ESCOLA UNIVERSITÁRIA VASCO DA GAMA

MESTRADO INTEGRADO EM MEDICINA VETERINÁRIA

The human-reptile bond and its implications for the welfare of captive semiaquatic turtles in Portugal

Maria Leonor Lobato Guimarães

Coimbra, Julho 2018

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Resumo

As tartarugas semiaquáticas são frequentemente mantidas como animais de estimação. No entanto, são dos répteis mais difíceis de manter em cativeiro devido às suas necessidades específicas de temperatura, água, dieta e de comportamento, que requerem cuidados especializados. Para além disto, os detentores destes animais têm, de uma forma geral, pouco conhecimento sobre o seu comportamento. O objectivo deste estudo foi investigar o bem-estar das tartarugas semiaquáticas em cativeiro em Portugal, e relacioná-lo com a ligação homem-animal. Para o efeito foi desenvolvido um questionário no qual participaram 114 detentores de tartarugas (Nov.2017 - Feb.2018).

A maioria dos participantes classificou o bem-estar do seu animal como bom ou muito bom (75.4%). Em relação à ligação homem-animal, 65.8 % dos detentores consideraram a tartaruga como "um membro da família", 64.0% afirmaram que falavam com a sua tartaruga mais de cinco vezes por semana e 70.2% declararam que a acariciavam pelo menos uma vez por semana. Verificou-se que aqueles que consideraram o animal como um "membro da família" ou "amigo" não proporcionavam melhores condições de maneio como lâmpada UVB, fontes de aquecimento ou temperatura de alojamento controlada ($p>0.05$ para todos). Mais de um terço dos detentores (35.9%) nunca levou a tartaruga ao veterinário. Não se estabeleceu relação entre ter consultado um veterinário e fornecer lâmpada UVB e fontes de aquecimento, assim como controlar a temperatura do alojamento ($p>0.05$ para todos).

Concluímos que, apesar de a maioria dos detentores de tartarugas semiaquáticas as considerarem como "membros da família", interagindo e falando com elas regularmente, as condições básicas de maneio e alojamento para estes animais não estão a ser aplicadas corretamente. Estes resultados colocam-nos a seguinte questão: até que ponto pode a ligação homem-animal ser um indicador de bem-estar animal?

Se o problema principal é falta de informação, má comunicação entre o detentor e o veterinário, não observância das recomendações veterinárias ou simples negligência, é uma questão que requer uma investigação mais aprofundada.

Palavras-chave: Bem-estar animal; Cativeiro; Tartarugas semiaquáticas; Ligação homem-animal; Comportamento animal; Medicina de animais exóticos; Questionário

Abstract

Semiaquatic turtles are common pets but are arguably one of the most difficult reptiles to maintain because of species-specific thermal, hydric, dietary and behavioral requirements that call for specialized care. Furthermore, keepers' familiarity with reptilian behavioral and psychological health is largely uncommon. The purpose of this study was to investigate the welfare of captive semiaquatic turtles in Portugal and relate it with the human-animal bond. A survey was developed and 114 turtle keepers participated (Nov.2017 - Feb.2018).

The majority of respondents considered the welfare of their animals as being good or very good (75.4%). Regarding the human-reptile bond, 65.8 % of keepers considered their turtle to be a "member of the family", 64.0% of people claimed to talk with their turtle more than 5 times a week and 70.2% pet them at least once a week. Those who considered the animal to be a family member/friend were not seen to provide better husbandry conditions such as UVB lamp, heat sources or control over temperatures ($p>0.05$ for all). Over one third of owners (35.9%) never took their turtle to the veterinarian. Having a UVB lamp, providing a heat source and having control over temperatures were not influenced by having visited a veterinary clinician ($p>0.05$ for all).

We conclude that, although most keepers perceive semiaquatic turtles as family members, talking to them and petting them regularly, basic husbandry requirements are not being adequately met. This puts into question to what extent is the human-reptile bond an indicator of good welfare. Whether the problem is lack of proper information, poor communication between the clinician and the keeper, noncompliance or mere negligence are questions that call for additional research.

Keywords: Animal Welfare; Captivity; Semiaquatic Turtles; Human-animal Bond; Animal Behaviour; Exotic Pet Medicine; Survey

“What else is it that should trace the insuperable line? Is it the faculty of reason or perhaps the faculty of discourse? But a full-grown horse or dog is beyond comparison a more rational, as well as a more conversable animal than an infant of a day or a week or even a month old. But suppose the case were otherwise, what would it avail? The question is not, Can they reason? Nor, Can they talk? But, Can they suffer?”

Jeremy Bentham (1748-1832)

(In: *An introduction to the principles of morals and legislation*. 1789, London, Ch. XVII, par. 4, fn.)

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To all the animals who have the patience to deal with veterinarians.

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List of abreviations and acronyms

CVEP: Centro Veterinário de Exóticos do Porto

ITB: Interaction with transparent boundaries

MBD: Metabolic Bone Disease

SD: Standard deviation

UVB: Ultraviolet B radiation with wavelengths between 290 and 320 nm

Ca: Calcium

P: Phosphorus

The human-reptile bond and its implications for the welfare of captive semiaquatic turtles in Portugal

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The majority of respondents considered the welfare of their animals as being good or very good (75.4%). Regarding the human-reptile bond, 65.8 % of keepers considered their turtle to be a "member of the family", 64.0% of people claimed to talk with their turtle more than 5 times a week and 70.2% pet them at least once a week. Those who considered the animal to be a family member/friend were not seen to provide better husbandry conditions such as UVB lamp, heat sources or control over temperatures ($p>0.05$ for all). Over one third of owners (35.9%) never took their turtle to the veterinarian. Having a UVB lamp, providing a heat source and having control over temperatures were not influenced by having visited a veterinary clinician ($p>0.05$ for all).

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Introduction

The human-reptile bond

Throughout history human beings have sought the companionship of animals. The domestication and socialization of animals was an interactive process of cooperation and co-evolution based on benefits for both humans and animals (Walsh, 2009). The American Veterinary Medical Association defines the human-animal bond as "a mutually beneficial and dynamic relationship between people and animals that is influenced by behaviours essential to the health and wellbeing of both. This includes, among other things, emotional, psychological, and physical interactions of people, animals, and the environment" (AVMA, no date).

First evidence of human-animal companionship comes from the domestication of wolves, ancestors of the dog, who lived in settlements with humans over 14,000 years ago (Serpell, 2008). They were respected as guardians, guides, and partners in hunting and fishing. Later, in developing agricultural communities, dogs assisted in herding and farming, while cats eliminated rodents that brought disease and threatened grain harvests (Walsh, 2009). In the past two decades, non-domesticated species such as reptiles, exotic mammals, amphibians and exotic birds have become popular as pets (Grant, Montrose, & Wills, 2017).

But what are the reasons for choosing a reptile as a companion animal? Probably the answers are as many as the number of people who acquire these animals. Or maybe the reasons are the same as for choosing any other pet. In what comes to the pet reptile group, it seems that the attitudes of keepers towards their animals are varied. The reptile can be a true "friend" or a "member of the family" or otherwise play a decorative role in the person's life as an interesting specimen that looks good in the living room and also brings an aura of extravagance to the keeper. The relationship may be as simple as the owner dropping some crickets in the animal's cage every morning, or it may be as complex as the owner having conversations with their pet and offering it Christmas presents (Mader & Mader-Weidner, 2006, pg 14) Depending on the reptile in consideration, many owners claim that their pets show reciprocal affection. This affection may be a matter of personal interpretation but, in the end, what is important is the emotional connection that the keeper feels with his/her pet (Mader & Mader-Weidner, 2006, pg 14).

The human-animal bond can have important implications for the physical and mental welfare of these animals. Having positive emotional relationships with animals may enhance recognition of animal sentience and help create positive attitudes toward animals both at the societal and individual levels (Wensley, 2008). A strong human-animal bond may, for example, motivate the keeper to commit time and money to veterinary medical treatment. However it can also be a source of poor welfare: for example, a close bond may lead to obesity through overfeeding. Finally there is a third scenario where animal welfare problems exist despite a positive human-animal bond but not because of it. In this case, ignorance or the persistence of long-established practices may be the reasons why highly

bonded keepers provide poor welfare to their animals (Wensley, 2008). Reptile keepers who do not provide a thermal gradient to their animals, amongst other things, can be a good example of this.

Welfare of captive reptiles

There is a variety of perceptions, within society, of what constitutes good and bad animal welfare (Mellor & Stafford, 2001). In 1979, the Farm Animal Welfare Council formulated the 5 freedoms in wich "good welfare exists where animals have freedom from hunger and thirst, discomfort, pain, injury or disease, fear and distress, and freedom to express normal behavior" (Webster, 2001). This is a very complete and practical definition that includes physiological and psychological requirements (Williams, 2014).

The "five freedoms" can be assured for a given companion animal, if the keeper[1] provides conditions for optimal nutrition, environment, health and behaviour that lead to optimal physical and mental states (Mellor & Stafford, 2001). However, reptiles have species-specific thermal, hydric, dietary and behavioral requirements (Table 1). This taxon-specific husbandry implies specialized care that is still lacking, especially among less experienced keepers (Pasmans et al., 2017). In effect, deficiencies in husbandry are the most common factor causing disease in captive reptiles (Mader & Divers, 2014, pg 13). Some of these diseases, such as metabolic bone disease (MBD) reflect a lack of basic knowledge concerning nutrition and husbandry (Pasmans et al., 2017). MBD includes a variety of clinical syndromes affecting bone structure that commonly result from long-term dietary deficiency of calcium or vitamin D, a negative dietary calcium to phosphorus ratio (Ca:P) and/or lack of exposure to ultraviolet (UVB) light (Mader, 1996, pg 385). Other common husbandry related alterations in reptiles are hipovitaminosis A, dermatitis, intestinal impactions and thermal burns (Warwick et al., 2013).

In addition to all this, there is the question of keeper's ability to interpret and address reptile behaviour. Knowledge of normal and abnormal behaviors displayed by the turtle it's important so that the keeper can identify early signs of disease and detect welfare problems related to captivity (Bays, Lightfoot, & Mayer, 2006) (Tables 2 and 3).

Some of the most common species of semiaquatic turtles kept as pets include species native to North America such as the North American Red-Eared Slider *(Trachemys scripta elegans)* or Map turtles *(Graptemys sp.).* There are also some Asian species (*Mauremys reevesii)* and tropical species *(Trachemys dorbigni)*. In this study we intended to investigate the link between the human-reptile bond and the welfare of captive semiaquatic turtles in Portugal and how they influence one another. The main aim was to investigate if a positive human-reptile bond can be an indicator of good welfare.

[1] O Decreto-Lei n.o 313/2003 de 17 de Dezembro que cria o Sistema de Identificação de Caninos e Felinos define detentor como: «Detentor» qualquer pessoa, singular ou colectiva, responsável pelos animais de companhia, para efeitos de reprodução, criação, manutenção, acomodação ou utilização, com ou sem fins comerciais; Assim sendo decidimos usar o termo inglês equivalente, *keeper* (detentor) por ser um termo legalmente reconhecido em Portugal para animais de companhia.

Trough a survey intended for keepers of semiaquatic turtles we tried to address the following research questions: what kind of husbandry conditions do keepers provide for their turtles? How do they interact with their animals? Are they able to interpret and address some common types of behavior? How does the owner-reptile bond affect the health and welfare of these animals? Does a stronger bond mean better welfare?

Basic care and husbandry of semiaquatic turtles			
Housing	Type of enclosure	Glass aquariums, plastic containers, stock watering tanks, pond liners, or outdoor ponds	
	Cage size	The combined size of all residents' carapace should not exceed 25% of the cages floor surface area	
	Water	Water depth should be at least 1.5-2 times the turtle's carapace length	
	Substrate	Stones (big enough so that the turtle cannot ingest them) and live plants.	
	Basking site	Dry "haul out" areas (islands or platforms), one of them with a basking light, should be present so that the turtle can crawl out of the water, dry off and bask.	
	Hiding spots	To reduce stress and to allow the turtle to avoid, when needed, direct exposure to both light and heat.	
Heating	Heaters	The enclosure should ideally be heated in two ways: with a submersible aquarium heater and a basking light	
	Temperature	Ambient	Preferred optimal temperature zone (POTZ): 27 to 29ºC (day) / 18 to 21ºC (night)
		Hot spot	29 to 32ºC
		Water	24 to 29ºC
Lighting	Unfiltered sunlight	Natural direct exposure to sunlight is the best husbandry practice. Most glasses block the passage of UVB radiation	
	UVB artificial lighting	In an indoor environment, UV lights are recommended over the basking area.	
Water quality	Cleaning routine	Complete water changes at a minimum of once a week	
	Filter	Both mechanical and biological filtration is required. Filtration doesn't eliminate frequent and complete water changes.	
Diet	Majority of the diet	Whole animals such as mice, fish, earthwoms and slugs.	
	Small doses	Fruit, catfish, trout, shrimp chow, insects such as crickets, wax worms and mealworms, some types of dog and cat commercial food and commercial pelleted turtle food, vegetables (especially dark-green leafy vegetables)	

Table 1. Semiaquatic turtle care and husbandry. References: (Mader, 1996) (Kottwitz & Coke, 2007) (Bays et al., 2006) (Brames & Baines, 2007) (Acierno, Mitchell, Roundtree, & Zachariah, 2006) (Ballard & Cheek, 2017)

Behavioural signs of normal activity, quiescence and comfort	
Behaviour	**Possible causes**
Wandering about in the enclosure, investigating objects and people	Normal environmental investigation, food searching/foraging
Basking in the sun / hot spot with stretched out limbs	Normal thermoregulatory behavior and rest

Table 2. Behavioural signs of normal activity, quiescence and comfort. References: (Bays et al., 2006) (Warwick, Arena, Lindley, Jessop, & Steedman, 2013)

Behavioural signs of captivity-stress	
Behavior	**Possible causes**
Frequent interaction with transparent boundaries (ITB).	Stress/fear, exploratory or escape activity
Hipoactivity and/or anorexia	Hypothermia, organic dysfunction / disease, pain
Human-directed aggression	Stress/fear, escape behavior
Retraction into shell when handled or in the presence of people	Stress/fear
Open-mouth breathing	Hyperthermia, organic dysfunction/ disease or pain
Cloacal evacuations when handled	Stress/fear, organic dysfunction/ disease
Moving to a dark area of the enclosure / hiding spot	Stress/fear, normal thermoregulation

Table 3. Behavioural signs of captivity-stress. References: (Bays et al., 2006) (Warwick et al., 2013)

Materials and methods

For the purpose of this study, an electronic survey was developed for the keepers of semiaquatic turtles in Portugal.

The survey was divided into five parts. The first part aimed at describing the animals involved (scientific or common name, age, gender and origin). In the second part, participants were asked about husbandry and care, including type of enclosure, lighting, heating and nutrition. The third part included questions to assess the owner-reptile relationship, such as the kind and frequency of human-animal interactions, the animals' reactions to those interactions and how owners perceived the ownership of these animals (no opinion, burden, pet, friend, family member). The fourth part used behavioural questions to assess how able owners are at interpreting the welfare of their animals with regard to common types of (normal and abnormal) behaviour displays. Definitions of "animal welfare" and "normal behaviour" were provided. The full questionnaire is provided as Annex. The last part included owners' demographic information (age, gender, housing, location, education). Closed-ended research questions were compulsory whereas open-ended questions were voluntary. All demographic questions were voluntary.

Study design followed procedures used in previous studies ((d'Ovidio et al, 2016) (Pirrone et al, 2015) (Warwick et al, 2013)) and questions were based on a literature review. The survey was then piloted by a group of veterinary exotic practitioners (N=5), and revised accordingly. It was submitted via E-mail to keepers of semi-aquatic turtles attending an exotic veterinary practice (Centro Veterinário de Exóticos, Porto) between November and December, 2017. It was also published in dedicated reptile forums on social media between November 2017 and February 2018. The survey was generated using Google Forms.

Participants were asked to answer only once to the questionnaire. Repeated submissions (N=2) were identified and deleted.

The collected data was handled with Microsoft Excel 2010 and analyzed using statistical software R. Pearson's Chi-squared test with Yates' continuity correction was used. We considered $P < 0.05$ statistically significant.

Ethics statement

The study conformed to standard procedures for ethical approval at Escola Universitária Vasco da Gama, Coimbra, Portugal. Before data collection, the study received approval from the EUVG Scientific Committee. Participation was voluntary and anonymous and no identifiable information was stored. Participants were informed about the aims of the study and that the information gathered would be used solely for research purposes and not shared with third parties. The contact details of the researcher responsible for the study, Leonor Guimarães, were provided for further inquiries.

Results

Keepers

In total, 114 people agreed to participate, age ranging between 18 and 64 years old, from both sexes (71.9% female, 27.2% male, 0.9% unknown).

Age distribution is shown in figures 1 and 2. 50 percent of respondents have ages ranging from 22 to 37 (mean, 30.8; standard deviation [SD], 10.0; median, 28.5).

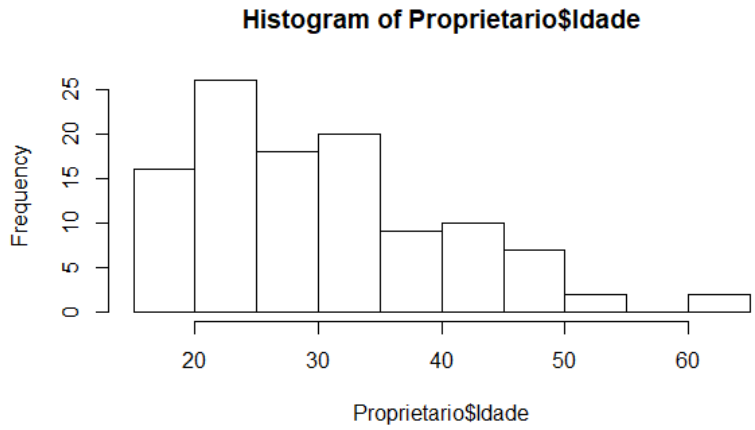


Figure 1. Histogram of keepers' age distribution.

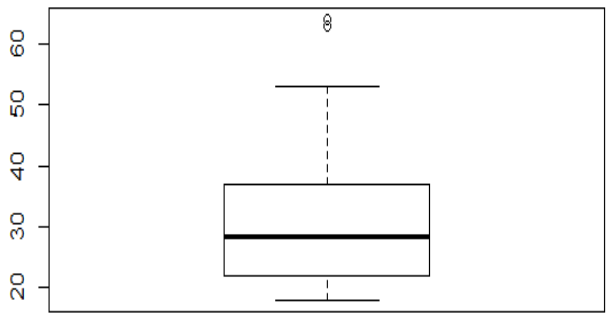


Figure 2. A summary of participants' ages in boxplot form. Median is indicated by the bold bar; 25th and 75th percentiles by the edges of the box; 5th and 95th percentiles by the elongated arms and further outliers by the points outside the box. 1st quadrant, 22.25; 3rd quadrant, 36.75 (50% of respondents have ages ranging from 22.25 and 36.75).

Most participants (69.3%) were from the North part of Portugal. 15.8% of respondents lived in the center and 5.3% lived in the south of Portugal and two people (1.8%) were from the island of Madeira (Figure 3).

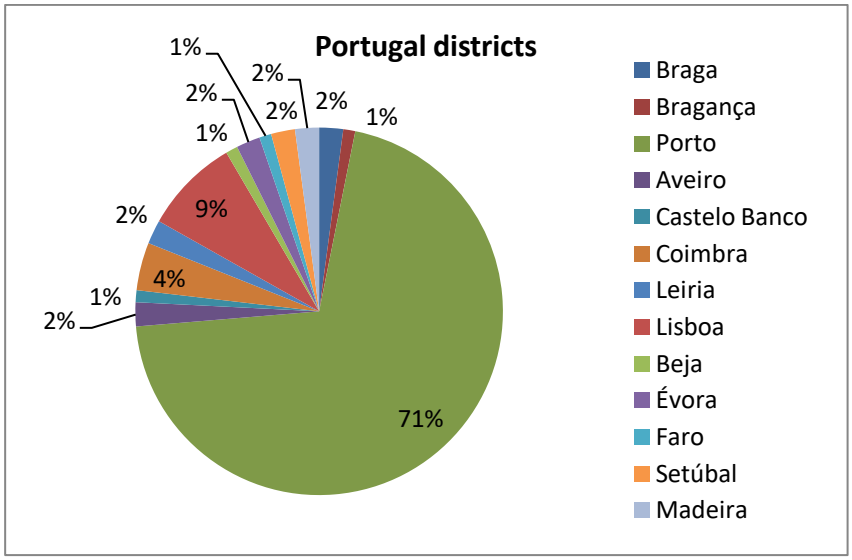


Figure 3. Geographical distribution of respondents (Portugal districts).

85.1% came from urban areas while 13.2% lived in rural areas.

Regarding to the level of education, 37.7% of keepers had no university degree while 62.3% were university graduates. Of these, 45.6% had a bachelor's degree, 14.0% had a master's degree and 2.6% had a PhD.

Participants kept semi-aquatic turtles from the following genera: *Graptemys* (25.4% of total), *Trachemys* (25.4%), *Pseudemys* (10.5%), *Mauremys* (8.8%), *Pelomedusa* (1.8%), *Cuora* (0.9%), *Sternotherus (*0.9%), and other unknown (26.3%).

More than half of the respondents 66.7% claimed that the turtle was his/her first reptile pet. The other 33.3% had had other reptiles.

Turtle-keeper interaction

In order to gauge the Human-Animal Bond, participants were asked to classify how they felt for their turtle (i.e. the level of affection). Responses are shown in Figure 4. The option "I have no opinion" was never chosen.

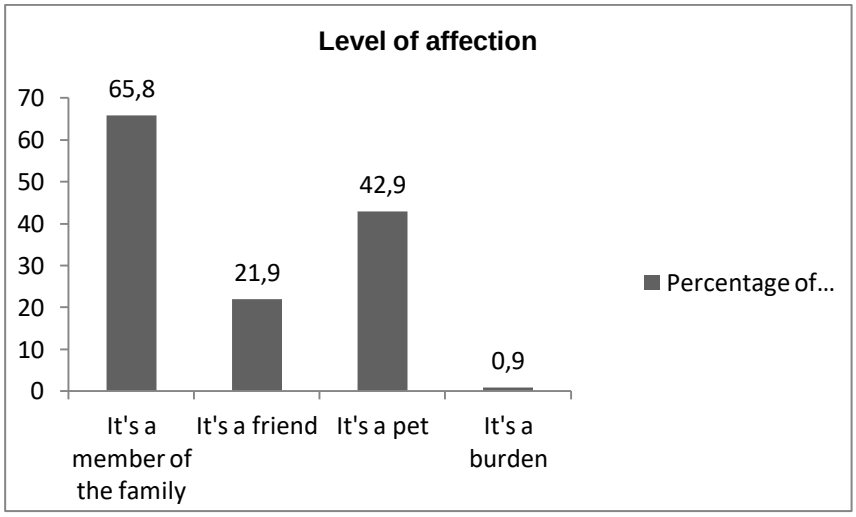


Figure 4. Keepers' level of affection for their turtles.

Level of education did not seem to influence responses regarding the level of affection that keepers felt for their turtle ($p>0.05$ for all; $df=5$ for all). The same was true for the age of the respondents ($p>0.05$ for all; $df=1$ for all).

Regarding to keeper-reptile interaction: 64.0% of the owners claimed to talk with their turtle more than 5 times a week, 70.2% pet them at least once a week and 50.0% hold them at least once a week (Figure 5).

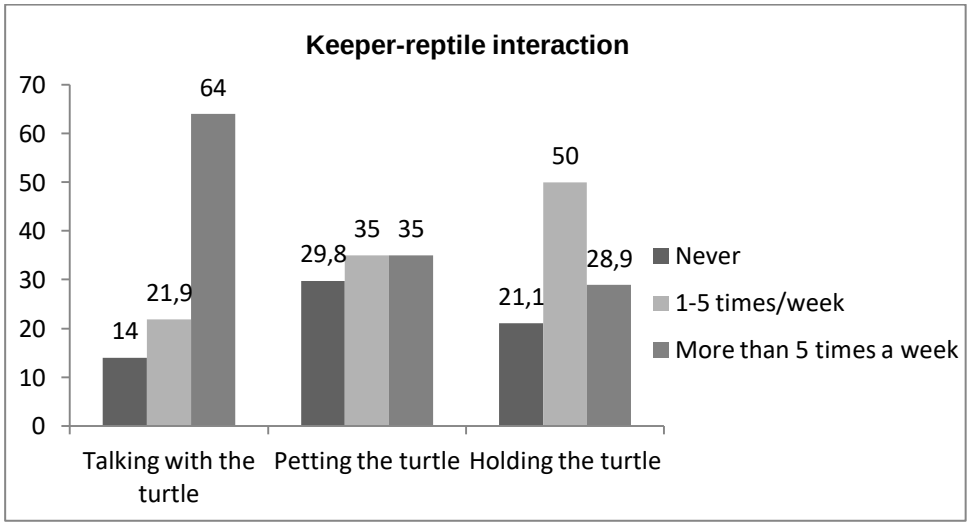


Figure 5. Frequency of keeper-turtle interaction.

Finally, 55.3% of respondents rated the experience of having a pet reptile as "very good", 41.2% as "good" and 2.6% did not have an opinion. One person (0.9%) considered it to be a "very bad" experience.

Husbandry and care

Over seventy percent (70.7%) of keepers reported that their turtles lived in an indoor environment, 16.6% of the owners reported that the turtles lived outdoors and 13.2% said that they lived in a mixed indoor-outdoor environment.

Most keepers (85.1%) affirmed that they provided enough water for the turtle to swim, 14.0% provided enough water for the turtle to bathe but not enough to swim and one person (0.9%) reported that there was no water in the enclosure. With one notable exception, 99.1% of keepers reported that the turtle had access to dry areas in the enclosure.

In terms of shelter, 33.3% of respondents reported that the enclosure of the turtle didn't have any hiding places while 66.7% claimed that it did.

Regarding UVB light sources, 19.3% of respondents reported that the primary source of UVB light provided to the turtle was through an UVB lamp; 24.6% claimed that the main source of UVB light was filtered natural sunlight (light filtered through a glass), 28.1% reported that the primary source was unfiltered natural sunlight and 30.7% of keepers provided a combination of 2 or 3 of these sources (Figure 6).

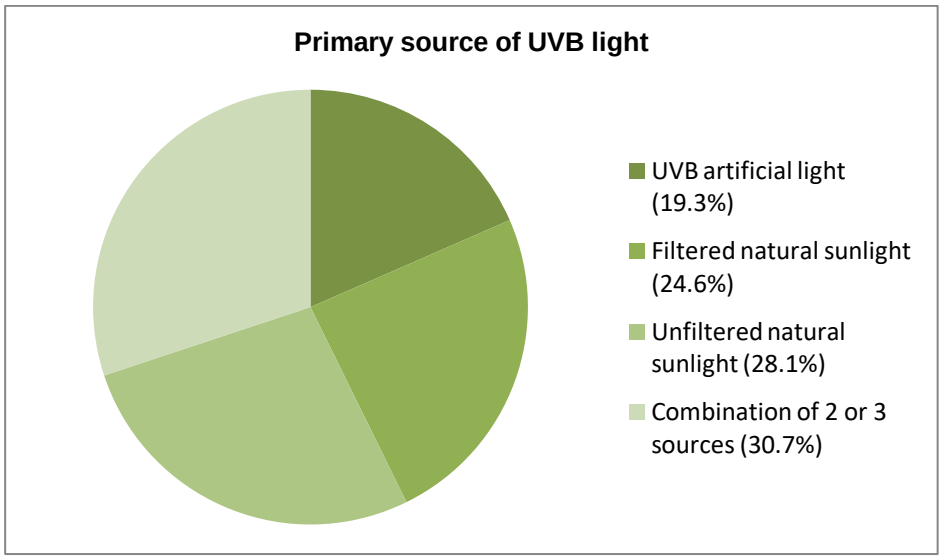


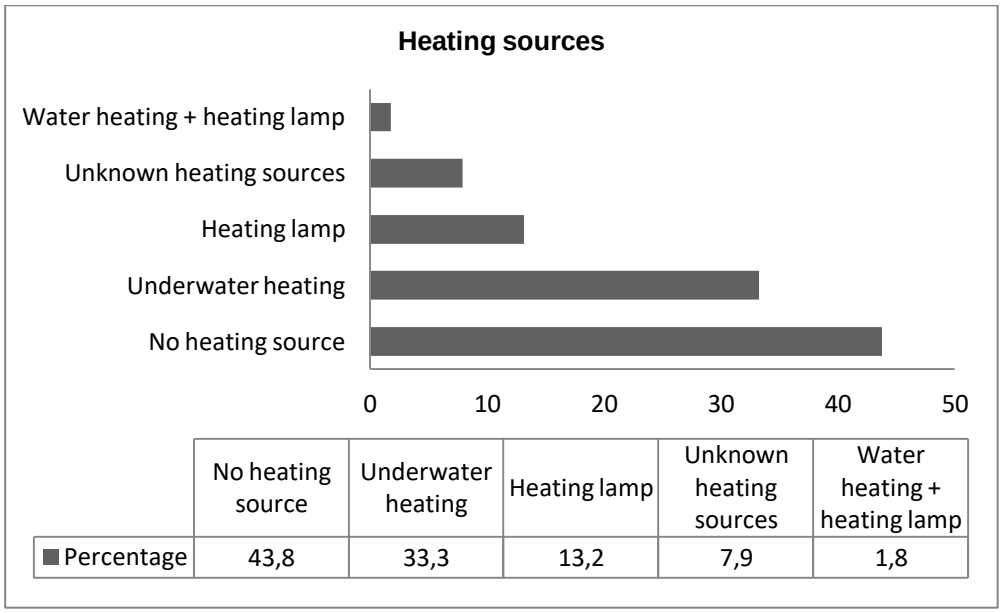
Figure 6. Primary source of UVB light provided to the turtle.

People who considered the animal to be a member of the family were not more likely to provide UVB artificial lighting to the turtle (p=1; df=1). People who considered the turtle to be a friend were actually less likely to provide an UVB lamp than people who didn't considered it to be a friend (p=0.02707; df=1).

Similarly, people who considered the turtle to be a member of the family were not more likely to provide access to unfiltered natural sunlight (p=0.2827; df=1). Neither did the ones who considered

the animal to be a friend (p=0.965; df=1).

When asked about the heating sources, 43.8% of keepers reported that the enclosure didn't have a heating source. Responses are summarized in Figure 7.



	No heating source	Underwater heating	Heating lamp	Unknown heating sources	Water heating + heating lamp
Percentage	43,8	33,3	13,2	7,9	1,8

Figure 7. Heating sources provided to the turtle.

A statistically significant association between considering the turtle to be a "member of the family" and providing a heat source was absent (p=0.8752; df=1). The same was true for people who considered the turtle to be a friend (p=0.8072; df=1).

When asked about the temperatures of the enclosure, 48.2% of all owners responded "I don't know". Similarly there was no association between a stronger level of affection (considering the turtle to be a member of the family or a friend) and having control over temperatures (p=0.5058; df=1 and p=0.8425; df=1, respectively).

It should be highlighted also that no association was found between "talking with the turtle more than 5 times a week" and provide access to unfiltered natural sunlight (p=0.7554; df=1), UVB lamp (p=0.5779; df=1) or heating sources (p=0.07561; df=1).

With regard to the diet, the most commonly selected food item was turtle commercial pellets (88.6%) followed by shrimp (50%), vegetables (44.7%) and fish (36.8%). Food items provided to the turtles are shown in Figure 8. Almost one quarter of keepers (22.8%) reported to feed solely commercial pellets to their turtles.

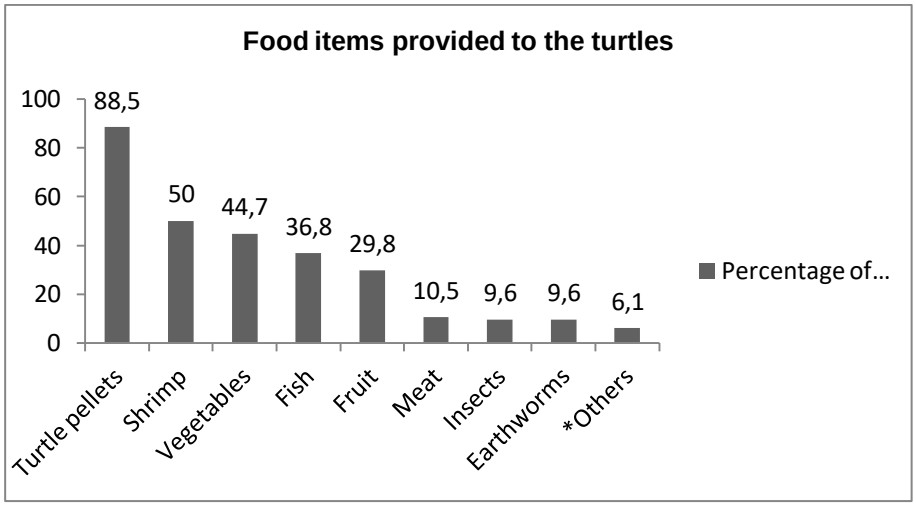


Figure 8. Food items provided to the turtle. The option *Others include commercial dog and cat food and snails.

When asked to report whether they supplemented their turtle's diet with vitamins and minerals, 68.4% responded that they didn't engage in this practice and 31.6% indicated that they did.
Keepers were also asked about the cleaning routine of the enclosure, with 33.3% claiming to clean the enclosure once a week, 29.8%% cleaning it several times a week and 31.7% cleaning it 3 times every month, or less. Six respondents (5.3%) did not specify their cleaning routine.

Veterinary care

Over one third of the keepers (35.9%) never took their turtle to the vet. A high level of affection (i.e. considering the turtle a family member) did not seem to influence taking the turtle to the vet (p=0.8455).

Reasons for consulting a veterinary clinician are summarized in figure 9.

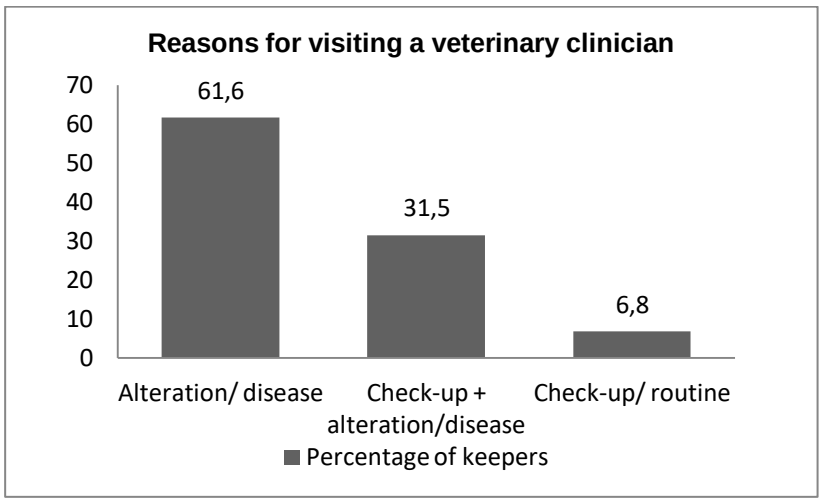


Figure 9. Keepers reported reasons for visiting a veterinary clinician.

A statistically significant association between having taken the turtle to the vet and providing direct access to natural sunlight was found (p=0.0151; df=1). However, having a UVB lamp (p=1; df=1) or providing a heat source (p=1; df=1) and having control over temperatures (p=0.9127; df=1) were not influenced by having visited the vet (all p>0.05).

Keepers' perception of turtle's welfare

Keepers were asked to rate the welfare of their turtles on a scale of 1 to 5 (1 = very bad; 5 = very good). The definition of welfare according to the Farm Animal Welfare Council was provided to the keepers: "good welfare exists where animals have freedom from hunger and thirst, discomfort, pain, injury or disease, fear and distress, and freedom to express normal behavior" (Webster, 2001). The majority (77.2%) of the respondents considered the welfare of their animals as being good (4) or very good (5). Mean, 4.1; standard deviation [SD], 0.7; median, 4.0. Results are shown in figures 10 and 11.

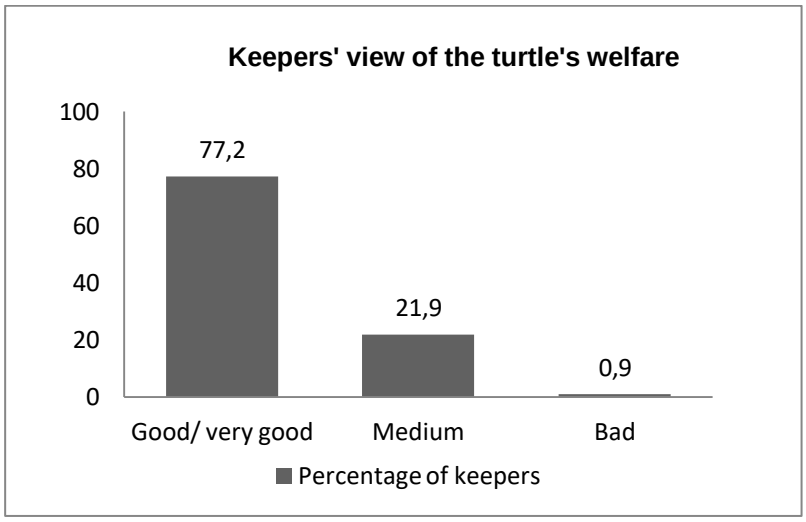


Figure 10. Keepers' answers to the question "How do you rate the welfare of your turtle, on a scale of 1 to 5, where 1 = very bad and 5 = very good".

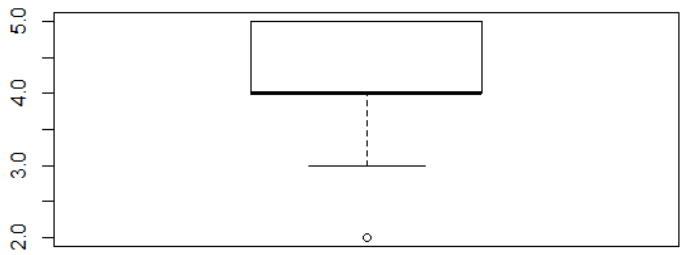


Figure 11. A summary of the responses to the question "How do you rate the welfare of your turtle, on a scale of 1 to 5" in boxplot form. Median is indicated by the bold bar; 25th and 75th percentile by the edges of the box; 5th and 95th percentile by the elongated arms and further outliers by the circle outside the box. 1st quadrant, 4.0; 3rd quadrant, 5.0 (77.2% of all answers were between 4 and 5).

A statistically significant association between considering the turtle to have good welfare and providing the enclosure with an UVB lamp was found (p=0.02394; df=1). There was also a positive association between considering the turtle to have good welfare and providing a heat source to the turtle (p=0.007978; df=1). On the other hand, there was no association between providing access to unfiltered natural sunlight and considering the turtle to have good welfare (p=0.8475; df=1). Finally, keepers view of welfare was not influenced by visiting the vet (p=0.9203; df=1).

Behaviour

Keepers were asked to_interpret some common types of behaviour displayed by their turtles by choosing one or more possible causes from a dropdown menu. Results are shown in Figures 12, 13, 14, 15 and 16.

A definition of normal behaviour was given: being able to express species-specific natural behaviour patterns and revealing well-being (Mills, 2010).

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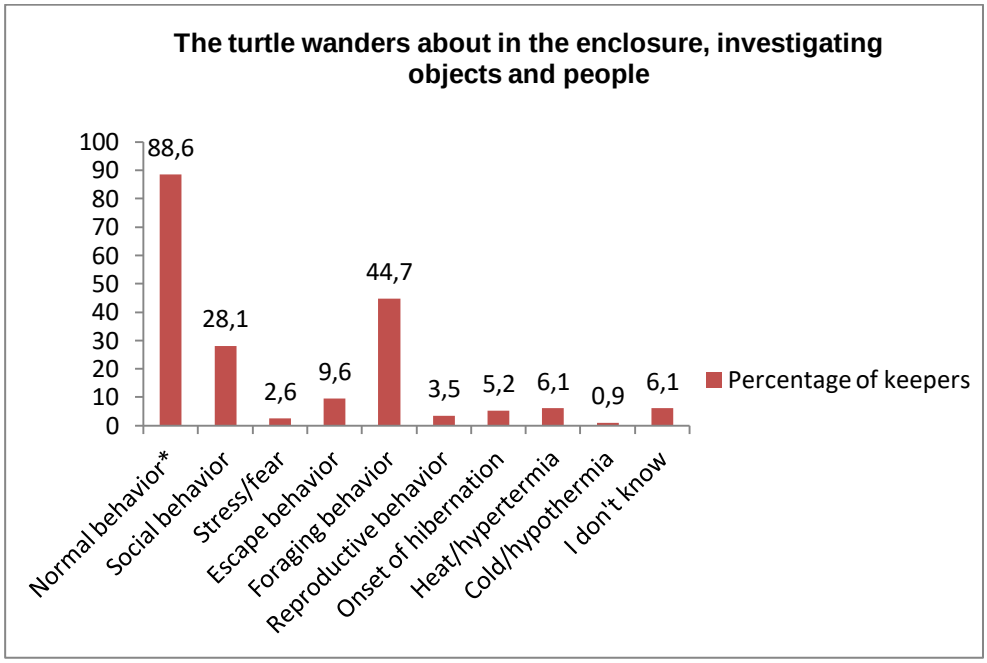

Figure 12. Keepers' answer options to the behaviour of "wandering about in the enclosure, investigating objects and people".

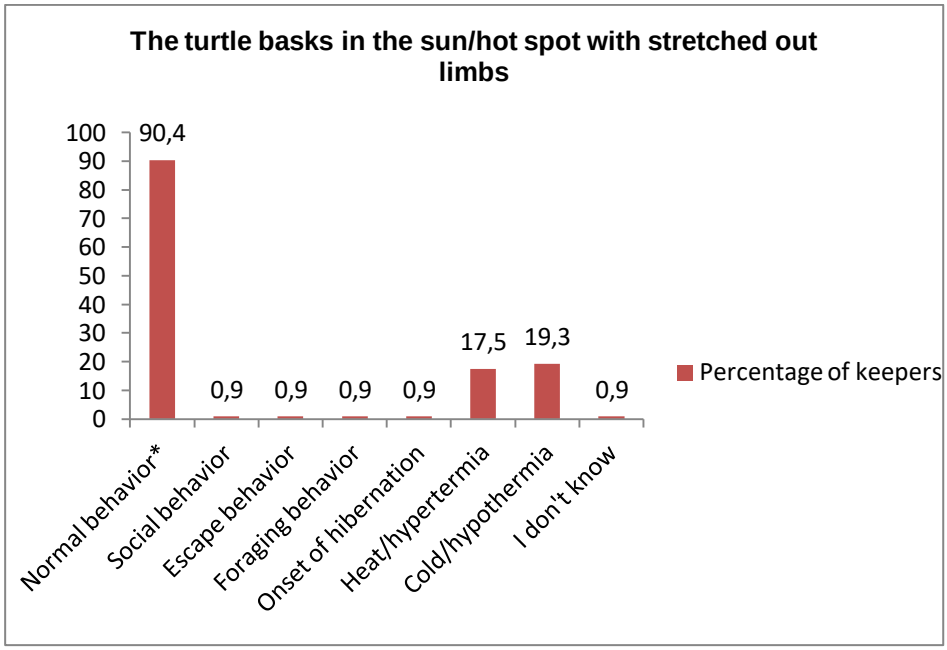

Figure 13. Keepers' answer options to the behaviour of basking in the sun / hot spot with stretched out limbs.

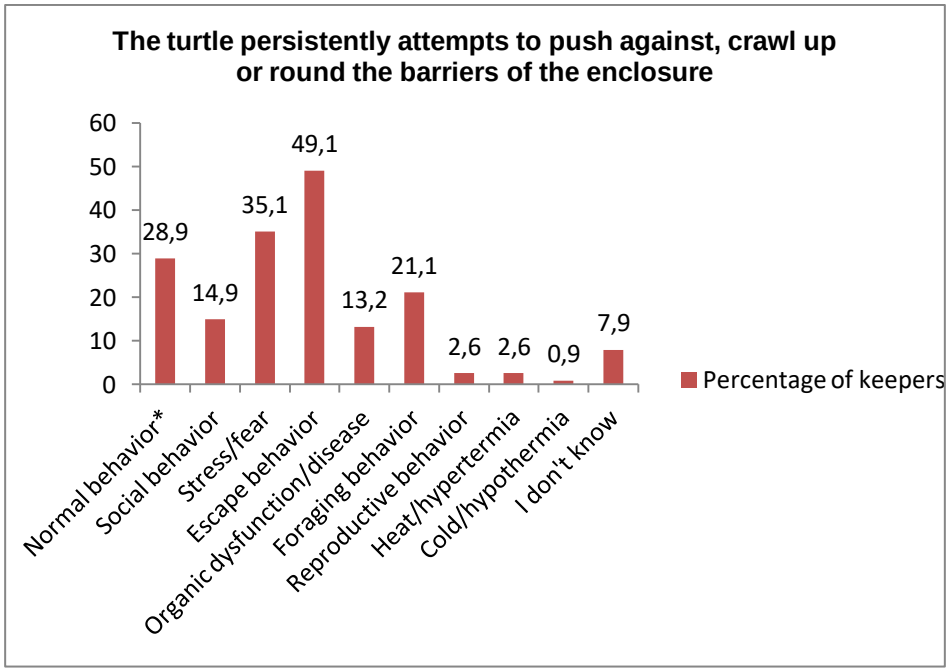

Figure 14. Keepers' answer options to the behaviour of frequently interacting with transparent boundaries (ITB).

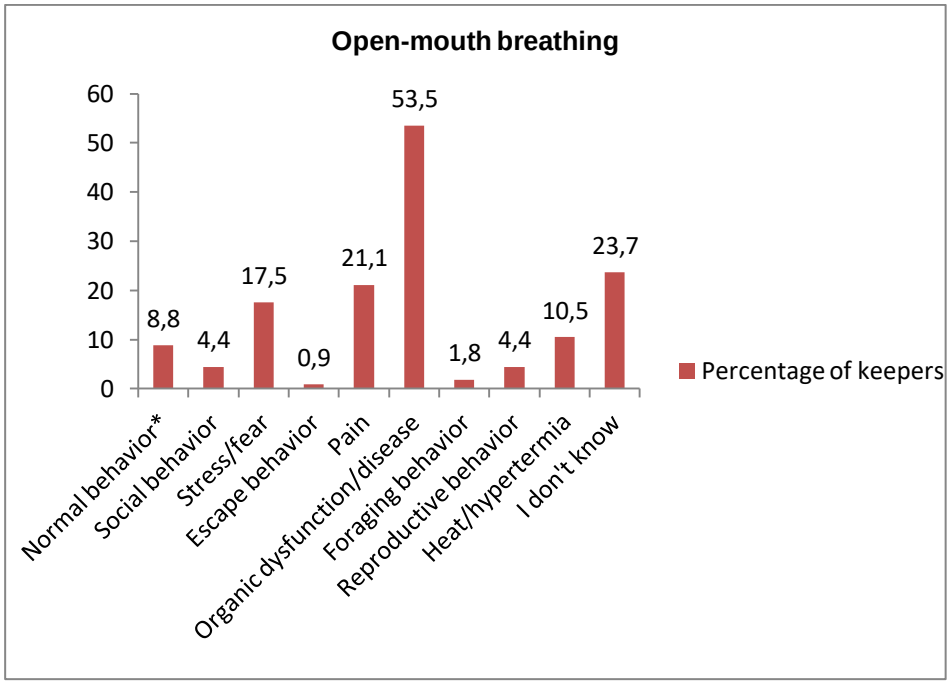

Figure 15. Keepers' answer options to the behaviour of open-mouth breathing.

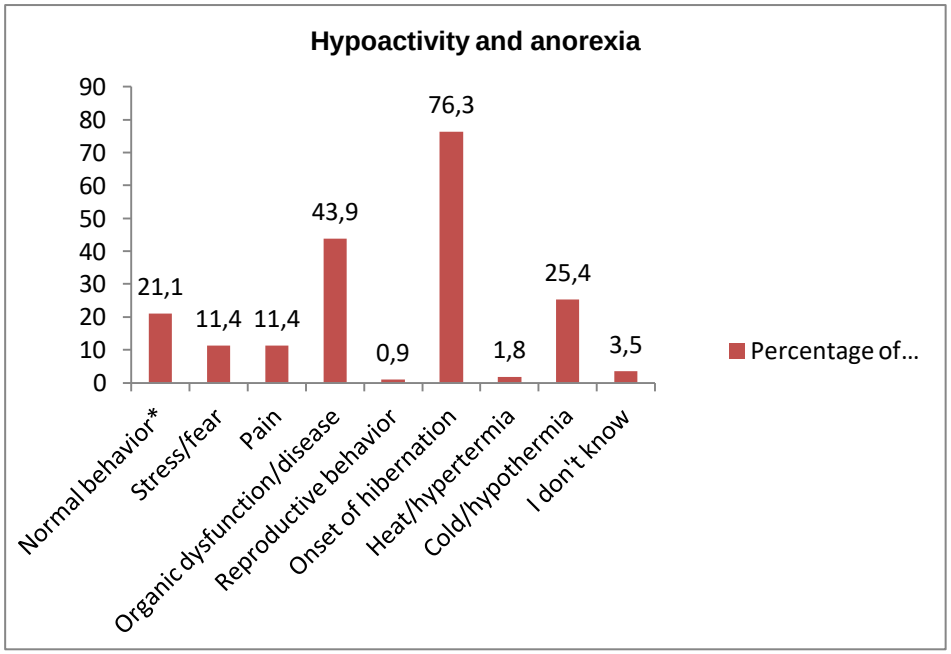

Figure 16. Keepers' answer options to the behaviour of anorexia and decreased physical activity.

Discussion

The purpose of this study was to assess the welfare of captive semiaquatic turtles in Portugal and relate it with the human-animal bond. The following questions were addressed: what kind of husbandry conditions do keepers provide to their turtles? How do they interact with their animals? Are they able to interpret and address some common types of behavior? How does the owner-reptile bond affect the welfare of these animals? Does a stronger bond mean better welfare?

Husbandry conditions

From the described results, the husbandry factors that are not being adequately met and that directly impact on turtle welfare are the following:

A considerable part of the animals does not have a heating source in their enclosure (43.8% of total) and regarding the ones who do, there doesn't seem to be a proper control over temperatures - when asked about the temperature of the enclosure, 48,2% of all owners responded "I don't know". Only two people (1.8%) provided the enclosure with water heating combined with a heating lamp, which is the ideal setup for a captive aquatic turtle (Kottwitz & Coke, 2007). This leads us to think that most enclosures don't have a haul out area with a hot spot, called the basking site. Without this area, behavioral thermoregulation is compromised and the dry-off of the skin and shell is slowed predisposing to dermatitis (Mader, 1996, pg 413).

The temperatures of the cold and hot areas of the enclosure were asked in the survey. However, the questionnaire failed to address water temperature. This fact compromises further analysis because it is not clear to what temperature is the keeper referring to. For this reason, we chose not to include this information in this text.

There are turtles (24.6% of total) whose primary source of UVB light is natural sunlight filtered through a glass, which may block the passage of UVB radiation. This means that they are prevented from having access to direct sunlight or UVB artificial lighting. Exposure to UVB light, in particular to unfiltered natural sunlight, is essential for stimulating vitamin D3 synthesis (Acierno et al., 2006). When direct exposure to sunlight is not possible, UVB artificial lights are recommended (Mader, 1996, pg 76). Another 28.1% of keepers reported that the primary source of UVB light provided to the turtle was unfiltered natural sunlight, which could result in adequate exposure to UVB light. However, these findings must be regarded with caution because this represents a more passive way of providing sunlight and we cannot know, from the questionnaire, in which conditions exposure to sunlight is achieved (e.g., how much time per day; indoors or outdoors). Moreover, information is lacking on how the UVB artificial lights are used (e.g., frequency of replacement of the lamp, distance to the basking spot, hours of light per day)

Regarding diet, the most commonly selected food item was turtle commercial pellets (88.6% of owners) followed by shrimp (50%), vegetables (44.7%) and fish (36.8%). Following Mader, (1996)

whole animals should be preferred to turtle pellets, see table 2. This subject is, however, a matter of debate. There are other authors who consider some commercial turtle formulations to be well balanced and recommend them as part of a varied diet (Mcarthur, Wilkinson, & Meyer, 2004, pg 80) Nevertheless, almost one quarter of keepers reported to feed their turtles exclusively with commercial pellets. Turtle owners that feed only pelleted food should always be encouraged to supplement the diet with other food items in order to provide the most varied and balanced nutrition possible (Ballard & Cheek, 2017). Limitation of this study, regarding this subject, are that we cannot determine the ratio of the different food items being provided neither the total amount of food given or the nutritional profile of each commercial turtle food. Another limitation is that we don't know if the shrimp offered to the turtles is dried shrimp or fresh shrimp. Dried shrimp is not recommended because it is deficient in minerals and vitamins (Mcarthur et al., 2004, pg 80).

In terms of water provision, 14.0% provided enough water for the turtle to bath but not enough to swim and one person (0.9%) reported that there was no water in the enclosure. These findings are of concern regarding the fact that these are semiaquatic animals. General recommendation for semiaquatic turtles is that the water depth should be at least 1.5-2 times the turtle's carapace length for allowing normal swimming and turning behavior to occur (Kottwitz & Coke, 2007).

One third of respondents reported that the enclosure of the turtle didn't have any hiding places. This is also of some concern because providing hiding spots or protected areas is important to reduce stress and to allow the turtle to avoid, when needed, direct exposure to both light and heat (Bays et al., 2006).

Behaviour

Despite the subjectivity of interpretation that behavioural displays might have, we can say that, overall, keepers were able to interpret correctly most behavioural signs. For example, most keepers (84.2%) related the behaviour of frequently interacting with transparent boundaries (ITB) either with stress/fear or escape activity, which are the possible causes described by Warwick and colleagues (2013). However, 28.9% of respondents consider this behaviour to be a sign of normal activity. This means that if some of these keepers have turtles in sub-optimal conditions that suffer from captivity-stress, for example due to small cages and overcrowding, they might fail to recognize the behavioural signs.

It is also important to highlight the answers towards the behavioural display of "open mouth breathing". This behavioural sign can be an indicator of hyperthermia, organic dysfunction/disease or pain (Warwick et al., 2013, Bays et al., 2006). Half of respondents (51.8%) associated this behaviour to organic dysfunction/disease while only 20.2% relate it to pain and 10.5% to hyperthermia. This was also the behaviour display that led more people to respond "I don't know" (23.7%).

Even if somewhat empirically, turtle keepers appear to have enough knowledge to recognize some signs of abnormal behaviour and stress. The question remains if they can relate abnormal behaviour with poor welfare and, if so, do they can reflect upon the husbandry conditions that they provide?

As stated earlier, behaviour interpretation can be subjective. In particular, the option "normal behaviour" defined as "to express species-specific natural behaviour patterns" can be misleading for it

can have different meanings depending on the context (Warwick et al., 2013). It may not be accurate to refer to the behaviour of a captive animal, who lives in an artificial environment, as “natural”.

Relating animal welfare and the human-animal bond

Two of the most important husbandry conditions were chosen as indicators of welfare: heating and providing access to UVB light. We chose these particular conditions because they are directly related to the turtle’s health and they require an active participation of the keeper by buying and placing the heaters and the UVB lamps. These factors were then related to the human-animal bond.

In this study population, there seems to be a positive human-animal bond, at least as perceived by the keepers: 65.8 % of keepers considered their turtle to be a “member of the family”, 64.0% of people claimed to talk with their turtle more than 5 times a week and 70.2% pet them at least once a week. Those who consider the animal to be a member of the family or a friend were not seen to provide better husbandry conditions such as UVB light, a heat source, control over temperatures or providing veterinary care. This puts into question to what extent is the human-reptile bond an indicator of good welfare. However, further research on how to assess human-reptile bond might be important. Existing human-animal bond indicators were created for mammals, specially cats and dogs. However, reptiles have important physiological and behavioural diferences from mammals. These differences will certainly impact on the human-reptile bond making the nature and expression of this relationship to be unique. New human-animal bond indicators, that behold all the particularities of reptiles and all the interaction approaches and attitudes of people towards these animals should be created to better assess such a bond.

Having visited a veterinary clinician also did not influence providing improved husbandry conditions, with the exception of access to unfiltered natural sunlight. One might question why keepers fail to provide correct care and husbandry despite having taken the turtle to the vet. This fact, together with the fact that most owners consider the welfare of their turtles as good or very good, may indicate that the information they are receiving is either incomplete or poorly understood.
We have to take into account that exotic pet practice has not been a traditional area of education within Portuguese veterinary curricula, raising questions regarding the average knowledge in exotic pet medicine amongst general small animal practitioners. Furthermore, there are few exotic animal veterinary practitioners in Portugal, making it difficult for the small animal veterinarians to refer cases to better judgment. In addition, many keepers search for information on how to take care of their turtles on the internet or social media where a readily accessible and wide range of information may also be the source of husbandry and care mistakes. Simultaneously, there is the possibility that pet store sellers and breeders are not advising their clients properly.
On the other hand, there is the question of keepers’ compliance with veterinary recommendations. The American Animal Hospital Association (AAHA) conducted a quantitative study on this subject and found that compliance on the part of clients was much lower than what veterinarians predicted in

several key areas such as heartworm medication and therapeutic diets ((AAHA, 2003) from (Abood, 2007)). If this is the reality for the small animal practice we can only guess that to be also true for exotic animal medicine. Interestingly, Lue and colleagues (2008) note that the cost of care is not a major obstacle to compliance. Instead, confusion, uncertainty, and misunderstanding seem to play a greater role in noncompliance (Lue, Pantenburg, & Crawford, 2008). These authors state in their special report that a main reason (30%) owners cited for not following recommendations from their veterinarians was that they felt that the recommended treatment was unnecessary (Lue et al., 2008). When considering turtle medicine, we first have to bear in mind the vast amount of information that keepers have to handle about reptile husbandry and care, when attending a first time consultation. Secondly, semiaquatic turtles are resilient animals, when compared to other pets including reptiles, and able to endure. Some long-time turtle keepers, who have established wrong husbandry practices, may not feel that these do any harm to their animals because the signs of maladaptation may not be readily visible. Communication skills of a veterinarian are essential for a good vet-client relationship and play a decisive role on the care that pets receive. Cornell & Kopcha (2007) propose the communication to be relationship-centered where the veterinarian assumes the role of "collaborator" that engages the client in the decision making process and outcome responsibility so he/she may become more committed to follow a proposed treatment plan (Cornell & Kopcha, 2007).

Another possible explanation involves that the owners are not fully aware of the concept of welfare, perhaps misjudging it for mere lack of disease, although a definition of welfare was provided in the questionnaire. This seems to be in accordance with the statement of Clifford Warwick: "Reptile keepers commonly interpret signs of "good feeding", "good bodyweight" and "active reproduction" as positive indicators of welfare" (Warwick et al., 2013). However, we should highlight that, in our study, a statistically significant positive association between providing an UVB lamp and heat sources and considering the turtle to have good welfare was found. This might indicate that the minority of people who do provide these husbandry conditions understand that they are positive indicators of welfare while the rest of the keepers, not being aware of their necessity, have a more narrow perception of what constitutes good welfare. Accordingly to this idea, keepers who provide access to unfiltered natural sunlight, a more passive way of providing sunlight, do not seem to be completely aware of its importance, when compared with people who provide an UVB lamp: there is not a positive association between providing access to unfiltered natural sunlight and considering the turtle to have good welfare. Nevertheless, further research on turtle keepers' perception of welfare is needed.

From a wider point of view, the keeping of exotic pets is controversial because it raises questions about public health and safety, animal welfare and biodiversity conservation (Pasmans et al., 2017). The suitability of reptiles as companion animals is under debate. The main concern, besides the ethical aspects of the pet trade, is the specialized care that these animals require (Grant et al., 2017). To encompass this difficulty maybe we should, otherwise, evaluate the suitability of the keepers for keeping these animals, instead of the opposite. The commercial pet trade is a big and global industry, not easily regulated. The individual keeper, however, is more reachable and can be educated by

veterinarians, breeders, and responsible pet store sellers. Some European countries, such as France, require proof of aptitude from the keeper (Arrête du aoaût 2004) and a voluntary certificate of aptitude can be obtained in Germany (Sachkundenachweis, DGHT) (Pasmans et al., 2017). Maybe similar measures should be proposed in Portugal.

Limitations of the study

A particularity of this study is that the surveys were sent both to clients of a veterinary clinic and to the wider public using online forums. Therefore these results provide the views of a convenience sample of respondents and extrapolation to the general population of turtle keepers should be made with caution. Similarly, since a great proportion of respondents were clients of the CVEP, we cannot draw conclusions about the overall proportion of people who actually take their turtle to the vet.

Moreover, there is not a balanced geographical distribution amongst Portuguese districts. However, we were not aiming for geographical representativeness since turtle keeping distribution is unknown in Portugal.

Furthermore, we cannot know for sure if the person who has answered the questionnaire is in effect the person in charge for the animal, the ” true keeper”. Additionally, even if the person answering is the keeper, we have to take into account that the information provided by the respondents is not always reliable. This holds true for any study based on surveys.

In this study, we aimed at inquiring about basic husbandry practices that may provide minimum welfare conditions for semiaquatic turtles in Portugal, and relate these results with the human-animal bond. The information gathered enables us to assess, to great extent, almost all 5 freedoms: freedom from thirst, hunger, pain, injury, disease, fear and distress. However, meeting the 4th freedom, “freedom to express normal behaviour”, might require more advanced care, including providing environmental enrichment that would allow for a wider range of normal behaviors to be expressed (Burghardt, 2013)

Consequently, a complete assessment of the welfare of semiaquatic turtles in Portugal would require a more in depth approach, such as interviews or surveys focused on detailed husbandry conditions.

Conclusions

We conclude that, although most owners perceive the keeping of freshwater turtles as a “very good” experience and consider their animal as a “family member”, talking with the turtle and petting it regularly, the basic husbandry requirements are not being adequately met. This puts into question to what extent is the human-reptile bond an indicator of good welfare. Whether the problem is lack of information/ wrong sources of information, bad communication between the clinician and the owner or poor compliance with veterinary recommendations is a question that calls for more research.

It seems that despite the existence of a positive keeper-turtle bond in Portugal there is still lack of knowledge or resistance to follow correct care and husbandry practices for semiaquatic turtles. This fact appears to lead to a generalized wrong perception of the meaning of good welfare. This study may be helpful for veterinarians working with chelonian species to understand what husbandry aspects they need to emphasize even more when talking with the keepers. For example to insist on the heating sources, thermal gradient and unfiltered UVB light sources which are important factors that are being neglected.

The keeping of semiaquatic turtles may be a matter of debate surrounded by various and opposite opinions, but is a reality that cannot be ignored. Instead of looking at this subject from a negative perspective we can also embrace the fact that it’s possible to keep these animals in our homes in a loving way that is also respectful to their welfare needs and making them part of our daily life, similarly to cats and dogs. The human-reptile bond is a good starting point, but it’s not enough. Looking at this study population, turtle keepers demonstrate empathy for their animals and have good intentions regarding their care. It is the veterinarians’ responsibility to take advantage of this bond and educate them to follow good care and husbandry practices.

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Annex I – Summary of X^2, *df* and *p* values

Level of affection + Care and husbandry conditions

	It's a member of the family	It's not a member of the family	X^2 *	*P* value	*DF*
Access to filtered natural sunlight					
Yes	40	14			
no	35	25	2.4685	0.1161	1
Access to unfiltered natural sunlight					
Yes	31	21			
No	44	18	1.1543	0.2827	1
UVB lamp					
Yes	31	16			
No	44	23	$2.8634e^{-31}$	1	1
Heating sources					
Yes	43	21			
No	32	18	0.0247	0.8752	1
Control over temperatures					
Yes	41	18			
No	34	21	0.4428	0.5058	1
Vitamin/mineral suplementation					
Yes	27	9			
No	48	30	1.4302	0.2317	1
Have taken the turtle to the vet					
Yes	49	24			
No	26	15	0.0379	0.8455	1
*Pearson's χ2 with Yates' correction for continuity, P<0.05					

Table 4 – Association between considering the turtle to be a "Member of the family" and husbandry conditions.

	It's a friend	It's not a friend	X^2 *	*P* value	*DF*
Access to filtered natural sunlight					
Yes	15	39	1.4518	0.2282	1
no	10	50			
Access to unfiltered natural sunlight					
Yes	12	40	0.0019	0.965	1
No	13	49			
UVB lamp					
Yes	5	42	4.8861	0.0271	1
No	20	47			
Heating sources					
Yes	13	51	0.0596	0.8072	1
No	12	38			
Control over temperatures					
Yes	12	47	0.0395	0.8425	1
No	13	42			
Vitamin/mineral suplementation					
Yes	5	31	1.3599	0.2436	1
No	20	58			
Have taken the turtle to the vet					
Yes	18	55	0.4947	0.4818	1
No	7	34			
*Pearson's χ2 with Yates' correction for continuity, P<0.05					

Table 5 – Association between considering the turtle to be a "Friend" and husbandry conditions.

	It's a pet	It's not a pet	X^2 *	*P* value	*DF*
Access to filtered natural sunlight					
Yes	23	31	0	1	1
no	26	34			
Access to unfiltered natural sunlight					
Yes	23	29	0.0032	0.9548	1
No	26	36			
UVB lamp					
Yes	19	28	0.0727	0.7874	1
No	30	37			
Heating sources					
Yes	27	37	1.1185^{-05}	0.9973	1
No	22	28			
Control over temperatures					
Yes	25	34	3.752^{-31}	1	1
No	24	31			
Vitamin/mineral suplementation					
Yes	12	24	1.4649	0.2262	1
No	37	41			
Have taken the turtle to the vet					
Yes	33	40	0.1959	0.658	1
No	16	25			
*Pearson's χ2 with Yates' correction for continuity, P<0.05					

Table 6 – Association between considering the turtle to be a "Pet" and husbandry conditions.

	Talks with the turtle (**+**) than 5 times/week	Talks with the turtle (**-**) than 5 times/week	X^2 *	*P* value	*DF*
Access to filtered natural sunlight					
Yes	38	16	1.3036	0.2536	1
no	35	25			
Access to unfiltered natural sunlight					
Yes	32	20	0.0978	0.7554	1
No	41	21			
UVB lamp					
Yes	32	15	0.3096	0.5779	1
No	41	26			
Heating sources					
Yes	46	18	3.1569	0.07561	1
No	27	23			
*Pearson's χ2 with Yates' correction for continuity, P<0.05					

Table 7 – Association between "talking with the turtle more than 5 times/week" and husbandry conditions.

Taking the turtle to the vet + Care and husbandry conditions

	Have taken the turtle to the vet	Haven't taken the turtle to the vet	X^2 *	*P* value	*DF*
Access to filtered natural sunlight					
Yes	34	20			
no	39	21	0.0009	0.9754	1
Access to unfiltered natural sunlight					
Yes	40	12			
No	33	29	5.9053	0.0151	1
UVB lamp					
Yes	30	17			
No	43	24	2.492^{-31}	1	1
Heating sources					
Yes	41	23			
No	32	18	0	1	1
Control over temperatures					
Yes	37	19			
No	36	22	0.0120	0.9127	1
Vitamin/mineral suplementation					
Yes	23	13			
No	50	28	3.125^{-31}	1	1
*Pearson's χ2 with Yates' correction for continuity, P<0.05					

Table 8 – Association between having taken the turtle to the vet and husbandry conditions.

Keepers' perception of turtle's welfare + Care and husbandry conditions

	Considers the welfare to be good	Considers the welfare to be medium or bad	X^2 *	*P* value	*DF*
Access to filtered natural sunlight					
Yes	40	14			
No	46	12	0.1865	0.6658	1
Access to unfiltered natural sunlight					
Yes	39	13			
No	47	13	0.0369	0.8475	1
UVB lamp					
Yes	40	5			
No	46	21	5.0989	0.0239	1
Heating sources					
Yes	54	8			
No	32	18	7.0384	0.0079	1
Have taken the turtle to the vet					
Yes	56	16			
No	30	10	0.0100	0.9203	1
*Pearson's χ2 with Yates' correction for continuity, P<0.05					

Table 9 – Association between keepers' perception of turtle's welfare and husbandry conditions.

Annex II – Paper version of the questionnaire

Questionário

Relação réptil-tutor

Quelónios

Este questionário destina-se aos tutores de quelónios (répteis da ordem *Chelonia*, que inclui as tartarugas aquáticas e terrestres) e faz parte de um estudo que tem como objectivo avaliar a relação réptil-tutor e os seus efeitos no bem-estar dos répteis em cativeiro, em Portugal.

A sua participação é voluntária, sendo que o questionário demora cerca de 15 minutos a responder. Os dados recolhidos serão usados para fins científicos e não serão partilhados com terceiros. A identidade dos partipantes não será revelada. Caso queira saber mais sobre este estudo pode contactar o investigador responsável: Leonor Guimarães. Endereço electrónico: mleonor93@gmail.com, contacto telefónico: 934017587.

Parte 1 - Questões gerais sobre o animal

Nota: Se tiver várias tartarugas, considere apenas uma delas para responder às questões.

Qual o nome comum ou científico da espécie?	
Data de nascimento	Nasceu em _____(ano) Ou Antes de _____(ano) Depois de _____ (ano)
Há quanto tempo o tem?	
Sexo	Macho ☐ Fêmea ☐ Não sei ☐
É castrado/esterilizada?	**Sim** ☐ **Não** ☐
É o seu primeiro réptil?	**Sim** ☐ **Não** ☐
Onde foi adquirido?	Ponto de venda/Loja de animais ☐ Oferecido ☐ Retirado à natureza ☐ Outra(especificar) ☐ _____

Actualmente tem outros animais em casa? Quais?	
Que outros animais teve anteriormente? **Ex: Já tive cães, gatos e piriquitos**	

Parte 2 - Questões de maneio

Nota: Definições

***Terrário:** recipiente fechado onde se reproduzem as condições ambientais necessárias para a sobrevivência de seres vivos total ou parcialmente terrestres pois permite controlar parâmetros como humidade, luz e temperatura.

***Aquário:** reservatório artificial de água, geralmente de vidro ou de outro material transparente onde se reproduzem as condições ambientais necessárias para a sobrevivência de seres vivos aquáticos.

***Jaula/gaiola:** caixa de grades, em geral metálicas.

Ambiente onde vive	Interior ☐ Exterior ☐ **Misto** ☐
Alojamento **(indique todas as aplicaveis)**	Terrário* ☐ Aquário* ☐ Jaula/Gaiola *☐ Circula livremente ☐ Outro ☐ **Qual?**_____
Indique aproximadamente as dimensões do alojamento	(comprimento) _____cm x (largura) _____cm x (altura) _____cm
Com quantos animais partilha a tartaruga o seu alojamento?	
Que animais partilham alojamento com a tartaruga? **(indique todas as aplicáveis)**	Outras tartarugas ☐ Outros répteis que não tartarugas ☐ Vive sozinha ☐ Outra ☐ Qual? _____

O alojamento tem:	Paredes transparentes ☐ Paredes reflectoras (espelhadas) ☐ Paredes opacas ☐ Paredes mistas opacas, transparentes ou reflectoras☐
A tartaruga tem acesso a luz solar/UVB? **(indique todas as aplicaveis)**	Sim, luz solar através do vidro de uma janela ☐ Sim, luz solar directamente pelo exterior ☐ Sim, lâmpada UVB colocada fora do alojamento ☐ Sim, lâmpada UVB colocada dentro do alojamento ☐ Não ☐ Não sei ☐
O réptil tem acesso a horas de escuridão?	Sim ☐ Não ☐
O alojamento tem: **(Indique todas as aplicáveis)**	Fonte de calor ☐ Lâmpada de aquecimento ☐ Lâmpada UVB ☐ Lâmpada de iluminação ☐ Tem lâmpada mas não sei de que tipo ☐ Não tem nenhuma destas opções ☐ Outra ☐ **Qual?** _____
Que tipo de fonte de calor utiliza?	
Se souber, indique as temperaturas do alojamento: **-<u>máxima</u> (no ponto mais quente)** **-<u>mínima</u> (no ponto mais frio)** **-<u>média</u>**	
No ambiente onde a tartaruga vive existem esconderijos?	Sim ☐ Não ☐ Não sei ☐
No caso de ser uma tartaruga aquática esta tem acesso a locais secos como ilhotas ou plataformas?	Sim ☐ Não ☐ Não sei ☐
Que tipo de substrato existe no seu ambiente? **(indique todas as aplicáveis)**	Água (que permita ao animal nadar) ☐ Banheira (água suficiente para se molhar mas não nadar)☐ Areia ☐ Aparas de madeira ☐ Casca de árvores ☐ Substrato próprio para incubação de ovos ☐ Musgo ☐ Húmus ☐ Argila ☐ Terra ☐ Outro(qual?) ☐ _____
Com que frequência é feita a higiene do alojamento?	
Como é feita a alimentação? **(indique todas as aplicaveis)**	Comida comercial (ração) ☐ Fruta ☐ Legumes Fruta ☐ Insectos ☐ Camarões ☐ Peixe ☐ Minhocas ☐ Outra (qual?) ☐_____
Se aplica suplementos vitamínicos ou minerais, indique quais utiliza e como administra (ex: Vitamina A, vitamina D, Cálcio na comida)	

Parte 3 - Relação réptil-tutor

Nota: Definições

- *Bem estar: O animal está livre de fome, sede, desconforto, dor, lesões, patologias , medo e tem liberdade para expressar o seu comportamento normal.

Que designação define melhor o seu réptil? (indique todas as aplicaveis)	É um membro da família ☐ É um amigo ☐ É um animal de estimação ☐ É um transtorno para mim ☐ Não tenho opinião ☐ Outra ☐ Qual? _____
Tem o hábito de falar com o seu réptil?	Não ☐ Sim ☐ Se sim, quantas vezes por semana? 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ >5 ☐
Tem o hábito de acariciar o seu réptil ?	Não ☐ Sim ☐ Se sim, quantas vezes por semana? 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ >5 ☐
Tem o hábito de o manipular? Ou seja, costuma colocá-lo ao seu colo ou transportá-lo nas mãos?	Não ☐ Sim ☐ Se sim, quantas vezes por semana? 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ >5 ☐
Quando se aproxima do réptil, que reacções observa <u>mais frequentemente</u>? <u>(indique todas as aplicáveis)</u>	Não há reacção ☐ Aproxima-se de mim ☐ Eleva a cabeça ☐ Afasta-se de mim (foge) ☐ Esconde-se ☐ Retrai-se para dentro da carapaça ☐ Escava o solo ☐ Vocaliza ☐ **Abre a boca** ☐ Tenta morder ☐ Outra ☐ **Qual? _____**
Como avalia, em termos gerais, a experiência de ter um réptil?	Muito boa ☐ Boa ☐ Má ☐ Muito má ☐ Não tenho opinião ☐
Desde que tem o réptil quantas vezes o levou ao veterinário?	Nunca ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ >5 ☐
As visitas ao veterinário são: (indique todas as aplicaveis)	De rotina/controlo ☐ Quando deteta alguma alteração no réptil ☐ Outra (qual?) ☐_____
Na sua opinião, como classifica o <u>bem estar</u>* do seu animal? ((Seleccione um número de 1 a 5 sendo 1 muito mau e 5 muito bom)	(muito mau) 1☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ (muito bom)

Parte 4 - Questões de comportamento:

Indique, na sua opinião, a que causas podem estar associados os seguintes comportamentos. Em cada resposta, selecione todas as opções que considerar correctas.

Nota: Definições

- *Comportamento normal: comportamento natural para a espécie e que revela bem estar**.**

- Bem estar: O animal está livre de fome, sede, desconforto, dor, lesões, patologias , medo e tem liberdade para expressar o seu comportamento normal.

Comportamento	Possíveis Causas
O animal investiga o ambiente aproximando-se e cheirando os objectos e/ou pessoas **(Indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
O animal expõe-se à luz (sol/lâmpada) ou aproxima-se do aquecedor com membros extendidos e cabeca elevada **(Indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
O animal bate frequentemente com a cabeça no vidro ou parede do terrário ou tenta trepar a parede do terrário/ aquário/jaula/gaiola **(Indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
Diminuição da actividade física e/ou do apetite **(Indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____

Agressividade para com humanos **ex: tentar morder** **(indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
Retracção para dentro da carapaça em resposta à manipulação ou à presença de pessoas **(indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
Respiração de boca aberta rápida/ofegante acompanhada de extensão do pescoço: **(indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
O animal defeca/urina ou regurgita (vomita) quando há contacto físico ou na presença de uma pessoa **(Indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____
Deslocar-se para uma zona escura / esconderijo do terrário/jaula: **(Indique todas as aplicáveis)**	Comportamento normal ☐ Tentativa de comunicação ☐ Stress/medo ☐ Tentativa de fuga ☐ Dor ☐ Mal estar geral/patologia ☐ Procura de alimento ☐ Época reprodutiva ☐ Início de hibernação ☐ Calor ☐ Frio ☐ Outra (qual?)_____

Parte 5 – Questões sobre o proprietário

Que tipo de proprietário é?	Particular ☐ Criador ☐
Idade	
Sexo	
Concelho de residência	
Habita em zona	Urbana ☐ Rural ☐
Educação	Ensino Basico ☐ Ensino Intermédio (9ºano) ☐ Ensino secundário (12ºano) ☐ Licenciatura ☐ Mestrado ☐ Doutoramento ☐
Profissão	
Se é estudante, que área estuda?	Artes ☐ Ciências ☐ Humanidades ☐ Economia ☐ Outra (qual?)_____
Estado civil	
Agregado familiar **Vive com**	
Vive em	Apartamento ☐ Moradia ☐
Tem jardim	Sim ☐ Não ☐

Parte 6 - Questão opcional

Se puder, explique em poucas palavras a razão pela qual decidiu adquirir e manter um réptil	

Fim

Muito obrigado pela sua colaboração

Annex III – Report of practical internship activities in CVEP

The practical internship in *CVEP* took place between September and December, 2017. During the internship the following goals were attempted:

- To gain practical clinical experience under supervision;
- To develop medical diagnostic reasoning;
- To acknowledge the etiology, pathophysiology, symptomatology and treatment of the most frequent diseases of exotic animals;
- To get in contact with the preventive medicine of the exotic animal practice.

The activities developed involved:

- Attendance to consultations and surgeries;
- Assistance in the treatment of the hospitalized animals;
- Customer service.

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mvet MEDICINA VETERINÁRIA

REGISTO DE CASUÍSTICA

	Aves	Répteis	Pequenos Mamíferos	TOTAL
Casos clínicos presenciados				
Comportamento	3	0	1	
Dermatologia	9	13	10	
Endocrinologia	2	5	2	
Gastroenterologia	5	8	28	
Ginecologia/Andrologia	4	2	19	
Infecciosas	2	0	3	
Nefrologia	0	0	3	
Neurologia	7	0	5	
Odontologia	0	1	39	
Oftalmologia	2	1	9	
Oncologia	0	0	5	
Ortopedia	5	0	1	
Otorrinolaringologia	4	1	8	
Pneumologia	10	1	3	
Traumatologia	6	3	7	
*				
TOTAL	59	35	143	
Cirurgias presenciadas				
Amputação de cauda	0	1	2	
Amputação de membro	1	0	0	
Desgaste dentário	0	0	22	
Desobstrução ducto nasolac	0	0	1	
Enucleação	0	0	1	
Extracção incisivos	0	0	5	
Laparotmia Exploratória	0	0	0	
Marsupialização de abcesso	0	0	2	
OVH	0	0	6	
Orquiectomia	0	0	5	
Redução de abcesso timpân	0	1	0	
Remoção cálculos vesicais	0	0	1	
Remoção massa	0	1	2	
Remoção quisto folicular	4	0	1	
Resolução de prolapso rectz	0	1	1	
**				
TOTAL	5	4	49	
Intervenções em sanidade e/ou produção animal				
***				
TOTAL				
Ações em Segurança Alimentar e Saúde Pública				
****				
TOTAL				
Necrópsias				
TOTAL				

*discriminar em linhas abaixo os casos clínicos observados, subdivididos ou não por especialidades de acordo com o critério do orientador

**nomear e quantificar as cirurgias assistidas nas diferentes espécies

***devem ser incluídas e nomeadas as diferentes ações de profilaxia (ex: intradermotuberculinação, desparasitação, vacinação, colheita de sangue para rastreio sorológico)

****discriminar as ações de segurança alimentar (ex: inspeção carcaças). No caso de ações em que a definição de espécie não seja possível ou aplicável deverão apenas preencher o total na última coluna

OBS: os critérios de definição e apresentação da casuística devem ser discutidos com os orientadores interno e externo, sugerindo-se no entanto a sua apresentação em folha de cálculo ou modelo semelhante; os dados na tabela podem ainda, se a orientação interna e externa, assim o entender, ser trabalhados graficamente, por espécie, especialidade etc...

Annex IV – Report of practical internship activities in Exoclinic

The practical internship in *Exoclinic* took place between January and February, 2018. During the internship the following goals were attempted:

- Learning how to handle and restraint exotic species;
- Learning to identify clinical signs and symptoms;
- To develop medical diagnostic reasoning;
- To acknowledge the etiology, pathophysiology, symptomatology and treatment of the most frequent diseases of exotic animals

  .

The activities developed involved:

- Attendance to consultations and surgeries;
- Assistance in the treatment of the hospitalized animals;
- Discussion of clinical cases;
- Laboratory practice.

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mvet MEDICINA VETERINÁRIA

REGISTO DE CASUÍSTICA

	Aves	Répteis	Pequenos Mamíferos	TOTAL
Casos clínicos presenciados				
Comportamento	2	0	1	
Dermatologia	5	1	8	
Endocrinologia	5	2	0	
Gastroenterologia	5	3	15	
Ginecologia/Andrologia	0	1	8	
Infecciosas	1	0	1	
Nefrologia	1	0	4	
Neurologia	0	0	2	
Odontologia	0	0	16	
Oftalmologia	1	0	2	
Oncologia	0	0	2	
Ortopedia	3	1	1	
Otorrinolaringologia	3	0	1	
Pneumologia	10	2	8	
Traumatologia	9	2	0	
*				
TOTAL	45	12	69	
Cirurgias presenciadas				
Amputação de cauda	0	1	0	
Amputação de membro	0	0	1	
Cistotomia	0	0	3	
Desgaste dentário	0	0	15	
Desobstrução ducto nasola	0	0	1	
Enucleação	0	0	0	
Extracção incisivos	0	0	0	
Gastrotomia	0	0	5	
Laparotmia Exploratória	0	0	0	
Marsupialização de abcesso	0	0	0	
OVH	0	0	5	
Orquiectomia	0	0	1	
Redução de abcesso	0	0	2	
Remoção cálculos vesicais	0	0	0	
Remoção massa	0	0	1	
Remoção nódulo cutâneo	0	0	1	
Remoção quisto folicular	3	0	0	
Resolução de prolapso rect	0	0	0	
**				
TOTAL	3	1	35	