivermectin (36.84%)	Tremors, hypersalivation, tachypnea, and tachycardia
		Organophosphate (15.79%)	Hypersalivation, tremors, tachycardia, and seizures
		Amitraz (15.79%)	Tremors, tachycardia, and ataxia
		Pyrethroids (15.79%)	Vomiting, diarrhea, tremors, tachycardia, and ataxia
		Chocolate (5.26%)	Vomiting and diarrhea
		Ibuprofen (5.26%)	Vomiting, diarrhea, tremors, ataxia, and tachycardia
		Paracetamol (5.26%)	Vomiting and melena
	Starvation (n=1)	Bone in the gastrointestinal tract	Emaciation, dehydration, and pale mucous membranes
	Untreated injuries (n=1)	Renal insufficiency	Vomiting, dehydration, melena, and pale mucous membranes
Cat	Animal hoarders (n=84)	FeLV+FIV infection (41.67%)	Pale mucous membranes, gingivitis, fever, and ataxia
		FeLV infection (26.76%)	Emaciation, pale mucous membranes, and gingivitis
		FIV infection (19.05%)	Gingivitis, pale mucous membranes, and ataxia
		FPV infection (8.33%)	Diarrhea, vomiting, dehydration, and emaciation
		FLUTD (1.19%)	Vomiting, urinary retention, and abdominal cramps
	Blunt force trauma (n=3)	Hit by a car (intentional) (75%)	Generalized blood staining on the skin and ataxia
		Cats are fighting in the house (25%)	Abscess, depression, and emaciation
	Penetrating injuries (n=4)	Dog bites (75%)	Weakness, abscess, and dehydration
		Cat bites (25%)	Abscess and ataxia
	Poisoning (n=21)	Paracetamol (52.38%)	Facial edema, cyanosis, and dyspnea
		Ivermectin (19.05%)	Panting, tremors, hypersalivation, and seizures
		Fipronil (14.29%)	Hypersalivation, vomiting, and tachycardia
		Anticoagulant rodenticides (9.52%)	Hyperthermia, tachycardia and seizures
		Bufotoxin (4.76%)	Mouth swelling, hypersalivation, and tachycardia
	Untreated injuries (n=2)	Sporotrichosis	Ulcerated wound, erythema on the skin, emaciation, dehydration, and weakness

CPV=canine parvovirus, FeLV=feline leukemia virus, FIV=feline immunodeficiency virus, FLUTD=feline lower urinary tract disease, FPV=feline parvovirus.

Table 3: Demonstrating the relationship between various factors and patterns of animal abuse and inadequate animal welfare practices

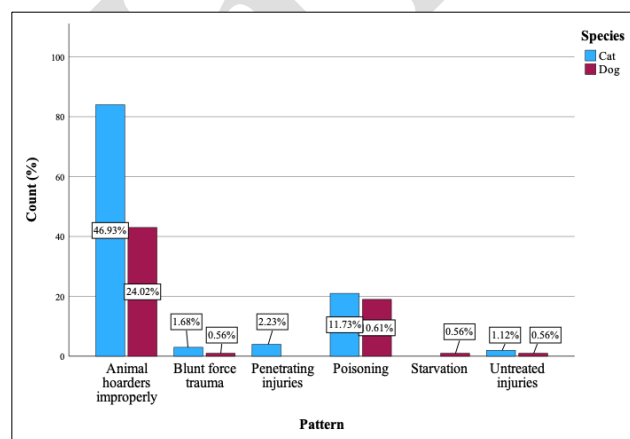| Forms of animal abuse and inadequate animal welfare	Variables (χ^2 value)				
	Species	Age	Gender	Breed	Husbandry system
	6.67	93.36	11.59	62.75	29.23
P-value	0.24	0.15	0.04*	0.04*	<0.001*

*Significant

Fig. 1: Forms of animal abuse and inadequate animal welfare from 2018 to 2023 in Thonburi district, Dao Khanong subdistrict, Bangkok, Thailand. The study revealed that the majority of cases involving dogs and cats were primarily associated with improper care by animal hoarders.

DISCUSSION

Animal cruelty and inadequate animal welfare management are pervasive issues observed globally, including in countries such as the United States, Serbia, and Thailand (Intarapanich et al. 2016; Kulnides and Lorsirigool 2023; Aleksic et al. 2024). This study found that cats are more frequently subjected to abuse than dogs, with abuse rates of 63.7% for cats compared to 36.3% for dogs. Additionally, males are more commonly affected than females in both species (χ^2 value=11.59, P<0.04). This finding contrasts with Araújo et al. (2021) which identified a higher prevalence of abuse in dogs than in cats, with male dogs being more frequently abused than females dogs and female cats experiencing abuse more often than male cats. The average age of the dogs and cats observed in this study was 3.79±3.26 years and 2.76±2.26 years, respectively. This is consistent with previous reports indicating a higher prevalence of abuse in juvenile dogs and cats (Araújo et al. 2021). The most observed breed among cats in this study

was domestic shorthair, while among dogs the most common breeds were mixed breed and French Bulldog (χ^2 value=62.75, P<0.04). For French Bulldogs, this study found an association with the accumulation of animals under inadequate management. This finding is consistent with Almeida et al. (2018), which also identified mixed breed dogs and cats as the most frequently encountered breeds. Regarding the husbandry systems observed in this study, dogs were housed in closed and open systems with similar frequency (50.77 and 49.23%, respectively). In contrast, for cats, open husbandry systems were associated with a higher incidence of animal cruelty compared to closed systems (77.19% versus 22.81%). It has been reported that dogs and cats kept in open husbandry systems are at a higher risk of experiencing animal cruelty, such as physical abuse, poisoning, and infections, compared to those kept in closed systems (Lorsirigool et al. 2022; Kulnides et al. 2023; Kulnides and Lorsirigool 2023).

This study identified six categories of animal abuse and inadequate welfare: animal hoarding (dogs: 24.02%, cats: 46.93%); poisoning (dogs: 10.61%, cats: 11.73%); blunt force trauma (dogs: 0.56%, cats: 1.68%); penetrating injuries (dogs: 2.23%); starvation (dogs: 0.56%); and untreated injuries (dogs: 0.56%, cats: 1.12%). Animal hoarding in dogs was primarily associated with heartworm infection (48.84%) and parvovirus infection (41.86%). These infections were linked to the owner's neglect to vaccinate the animals, the absence of a heartworm prevention programme, and a high prevalence of mosquitoes in the husbandry area. Demodicosis and ectoparasite infestations in dogs were also observed, likely due to stress and inadequate ectoparasite protection (Sivel and Yağcı 2023). One dog was found to have pyometra as a result of a contraceptive injection administered by the owner, whose lack of knowledge about proper contraceptive use led to complications (Xavier et al. 2023). In cats, animal hoarding was predominantly associated with FeLV and FIV infections (41.67%) due to inadequate vaccination and poor management practices, including failure to separate infected cats from healthy cats within the household. Additionally, one cat was diagnosed with FLUTD (1.19%), potentially related to the presence of multiple cats in the household and associated stress factors (Black 2018).

This study identified ivermectin (36.84%) and paracetamol (52.38%) as the primary toxins involved in poisoning cases in dogs and cats, respectively. These findings contrast with those of Markert et al. (2023), which reported that rodenticides and unidentified toxins were more commonly detected in cats, while Adekoya et al. (2020) noted that insecticides were the predominant toxins in dogs. The variation in toxin types may be attributed to differences in geographic regions, the level of knowledge and understanding among pet owners regarding medication administration, and the specific environmental conditions in which the animals reside. The clinical signs observed in dogs and cats exposed to toxins are nonspecific and are influenced by various factors, including the dosage, type of toxin, route of exposure, and the duration of exposure (Adekoya et al. 2020; Markert et al. 2023).

Physical abuse in dogs in this study was found to involve blunt force trauma inflicted by the owner using a broom handle. Physical examination revealed ataxia, pain,

and erosive wounds. In contrast, blunt force trauma in cats was primarily due to being hit by a car or from fights with multiple cats in the household. Intarapanich et al. (2016) reported that dogs and cats with non-accidental blunt force trauma often exhibited skull and vertebral fractures, as well as evidence of older fractures. Penetrating injuries observed in cats were caused by dog bites and other cat bites. Physical examination revealed abscesses, ataxia, and weakness. Risselada et al. (2008) reported that the causes of penetrating injuries in dogs and cats include gunshot wounds, fight wounds and bite wounds. Sporotrichosis in cats revealed that their owners were hesitant to continue treatment due to concerns about exposure to the infected cat, the lengthy duration of treatment, and the high associated costs.

Animals subjected to abuse or inadequate welfare often exist in unsanitary conditions where their living environments fail to meet hygiene standards (Mota-Rojas et al. 2022). These animals typically show signs of malnutrition and dehydration (Ferreira et al. 2024). Veterinarians have the critical role of evaluating the physical condition of such animals (Gerdin et al. 2016; Browning 2022). In many countries, animal abuse is legally prohibited and subject to penalties (Kulnides and Lorsirigool 2023; Mota-Rojas et al. 2023). This study identified animal hoarding as the most common issue, with research suggesting that it represents a psychological disorder in humans marked by the accumulation of pets without proper welfare management (d'Angelo et al. 2020; Prato-Previde et al. 2022). Previous studies have documented that dogs and cats are the most frequently hoarded animals (Wilkinson et al. 2022; Sacchettino et al. 2023 .(Future studies should investigate patterns of animal abuse and inadequate welfare management in other regions, which would be valuable for forensic veterinary science. Additionally, exploring the reasons why owners engage in animal hoarding without proper management could help inform strategies to reduce animal cruelty.

Conclusion

Animal hoarding is the predominant form of animal abuse and inadequate welfare observed for both dogs and cats, followed by poisoning. The incidence of abuse and inadequate welfare was higher in males compared to females in both species. An open husbandry system poses a greater risk for abuse compared to a closed system. In this region, domestic shorthair cats and mixed-breed dogs were the most commonly affected by abuse and inadequate welfare.

Conflict of interest: The authors confirm that there are no conflicts of interest associated with this study.

Author's Contribution: AL and YS created the study design and wrote the initial draft of the manuscript. AL was responsible for data collection and analysis, and also contributed to writing the manuscript. NK offered guidance

on the manuscript. All authors reviewed and approved the final submission to the journal.

REFERENCES

Adekoya OA, Adenubi OT, Adebayo OO, Adebowale OO, Oyewusi JA and Olukunle JO, 2020. Retrospective study of suspected canine poisoning cases at the Veterinary Teaching Hospital, Federal University of Agriculture, Abeokuta, Nigeria (2009-2019). Open Veterinary Science 1(1): 30-37. https://doi.org/10.1515/ovs-2020-0102

Aleksic Radojkovic J, Nesic V, Ilic Bozovic A, Davitkov D, Djuric M, Krstic V and Davitkov D, 2024. Cruelty toward dogs and cats in the Republic of Serbia during a 10-Year period. Animals 14(13): 1926. https://doi.org/10.3390/ani14131926

Almeida DC, Torres SM and Wuenschmann A, 2018. Retrospective analysis of necropsy reports suggestive of abuse in dogs and cats. Journal of the American Veterinary Medical Association 252(4): 433-439. https://doi.org/10.2460/javma.252.4.433

Araújo D, Lima C, Mesquita JR, Amorim I and Ochôa C, 2021. Characterization of suspected crimes against companion animals in portugal. Animals 11(9): 2744. https://doi.org/10.3390/ani11092744

Blache D and Maloney SK, 2009. Animal welfare legislation in Australia. Agrociencia 13(3): 35-44. Available at: https://agrocienciauruguay.uy/index.php/agrociencia/article/download/844/861

Black V, 2018. Approach to feline lower urinary tract disease. Companion Animal 23(7): 388-394. https://doi.org/10.12968/coan.2018.23.7.388

Browning H, 2022. Assessing measures of animal welfare. Biology & Philosophy 37(4): 36. https://doi.org/10.1007/s10539-022-09862-1

Carenzi C and Verga M, 2009. Animal welfare: review of the scientific concept and definition. Italian Journal of Animal Science 8(sup1): 21-30. https://doi.org/10.4081/ijas.2009.s1.21

d'Angelo D, Ciani F, Zaccherini A, Tafuri S, Avallone L, d'Ingeo S and Quaranta A, 2020. Human-animal relationship dysfunction: A case study of animal hoarding in Italy. Animals 10(9): 1501. https://doi.org/10.3390/ani10091501

Favre D, 2016. An international treaty for animal welfare. In: D. Cao, and S. White (Editors). Animal law and welfare-international perspectives. Springer Cham. 87-106. https://www.doi.org/10.1007/978-3-319-26818-7_5

Ferreira Siano G, Fonseca de Oliveira CS, de Sousa FG, Beier SL and da Costa-Val AP, 2024. Knowledge and perception about the welfare and mistreatment of dogs in Brazil. Plos One 19(4): e0302317. https://doi.org/10.1371/journal.pone.0302317

Gerdin JA, McDonough SP, Reisman R and Scarlett J, 2016. Circumstances, descriptive characteristics, and pathologic findings in dogs suspected of starving. Veterinary pathology 53(5): 1087-1094. https://doi.org/10.1177/0300985815575049

Gomes LB, Paiva MT, de Oliveira Lisboa L, de Oliveira CSF, Garcia RDCM and de Magalhães Soares DF, 2021. Diagnosis of animal abuse: A Brazilian study. Preventive Veterinary Medicine 194: 105421. https://doi.org/10.1016/j.prevetmed.2021.105421

Hennessy MB, Willen RM and Schiml PA, 2020. Psychological stress, its reduction, and long-term consequences: What studies with laboratory animals might teach us about life in the dog shelter. Animals 10(11): 2061. https://doi.org/10.3390/ani10112061

Intarapanich NP, McCobb EC, Reisman RW, Rozanski EA and Intarapanich PP, 2016. Characterization and comparison of injuries caused by accidental and non-accidental blunt force trauma in dogs and cats. Journal of Forensic Sciences 61(4): 993-999. https://doi.org/10.1111/1556-4029.13074

Kulnides N and Lorsirigool A, 2023. The role of veterinarians in forensic science: A Review. World's Veterinary Journal 3: 452-458. https://dx.doi.org/10.54203/scil.2023.wvj49

Kulnides N, Lorsirigool A, Pumipuntu N, Chantrarasmee C and Janthong N, 2023. Incidence and Hematological Changes in Dogs Infected with Dirofilaria immitis in Thailand. World's Veterinary Journal 1: 103-108. https://dx.doi.org/10.54203/scil.2023.wvj11

Li B, Wang Y, Rong L and Zheng W, 2023. Research progress on animal environment and welfare. Animal Research and One Health 1(1): 78-91. https://doi.org/10.1002/aro2.16

Lorsirigool A, Sudjaroen Y and Kulnides N, 2022. Incidence of clinical signs in poisoned pets of Thailand: A retrospective study. World's Veterinary Journal 1: 28-33. https://dx.doi.org/10.54203/scil.2022.wvj4

Markert C, Heilmann RM, Kiwitz D and Dörfelt R, 2023. A retrospective evaluation of confirmed and suspected poisonings in 166 cats between 2016 and 2020. Veterinary World 16(9): 1940. https://doi.org/10.14202/vetworld.2023.1940-1951

Merck M, 2012. Veterinary forensics: animal cruelty investigations. John Wiley & Sons. Available at: https://www.wiley.com/en-us/Veterinary+Forensics%3A+Animal+Cruelty+Investigations%2C+2nd+Edition-p-9780470961629

Mota-Rojas D, Mariti C, Marcet-Rius M, Lezama-García K, Gazzano A, Hernández-Ávalos I and Whittaker AL, 2022. The welfare of fighting dogs: wounds, neurobiology of pain, legal aspects and the potential role of the veterinary profession. Animals 12(17): 2257. https://doi.org/10.3390/ani12172257

Mota-Rojas D, Strappini A, Whittaker AL, Ghezzi M, Titto CG, Calderón-Maldonado N and Orihuela A, 2023. Controversial topics in animal welfare in Latin America: a focus on the legislation surrounding the human-companion animal relationship and animals used for recreational practices. Animals 13(9): 1463. https://doi.org/10.3390/ani13091463

Parry NM and Stoll A, 2020. The rise of veterinary forensics. Forensic Science International 306: 110069. https://www.doi.org/10.1016/j.forsciint.2019.110069

Prato-Previde E, Basso Ricci E and Colombo ES, 2022. The complexity of the human–animal bond: Empathy, attachment and anthropomorphism in human–animal relationships and animal hoarding. Animals 12(20): 2835. https://doi.org/10.3390/ani12202835

Risselada M, De Rooster H, Taeymans O and van Bree H, 2008. Penetrating injuries in dogs and cats. Veterinary and Comparative Orthopaedics and Traumatology 21(05): 434-439. https://doi.org/10.3415/VCOT-07-02-0019

Rowan AN, 2006. Animal cruelty: Definitions and sociology. Behavioral and Brain Sciences 29(3): 238-239. https://doi.org/10.1017/S0140525X06389054

Sacchettino L, Gatta C, Giuliano VO, Bellini F, Liverini A, Ciani F and Napolitano F, 2023. Description of twenty-nine animal hoarding cases in Italy: The Impact on Animal Welfare. Animals 13(18): 2968. https://doi.org/10.3390/ani13182968

Sivel GN and Yağcı BB, 2023. Evaluation of oxidative stress on dogs with demodicosis. Turkish Journal of Veterinary Research 7(1): 7-13. https://doi.org/10.47748/tjvr.1119988

Turkmen Z, Zengin S, Kuloglu Genc M, Yayla M, Tekin Bulbul T and Mercan S, 2022. The role of forensic veterinary toxicology in pet custody cases. Journal of Analytical Toxicology 46(9): e239-e242. https://doi.org/10.1093/jat/bkac088

Voogt AM, Ursinus WW, Sijm DT and Bongers JH, 2023. From the Five Freedoms to a more holistic perspective on animal welfare in the Dutch Animals Act. Frontiers in Animal Science 4: 1026224. https://doi.org/10.3389/fanim.2023.1026224

Wilkinson J, Schoultz M, King HM, Neave N and Bailey C, 2022. Animal hoarding cases in England: Implications for public health services. Frontiers in Public Health 10: 899378. https://doi.org/10.3389/fpubh.2022.899378

Xavier RGC, Santana CH, de Castro YG, de Souza TGV, do Amarante VS, Santos RL and Silva ROS, 2023. Canine Pyometra: A short review of current advances. Animals 13(21): 3310. https://doi.org/10.3390/ani13213310