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Wild fauna received by the Wild Animal Screening Centre and referred to the Veterinary Hospital of the University of Brasília

Fauna silvestre recebida pelo centro de triagem de animais silvestres e encaminhada para o hospital veterinário da Universidade de Brasília

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Abstract
The aim of this work was to analyze records from two institutions that work with wild animals throughout 2018. Data were obtained from the animals received by the Wild Animal Screening Centre of Federal District (CETAS-DF), Brazil, referring to the type of admission and destination, species, as well as animals that required veterinary care and were referred to the Wild Animal Sector of the Veterinary Hospital of the University of Brasilia (HVet-UnB) with description of the main conditions and temporal analysis. Of the 7,603 animals that were admitted to CETAS-DF (6,646 birds, 461 mammals and 496 reptiles), 1,028 individuals (13.52%) required veterinary medical care and were referred to HVet-UnB. The class of animals that most needed assistance was birds (765), followed by mammals (225) and reptiles (37). Unlike other fauna diagnostic surveys from environmental agencies, this is the first study that correlates the numbers of animals received by a CETAS and that were referred for veterinary medical follow-up. The high number of wild animals that require referral to specialized institutions reinforces the need to establish agreements and structure for veterinary medical treatment and subsequent rehabilitation of these specimens as part of an action plan for the conservation of biodiversity in the country.
Keywords: Diseases; Wild animals; Federal District; Rescue; Screening

Resumo
O trabalho teve como objetivo analisar registros de duas instituições que trabalham com animais silvestres ao longo do ano de 2018. Foram obtidos dados dos animais recebidos pelo Centro de Triagem de Animais Silvestres do Distrito Federal (CETAS-DF), referentes ao tipo de entrada e destinação, espécies, bem como animais que necessitaram de atendimento médico veterinário e foram encaminhados ao Setor de Animais Silvestres do Hospital Veterinário da Universidade de Brasília (HVet-UnB) com descrição das principais afecções e análise temporal. Dos 7.603 animais que deram entrada no CETAS-DF (6.646 aves, 461 mamíferos e 496 répteis), 1.028 indivíduos (13,52%) necessitaram de atendimento médico veterinário e foram encaminhados ao HVet-UnB. A classe de animais que mais precisou de assistência foi a de aves (765), seguida de mamíferos (225) e de répteis (37). Diferente de outros levantamentos de diagnóstico de fauna de órgãos ambientais, este é o primeiro estudo que correlaciona os números de animais recebidos por um CETAS e que foram encaminhados para acompanhamento médico veterinário. O alto número de animais silvestres que demandam encaminhamento para instituições especializadas reforça a necessidade de estabelecimento de acordos e estrutura de tratamento médico veterinário e posterior reabilitação desses exemplares como parte de plano de ação de conservação da biodiversidade no país.
Palavras-chave: Afecções; Animais Silvestres; Distrito Federal; Resgate; Triagem

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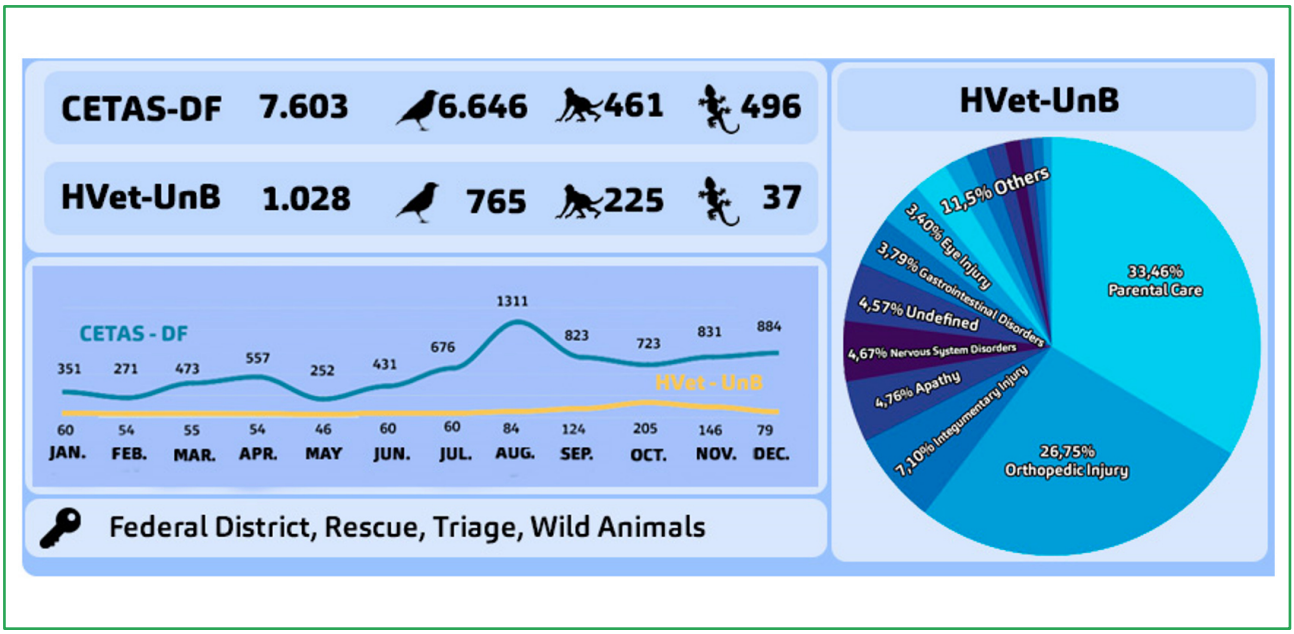

Graphic abstract: Wild fauna received by the Wild Animal Screening Centre and referred to the Veterinary Hospital of the University of Brasília

Introduction

In Brazil, the Wild Animal Screening Centres (CETAS) are subordinated to the State Superintendencies (SUPES) of the Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA), in accordance with Normative Instruction (IN) No. 23 of 31 December 2014. CETAS is responsible for wildlife management and its activities include reception, identification, marking, sorting, assessment, recovery, rehabilitation and destination of wild animals apprehended, rescued or handed over voluntarily to environmental agencies [1].

The increase in the receipt of wild animals in recent years is due to the popularisation of keeping unconventional animals as pets, increased activity of environmental agencies, with the confiscation of animals from trafficking, together with the expansion of deforestation, fragmentation and reduction of natural habitats, roadkill, and other anthropic actions, which victimise the native fauna [2,3,4].

Understanding the CETAS casuistry provides a basis for the improvement of strategies and the elaboration of planning based on critical periods, with organisation of necessary inputs and equipment according to these data for each region of the country. These data also favour the organisation of plans to reduce the trafficking of wild animals, learn about their environmental impact in the region, in addition to contributing to confiscation actions by the competent agencies. In this way, it is feasible to execute work plans for the necessary inputs and equipment with the determination of the most critical periods for receiving animals [5]. Some previous surveys of Brazilian CETAS determined that birds represented the vast majority of animals received by environmental agencies, followed by reptiles and mammals [6,5,7,8].

After the initial screening of the animals, the specimens that need intensive care are referred for veterinary medical assistance. In recent years, an increase in specialised care for wild animals has been observed. This growth can be explained by the intensification of confiscated animals from trafficking, as well as the rescue of specimens that are victims of anthropic actions linked to deforestation and habitat fragmentation, roadkill, electric shock accidents, bird–window collision, among others [4,9].

The Wild Animal Sector of the Veterinary Hospital of Brasília (HVet-UnB) provides services in the clinical, surgical, and diagnostic areas to specimens of animals sent by tutors. In addition, it also provides care for animals referred for veterinary medical assistance by environmental agencies through a

cooperation agreement with the CETAS/IBAMA [10].

The aim of this research was to carry out a survey of data from the animals received at the Federal District CETAS as well as to evaluate the percentage of this amount sent to the Veterinary Hospital of the University of Brasília in the year of 2018.

Material and methods

Data from the animals received by CETAS-DF and by the Wild Animal Sector of HVet-UnB were compiled from 1 January to 31 December 2018. The data from CETAS-DF were obtained from a database record in digital format. The data obtained from the HVet-UnB were based on the records of attendance of the animals sent by CETAS-DF, with information on the date of entry and exit of the animal, scientific and popular name of the species and type of disorder.

For the standardisation of popular and scientific names and classification of order and families, we used data from the Enciclopedia of life (EOL), the WikiAves website, International Union for Conservation of Nature [11] and the Chico Mendes Institute for Biodiversity Conservation (ICMBio) [12]. Registers whose popular and scientific names did not match correctly were classified as 'uncertain'.

Data analysis was performed according to taxonomic classification, type of delivery, frequency of receipt of each species, number of animals received according to the months of the year and the length of stay in the institution, calculated according to the date of entry and destination. In addition, the receipt by CETAS was classified as 'seizure', in the case of animals in an irregular situation and that were confiscated by environmental institutions; 'handed over voluntarily' by an individual; and 'rescue', when agents of an environmental agency captured the animals. Specimens that did not have information about their entry were classified as 'unidentified'.

The destination of these same animals were classified as 'without destination', for animals that remained under the care of CETAS; 'unspecified', in the case of those with a date of departure from the institution, but whose destination was not recorded; 'captivity' means animals that were transferred to other institutions for temporary or permanent maintenance in captivity; 'release', animals that were returned to the wild; 'provisional custody' means animals that were under the guardianship of a person. In addition, cases of 'escape', 'death' and 'euthanasia' were recorded.

After the initial screening carried out at CETAS-DF, animals that needed medical or parenteral care were referred to the HVet-UnB. For such specimens, the cases were classified according to the diagnosed conditions. Thus, the following categories were recorded: 'apathy' (debilitated animals without a conclusive diagnosis); 'parental care'; 'gastrointestinal and/or nutritional disorders'; 'genitourinary and/or reproductive disorders'; 'respiratory disorders'; 'infectious diseases'; 'electric shock injury'; 'intoxication'; 'eye lesion'; 'oral lesion'; 'orthopaedic injury' (animals with changes in the joint and musculoskeletal system); 'integumentary lesion'; 'tumour'; and 'central nervous system (CNS) trauma'. The classification 'others' was used for animals with impairments that did not fit into any of the aforementioned categories; and 'not defined' for specimens that did not have information on the record about the reason for attendance.

The Microsoft Excel Professional Plus 2019 program was used in the tabulation of data, as well as in the construction of graphs and descriptive statistical analysis.

Results

CETAS-DF receipt

In 2018, 7,603 animals were received by CETAS-DF, of which 6,646 were birds (87.41%), 496 reptiles (6.52%) and 461 mammals (6.07%). It was possible to identify 184 species, from 148 genera, 66 families and 31 different orders. The list of taxonomic classification of specimens is catalogued in Tables 1 to 3, separated by classes of birds, reptiles and mammals, respectively.

Of these individuals, 6,918 animals (90.99%) were referred to CETAS by agents of the fire department, environmental police, or state and/or federal environmental agencies. A total of 684 animals (9%) were delivered by individuals and one animal (0.01%) had no record of its origin. Regarding the type of delivery, 4,615 animals (60.70%) were apprehended, 2,217 (29.16%) were rescued, 766 (10.07%) were handed over voluntarily and five birds (0.07%) had no information recorded.

Regarding the destination of the animals, these were represented according to the classes in Table 4.

Table 1. List of orders, species and number of birds sent to the Federal District Wild Animal Screening Center (CETAS-DF) in 2018

ORDER	SPECIES	TOTAL
Accipitriformes	*Buteo brachyurus (n=2); Gampsonyx swainsonii (n=5); Geranospiza caerulescens (n=1); Rupornis magnirostris (n=9)*	17 (0.26%)
Anseriformes	Anatidae (n=11); *Dendrocygna viduata* (n=3); *Mergus octosetaceus* (n=1); *Netta rufina* (n=1)	16 (0.24%)
Apodiformes	*Chaetura meridionalis (n=4); Eupetomena macroura (n=3); Florisuga fusca (n=1); Trochilidae (n=17)*	25 (0.38%)
Caprimulgiformes	*Nyctibius sp. (n=21); Nyctidromus albicollis (n=35)*	56 (0.84%)
Cariamiformes	*Cariama cristata (n=7); Cariamidae (n=1)*	08 (0.12%)
Cathartiformes	*Coragyps atratus (n=45)*	45 (0.68%)
Charadriiformes	*Vanellus chilensis (n=24)*	24 (0.36%)
Columbiformes	*Columbina squammata (n=13); Columbina talpacoti (n=40); Patagioenas picazuro (n=51); outras (n=7)*	111 (1.67%)
Coraciiformes	Alcedinidae (n=1); *Baryphthengus ruficapillus* (n=1); *Megaceryle torquata* (n=1)	03 (0.04%)
Cuculiformes	*Coccyzus melacoryphus (n=1); Crotophaga ani (n=7); Guira guira (n=3); Piaya cayana (n=4)*	15 (0.23%)
Falconiformes	*Caracara plancus (n=53); Falco femoralis (n=3); Falco sparverius (n=40); Falconiforme (n=1)*	97 (1.46%)
Gruiformes	*Aramides saracura (n=3); Gallinula galeata (n=9); Pardirallus maculatus (n=1); Pardirallus nigricans (n=1)*	14 (0.21%)
Passeriformes	*Gnorimopsar chopi (n=281); Sicalis flaveola (n=1190); Sporophila nigricollis (n=1015); outros (n=1764)*	4250 (63.95%)
Pelicaniformes	*Ardea alba (n=2); Nycticorax nycticorax (n=2); Syrigma sibilatrix (n=9); Theristicus caudatus (n=8); outros (n=3)*	24 (0.36%)
Piciformes	*Colaptes campestres (n=24); Ramphastidae (n=11); Ramphastos toco (n=20); outros (n=13)*	68 (1.02%)
Psittaciformes	*Amazona aestiva (n=816); Brotogeris chiriri (n=415); Eupsittula aurea (n=91); Psittacara leucophthalmus (n=91); outros (n=218)*	1631 (24.54%)
Strigiformes	*Athene cunicularia (n=85); Glaucidium brasilianum (n=39); Tytonidae (n=49); outros (n=47)*	220 (3.31%)
Tinamiformes	*Crypturellus parvirostris (n=2); Nothura sp. (n=1); Tinamus guttatus (n=1); Rhynchotus rufescens (n=1)*	5 (0.07%)
Uncertain	Uncertain	17 (0.26%)
TOTAL		**6646 (100%)**

Table 2. List of orders, species and number of reptiles sent to the Federal District Wild Animal Screening Center (CETAS-DF) in 2018

ORDER	SPECIES	TOTAL
Crocodylia	*Caiman crocodilus (n=4); Crocodiliano (n=1)*	5 (1.00%)
Squamata	*Boa constrictor (n=42); Crotalus durissus (n=28); Micrurus lemniscatus (n=21); outros (n=93)*	184 (37.10%)
Testudinata	*Chelonoidis carbonaria (n=172); Chelonoidis sp. (n=42); Trachemys dorbigni (n=39); outros (n=50)*	303 (61.09%)
Uncertain	Uncertain	4 (0.81%)
TOTAL		**496 (100%)**

Tabela 3. List of orders, species and number of mammals sent to the Federal District Wild Animal Screening Center (CETAS-DF) in 2018

ORDER	SPECIES	TOTAL
Artiodactyla	*Pecari tajacu (n=1)*	1 (0.22%)
Carnivora	*Cerdocyon thous (n=8); Lycalopex vetulus (n=3); Nasua sp. (n=6); outros (n=7)*	24 (5.21%)
Cetartiodactyla	*Mazama gouazoubira (n=2); Ozotocerus bezoarticus (n=1)*	3 (0.65%)
Cingulata	Dasypodidae (n=1); *Dasypus novemcinctus* (n=16); *Euphractus sexcinctus* (n=4); *Tolypeutes* sp. (n=1)	22 (4.77%)
Didelphimorphia	*Didelphis albiventris (n=260); Didelphis aurita (n=26); Philander opossum (n=3)*	289 (62.69%)
Lagomorfos	*Lepus sp. (n=3); Sylvilagus brasiliensis (n=3)*	6 (1.30%)
Pilosa	subordem Folivora (n=2); *Myrmecophaga tridactyla* (n=2); *Tamandua tetradactyla* (n=5)	9 (1.95%)
Primatas	*Callithrix penicillata (n=73); Callithrix sp. (n=6); Sapajus sp. (n=4)*	83 (18%)
Rodentia	*Cavia aperea (n=1); Coendou prehensilis (n=11); Dasyprocta sp. (n=1); Hydrochoerus hydrochaeris (n=10)*	23 (4.99%)
Uncertain	Uncertain	1 (0.22%)
TOTAL		**461 (100%)**

Table 4. List of type of destination, according to taxonomic class, of animals sent to the Federal District Wild Animal Screening Center (CETAS-DF) in 2018

Destination	Birds	Reptiles	Mammals	Total
Without destination	3.068 (46.16%)	188 (37.90%)	190 (41.21%)	3446
Released	2980 (44.84%)	286 (57.66%)	147 (31.89%)	3413
Death	511 (7.69%)	13 (2.62%)	113 (24.51%)	637
Euthanasia	32 (0.48%)	2 (0.40%)	6 (1.30%)	40
Escape	27 (0.41%)	4 (0.81%)	4 (0.87%)	35
Provisional custody	0 (0%)	3 (0.61%)	0 (0%)	3
Captivity	26 (0.39%)	0 (0%)	0 (0%)	26
Unspecified	2 (0.03%)	0 (0%)	1 (0.22%)	3
TOTAL	**6.646 (100%)**	**496 (100%)**	**461 (100%)**	**7.603**

Animals sent by CETAS-DF to HVet-UnB

Of the 7,603 animals received by CETAS-DF in 2018, 1,028 individuals (13.52%) were referred for veterinary care to the Wild Animal Sector of HVet-UnB. Most of the assistances were birds with 765 animals (74.42% of the total assistances from HVet-UnB; 11.52% of the total number of birds received by CETAS-DF), followed by 225 mammals (21.89% of the total assistances from HVet-UnB; 48.80% of the total number of mammals received by CETAS-DF), 37 reptiles (3.6% of the total assistances from the HVet-UnB; 7.45% of the total number of reptiles received by the CETAS- DF) and an individual of unidentified class (0.1% of the total attendances at the HVet-UnB).

Of the 765 birds received at the HVet-UnB, 20 orders were identified: Acciptriformes (11; 1.44%), Anseriformes (1; 0.13%), Apodiformes (22; 2.88%), Caprimulgiformes (6; 0.78%), Cariamiformes (7; 0.92%), Cathartiformes (22; 2.88%), Charadriiformes (17; 2.22%), Ciconiiformes (01; 0.13%), Columbiformes (3; 4.18%), Coraciiformes (2; 0.26%), Cuculiformes (11; 1.44%), Falconiformes (34; 4.44%), Gruiformes (5; 0.65%), Nyctibiiformes (4; 0.52%), Passeriformes (143; 18.69%), Pelecaniformes (13; 1.70%), Piciformes (51; 6.67%), Psittaciformes (244; 31.90%), Strigiformes (135; 17.65%) and Tinamiformes (2; 0.26%). Two individuals (0.26%) were excluded from the classification because they did not have complete data. The order Psittaciformes and family Psittacidae were the most numerous, with 244 individuals (31.90% of birds and 27.74% of all animals). The genus *Amazona* had the largest number of individuals, with 88 animals (11.50% of the birds and 8.56% of the total number of animals), highlighting the *Amazona aestiva* species with 82 animals (10.72% of the birds and 7.98% of the total number of animals).

A total of 225 mammals of the orders Artiodactyla (1; 0.44%), Carnivora (13; 5.78%), Cingulata (13; 5.78%), Didelphimorphia (131; 58.22%), Lagomorpha (1; 0.44%), Pilosa (3; 1.33), Primate (54; 24%) and Rodentia (9; 4%) were received at the HVet-UnB. Of this amount, 131 (58.22% of mammals) animals belonged to the species *Didelphis albiventris*. In the case of reptiles, 37 individuals of the Crocodylia (1; 2.7%), Squamata (12; 32.43%) and Testudines (24; 64.86%) orders were treated. The Testudines order was the most representative with 24 animals (64.86% of the reptiles), the majority (29.73% of the reptiles) belonging to the Chelidae family and the *Phrynops geoffroanus* species.

Among the 1,028 cases treated, the types of conditions that affected the animals, in descending order, were: parental care (344; 33.46%); orthopaedic injury (275; 26.75%); integumentary injury (73; 7.10%); apathy (49; 4.76%); CNS trauma (48; 4.67%); undefined (47; 4.57%); gastrointestinal and/or nutritional disorders (39; 3.79%); eye injury (35; 3.40%); others (28; 2.72%); oral lesion (18; 1.75%); infectious disease (17; 1.65%); tumour (15; 1.46%); check-up (12; 1.18%); electric shock accidents (9; 0.88%); respiratory disorder (9; 0.88%); intoxication (7; 0.68%); genitourinary and/or reproductive disorders (3; 0.30%).

Temporal analysis

The number of animals received by CETAS-DF and HVet-UnB according to the months is represented in Figure 1.

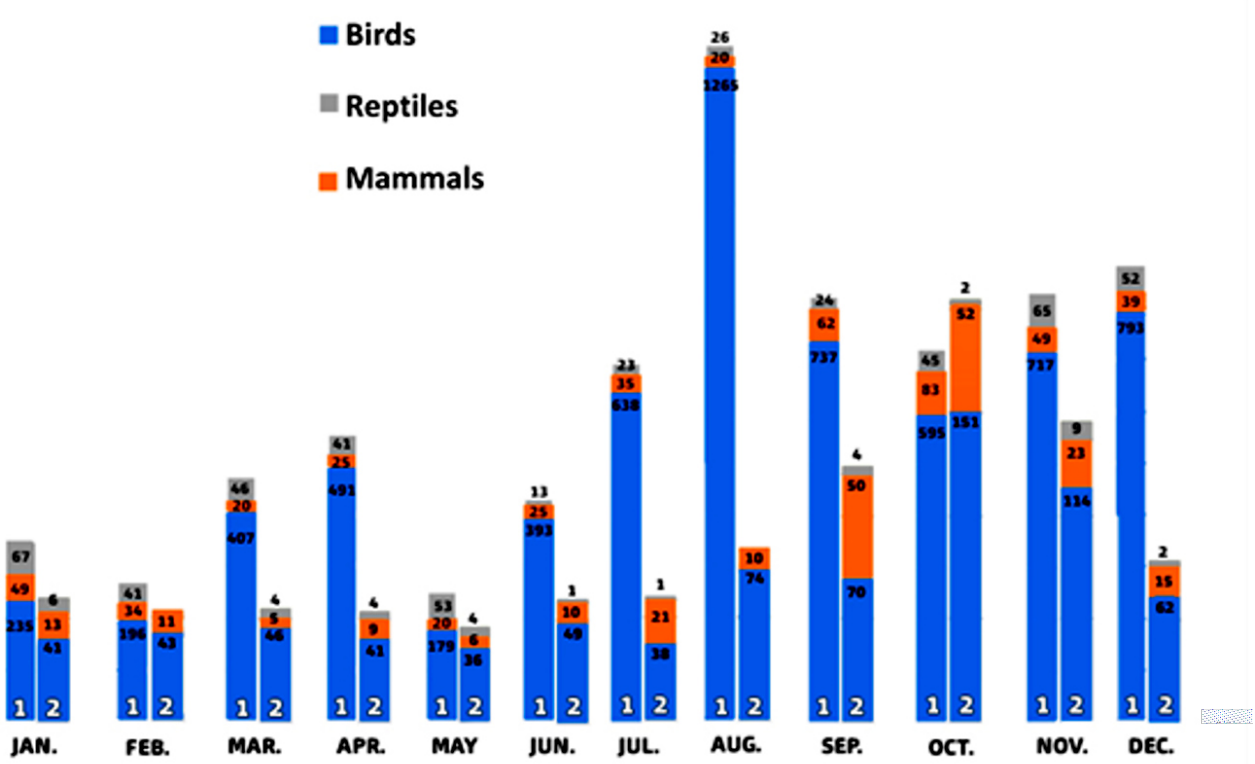

Figure 1. Monthly number of animals received by the Federal District Wild Animal Screening Centre (CETAS) (1) and the Wild Animal Sector of the Veterinary Hospital of the University of Brasília (UnB) (2) in 2018.

Discussion

Of the animals that were admitted to CETAS-DF in 2018, just over 60% were seizures and approximately 30% were rescued, highlighting the importance of environmental agencies' efforts to reduce the trafficking of wild animals, in addition to the rescue of fauna. The high number of bird seizures should be highlighted, a fact also observed by FREITAS et al. (2015) [5], MELLO (2016) [8] and SILVA et al. (2019) [9] when evaluating CETAS data from Belo Horizonte, Seropédica and Goiânia, respectively, which reflects the culture of illegal commercialisation of these specimens in the country, with an emphasis on the Passeriformes and Psittaciformes orders.

Regarding reptiles and mammals, rescues were the most common way of receiving these animals at CETAS-DF. These data reflect the impact of the proximity of some species to urban and peri-urban locations, due to the loss of habitat by anthropic actions. Such occurrence exposes the fauna to several adverse factors such as roadkill, electric shocks, attacks by domestic animals, among others [8].

Additionally, reptiles are also kept as companion animals for their beauty and easy maintenance. Testudines are highlighted by the presence of the shell and due to popular beliefs, such as those that correlate them with the cure of respiratory diseases [6,13], in addition they constitute an item of human food in some regions of the country[14,15]. Corroborating other surveys in Brazilian CETAS[6,7,16], the genus *Chelonoidis* was the most expressive for the reptiles of CETAS-DF and, among the snakes, the genus *Boa* obtained the highest record.

Unlike other articles on fauna diagnostics from environmental agencies, this is the first study that correlates the numbers of animals received by a CETAS and that were referred for intensive veterinary medical assistance after screening. The forwarding of 14% of the amount from CETAS-DF to the HVet-UnB highlights the importance of environmental agencies hiring veterinarians and celebrating veterinary hospitals' cooperation, as well having facilities that allow receiving, sorting, doing emergency care and surgical procedures [17].

Parental care (33.46%) was the main assistance performed in animals from CETAS-DF at HVet-UnB. This demand for the entry of offspring during the breeding season is usually correlated with the death of the parents. Thus, it is possible to diagnose most of the cases in the second semester, between the months of September and November, which are compatible with the reproductive

seasons of most species of birds and mammals [18,19]. The second largest series attended by the HVet-UnB was orthopaedic disorders. These were mainly correlated to traumatic origin in free-living specimens [4]. Fractures were the main type of injury and can be caused by fights, attacks by predators, roadkill, bird–window collision, human aggression, and electric shock [20].

In a survey carried out by MELLO (2016) [8] at CETAS of Seropédica – RJ, the second semester also had the highest number of animals received. This result corroborates that found in CETAS-DF in 2018, where the month of August had the highest amount of entry of birds consistent with the reproductive period of some species. For mammals, the highest number of receipts was in October, when *Didelphis albiventris* and *Callithrix penicillata* have newborns. For reptiles, the most significant month of receipt was January, which corresponds to a period of high temperatures and rainfall in the region, with greater availability of food, increasing the activity of these animals [21].

Most of the animals were registered as 'without destination' and remained in the institutions until their recovery and destination. The 'release' was the second largest destination, demonstrating the importance of this type of enterprise for the rehabilitation of these rescued specimens. Euthanasia was performed only for the relief of pain in animals classified as seriously injured and with intense irreversible suffering, when there was no possibility of treatment and in situations where the animal would not be able to express behaviours essential for survival and quality of life, as described by the National Council for the Control of Animal Experiments (CONCEA) [22].

Data such as those presented in this study are highly relevant for the environmental management of fauna in Brazil. The need for investments in environmental agencies is highlighted to enable the confiscation, reception and rescue of wild animals, as well as the treatment and assistance of specimens that need veterinary medical care. Knowledge of the casuistry in different regions of the country allows for better planning of actions and mobilisation of resources according to demand and is a fundamental point in the conservation of fauna and promotion of One Health.

Conclusion

It is concluded that seizure is the most common way of forwarding wild animals, especially birds, to CETAS-DF, and reinforces the importance of actions to reduce animal trafficking in the region. Of this amount, 13.52% of the specimens required veterinary medical assistance, mainly for parental care and the results of traumatic injuries. The partnership and/or contracting of veterinary medical services by environmental agencies is fundamental to guarantee the health, assistance and welfare of the fauna referred, as well as helping in the destination of the specimens.

Declaration of conflict of interest

The authors declare no conflicts of interest.

Author contributions

Conceptualization: L. Q. L. Hirano. *Data curation*: F. V. C. R. Lima and M. E. de Q. Soares. *Formal analysis:* G. B. Cunha and L. Q. L. Hirano. *Investigation*: G. B. Cunha, F. V. C. R. Lima and M. E. de Q. Soares. *Methodology:* L. Q. L. Hirano. *Project management:* L. Q. L. Hirano. *Supervision:* L. Q. L. Hirano. *Writting (original draft):* G. B. Cunha, F. V. C. R. Lima, M. E. de Q. Soares and L. Q. L. Hirano. *Writting (review & editing):* G. B. Cunha, F. V. C. R. Lima, M. E. de Q. Soares and L. Q. L. Hirano.

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