U.PORTO
INSTITUTO DE CIÊNCIAS BIOMÉDICAS ABEL SALAZAR
UNIVERSIDADE DO PORTO

BEHAVIOURAL STUDY OF LABRADOR RETRIEVER IN AQUATIC ENVIRONMENT

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Master's dissertation in Marine Sciences - Marine Resources

2011

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Candidature dissertation to the degree of Master in Marine Sciences - Marine Resources, submitted to Instituto de Ciências Biomédicas de Abel Salazar of Universidade do Porto.

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ACKNOWLEDGEMENTS

First of all, I would like to thank my supervisor and co-supervisor, Prof. Doutora Liliana de Sousa and Prof. Doutora Ana Magalhães, respectively. They have guided and helped me through this dissertation and they perfectly complement each other. It's been an extreme privilege to work with them and an inspiration to me. I'm extremely grateful for all the knowledge that they have shared with me and all the strength that they have given me during this process that is, eventually, an emotional one.

I would also like to thank the professors that, during my first cycle degree in aquatic sciences and this master, had made me grow as an academic and as a person. Especially, I would like to thank to Prof. Doutor Eduardo Rocha, for believing in my capabilities, allowing me to execute this less conventional work and being always available when I needed some advice.

A very sincere thanks to Sebastião Castro Lemos, proprietor of Quinta do Côvo, for his kindness in providing his farm to perform the research work. I would also like to thank him, the association Ânimas and the owners of domestic Labrador Retrievers for the use of some of their dogs in the study. Therefore, I have also to thank all the dogs that enthusiastically participated in the work and made me feel always welcome and happy: Bruna, Carol, Charlie, Cookie, Crazy, Gun, Max, Núria, Piki, Preta, Salsa, Scooby and Spooky.

Thanks to the people that had assisted me on the practical aspects of this work: Isabel Lobão Miranda, Maria João Cruz, Mariana Cardoso Filipe and Alexandra Valongueiro. Extra special thanks to my friend Lady Oliveira that helped me despite her little fear of dogs.

I would like to thank Doutora Teresa Summavielle, head of the Neuroprotection Laboratory of IBMC (Institute for Molecular and Cell Biology), for allowing me to use their software analysis of behaviour.

To all the researchers of GEE (Grupo de Estudos em Etologia) my gratitude for the enthusiastic sharing of ideas and findings.

I would also like to thank to my friends and my class colleagues for the interest demonstrated in the thematic of my dissertation and for the encouragement and support that they have always manifested.

Finally, a special thanks to my family, for their love and for believing in me, and to Miguel Reis, for his special friendship, encouragement, understanding, practical assistance and creation of the line drawings included in the ethogram.

ABSTRACT

The Labrador Retriever is a breed of domestic dog (*Canis familiaris*) with great value in our society. This breed was developed to perform tasks related with the aquatic environment and work with the fishermen, being shaped to be an excellent water dog. However, the behaviour of these animals during interaction with water has never been described or included in any ethogram of the specie, and there are no studies about the possible importance of this sort of environments to Labradors. This master dissertation has the aim of studying the behaviour of this breed in aquatic environment, introducing a new thematic about the behaviour of the domestic dog, and initiate the study of a possible importance of this environment to the breed. Therefore, this is a pioneer work that intents to be a precedent for future studies on the potential implications of not providing water environments to the welfare of this animals.

In the first study (Chapter 2), an ethogram of the behaviour of Labrador Retrievers in aquatic environments was developed. Previous ethograms of the domestic dog were reviewed to produce an inventory of typical dog behaviours. Thirteen Labrador Retrievers were observed, videotaped and photographed in two kinds of aquatic environments for a total of 118 min, in order to identify and obtain detailed descriptions of the observed behaviours. A total of 55 behaviours were catalogued and classified into 7 categories: exploratory behaviour (6 entries), water play (25 entries), approach behaviour (3 entries), comfort behaviour (7 entries), emotional cues (4 entries), physiological behaviour (5 entries) and retrieving behaviour (5 entries). The resulting ethogram enriches the knowledge about the specie, offering a practical tool for further studies, and shows that there is a great behavioural variety of this breed in aquatic environment.

In the second study (Chapter 3), an arena test with a swimming pool was designed to evaluate differences in approach and interaction towards three non-aversive stimuli: water, dog and human. This was measured during 2 min periods for each Labrador Retriever, in three trials, with all of the stimuli present at the same time in the arena. Nonparametric Friedman's test followed by Wilcoxon signed ranks tests were used to test the significant difference between stimuli ($p<0.05$). The water stimulus had a significantly superior approach frequency and duration of interaction than the dog and the human stimuli, revealing a relative preference from Labradors for this stimulus, which suggests some relative importance of aquatic environment to this breed.

The results of this dissertation indicate that there is attractiveness from Labradors for water, suggesting that it can have implications on their welfare. Further studies should be conducted, leading to a better understanding of their behaviour and to access how

important is the aquatic environment to this breed and possible implications to their welfare.

RESUMO

O Labrador Retriever é uma raça de cão doméstico (*Canis familiaris*) com um grande valor na nossa sociedade. Esta raça foi desenvolvida para realizar tarefas relacionadas com o meio aquático e trabalhar com os pescadores, sendo apurada para ser um excelente cão de água. Contudo, o comportamento destes animais em interação com a água nunca foi descrito ou incluído em nenhum etograma da espécie, e não existem estudos sobre a possível importância deste tipo de ambientes para os Labradores. Esta dissertação de mestrado tem o objetivo de estudar o comportamento desta raça no meio aquático, introduzindo uma nova temática acerca to comportamento do cão doméstico, e iniciar o estudo de uma possível importância deste ambiente para a raça. Este é, portanto, um trabalho pioneiro com a intenção de ser um precedente para estudos futuros sobre potenciais implicações de não prover ambientes com água no bem-estar destes animais.

No primeiro estudo (Capítulo 2) desenvolveu-se um etograma do comportamento de Retrievers do Labrador em ambientes aquáticos. Reviu-se, previamente, etogramas do cão doméstico já existentes, de forma a criar um inventário de comportamentos típicos do cão. Foram observados, filmados e fotografados treze Retrievers do Labrador, em dois tipos de ambientes aquáticos, num total de 118 min, de forma a identificar e obter descrições detalhadas dos comportamentos observados. Um total de 55 comportamentos foi catalogado e classificado em 7 categorias: comportamento exploratório (6 entradas), brincar na água (25 entradas), comportamento de aproximação (3 entradas), comportamento de conforto (7 entradas), pistas emocionais (4 entradas), comportamento fisiológico (5 entradas) comportamento de cobro (5 entradas). O etograma resultante enriquece o conhecimento sobre a espécie, proporcionando uma ferramenta prática para estudos posteriores, e mostra que há uma grande variedade comportamental desta raça no ambiente aquático.

No segundo estudo (Capítulo 3), foi delineado um teste de arena com uma piscina para avaliar diferenças na aproximação e interação em relação a três estímulos não-aversivos: água, cão e humano. Isto foi medido durante períodos de 2 min para cada Retriever do Labrador, em três ensaios, com todos os estímulos presentes na arena ao mesmo tempo. Testes não-paramétricas de Friedman, seguidos de testes de Wilcoxon (signed-ranks) foram utilizados para testar a diferença significativa entre estímulos ($p < 0,05$). O estímulo água teve uma frequência de aproximação e duração de interação significativamente superiores do que os estímulos cão e humano, revelando uma preferência relativa dos

Labradores por este estímulo, o que sugere alguma importância relativa do ambiente aquático para esta raça.

Os resultados desta dissertação indicam que existe atração dos Labradores por água, sugerindo que isso pode ter implicações no seu bem-estar. Devem ser conduzidos estudos adicionais para uma melhor compreensão do seu comportamento e para avaliar o quão importante é o ambiente aquático para esta raça e possíveis implicações para seu bem-estar.

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CHAPTER 1

GENERAL INTRODUCTION

Each experimental chapter contains an introduction focused on the specific topic to be addressed as a detailed discussion of the results. Therefore, this introductory chapter is relatively brief, as the Chapter 4, the general discussion, with the objective of integrating the general theme of both experiments and drawing overall conclusions about the results of both experiments, respectively. At the end of each chapter a list of references is also provided.

THE AIM OF THIS MASTER DISSERTATION

Before I introduce the theme of this work, it is important to highlight the aim of this master dissertation: to study the behaviour of Labrador Retrievers in aquatic environment. With this we intend to introduce a new thematic of dog's behaviour and to initiate the study of the possible importance of this environment to this breed, a precedent for future studies on potential implications to the welfare of this animals.

LABRADOR RETRIEVER

The domestic dog (*Canis familiaris*) is a result of almost 100,000 years of domestication (Vilà *et al.*, 1997) and is the oldest domesticated animal (Maejima *et al.*, 2007). Today there are a great variety of breeds, performing a variety of tasks and some breeds are multitaskers, performing several types of work; Labrador Retriever is one of those breeds (Thornton, 2004).

Labrador Retriever is one of the most popular breeds in the world, being in first place on recording statistic in the American Kennel Club for, at least, the past four years (AKC, 2010). The adaptability and versatility of this breed has made them succeed in a large number of areas. In addition of being appreciated as companion animals and gun dogs (for hunting), Labradors currently work as assistance dogs, search-and-rescue dogs, detection dogs and for dog-assisted interventions (e.g. therapy dogs) (Ley *et al.*, 2009; Maejima *et al.*, 2007; Thornton, 2004; Weiss and Greenberg, 1997).

This breed is extremely important to our society and is considerably responsible for the increasing bond between humans and dogs. This happens not only because of their work with the humans and for the humans in our everyday society, but especially due to the attachment and affection we have gained for this specie.

HISTORY OF THE BREED

Although Labrador Retriever is usually listed as an English breed, it is originary from Canada, where they helped the Newfoundland's fishermen. This predecessor of today's Labrador was known as the Small Water Dog, the Lesser Newfoundland, the St. John's Dog, the Lesser St. John's Dog or the Short-coated St. John's Dog (Desmond, 2008; McCarty, 1994; Thornton, 2004). Some worked with the fishermen from land, swimming out to retrieve nets and others worked from the fishing boats, leaping overboard to grab nets, retrieve fishes that could escape from them or objects that could fall into the water and swimming ashore with the fishermen (Desmond, 2008; Wiles-Fone, 2003). Furthermore, they also seemed to help them search out sea wrecks and survivors (McCarty, 1994). Thought the 19th century, when the Canadian fishermen boats visited the English ports, the fishermen were persuaded by the local hunting sportsmen to sell them these dogs and soon the Labrador gradually became established as an English gun dog. Late in the century, heavy tax imposed upon the dogs and certain quarantine laws put an end to their importation. Without new dogs in England, breeders crossed them with several other breed of gun dogs (as the Curly-coated Retriever, the Flat-coated Retriever and the Tweed Water Spaniel), that did not alter the physical appearance of the Labrador Retriever but enhanced his gun dog qualities (Desmond, 2008; McCarty, 1994). Still, this breed had undergone relatively few radical changes, since the fishermen and, later, the sportsmen were interested in maintain some high degree of purity in this breed.

In the 20th century the popularity of this breed increased and became spread all over the world. In 1903, the Labrador Retriever was officially recognized by that name by the Kennel Club (Desmond, 2008; Thornton, 2004).

DEFINING CHARACTERISTICS OF THE BREED

Table 1 resumes some of the standards characteristics of the breed approved by the Federation Cynologique Internationale (FCI) and adopted by the *Retriever Clube de Portugal*. There are some characteristic that distinguish this breed from other dogs in general. Labradors are strongly built medium-sized dogs; they are fast, both in water and in land, and that can work for hours under difficult conditions (McCarty, 1994; Thornton, 2004). They have a double weather-resistant coat, short and dense, that offers little resistance to water and prevents it from clogging with ice (in freezing waters) and have

also a generous layer of subcutaneous fat (that protects them from the effects of the cold); they have webbed toes, that improves the swimming, and a characteristic tail, resembling the one of an otter that they use as rudders in the water (Davis, 2008; Desmond, 2008; McCarty, 1994).

Labradors have an excellent sense of smell, and possess kind and friendly eyes that express the intelligent, alert and friendly temperament of this breed; this, combined with their obedience and willingness to please, facilitates the training of this dogs and their steady temperament allows them to excel as assistance dogs (Desmond, 2008; Thornton, 2004; Wiles-Fone, 2003).

As their name indicates, they are excellent retrievers. They can gladly fetch anything easily but what really distinguish them from others breeds is not their inclination to retrieve but the strong desire to do it; this desire is so strong in this breed that sometimes is considered to almost border a physiological need (Davis, 2008; Thornton, 2004).

TABLE 1. SOME STANDARDS CHARACTERISTICS OF THE BREED (APPROVED BY THE FCI).

Behaviour and temperament	Good-tempered, very agile. Excellent nose, soft mouth; keen lover of water. Adaptable, devoted companion. Intelligent, keen and biddable, with a strong will to please. Kindly nature, with no trace of aggression or undue shyness.
General appearance	Strongly built, short-coupled, very active; (which precludes excessive body weight or substance) broad in skull; broad and deep through chest and ribs; broad and strong over loins and hindquarters.
Size	Ideal height at the withers: Males 56 – 57 cms Females 54 – 56 cms
Body	Topline: level. Loin: wide, short-coupled and strong. Chest: of good width and depth, with well sprung barrel ribs – this effect not to be produced by carrying excessive weight.
Tail	Distinctive feature, very thick towards base, gradually tapering towards tip, medium length, free from feathering, but clothed thickly all round with short, thick, dense coat, thus giving “rounded” appearance described as “otter” tail. May be carried gaily, but should not curl over back.
Coat Hair	Distinctive feature, short, dense, without wave or feathering, giving fairly hard feel to the touch; weather-resistant undercoat.

> Colour: wholly black, yellow or liver/chocolate. Yellows range from light cream to red fox. Small white spot on chest permissible.

WHY DO LABRADORS SEEM TO ENJOY WATER SO MUCH?

As mentioned, the predecessor of the nowadays Labrador Retriever, the St. John's dog, worked with the fishermen and was expected to retrieve nets, fish or objects in the Newfoundland's water. The physical adaptations of this breed, developed for water environments (i.e. water-repellent coat, subcutaneous fat, webbed toes, "otter" tail), make them excellent swimmers. However, beyond that, the great majority of the Labradors enjoy swimming, splashing around and play in the water; they seem to have an attraction for this type of environments that can be speculated to be breed into them, as the predecessor's individuals to exhibit the most enthusiasm, joy and satisfaction for the water work could be rewarded with the chance to reproduce (Davis, 2008).

THESIS RATIONALE

The behaviour of Labrador Retrievers in aquatic environments has never been described. Also, in the ethograms of the domestic dog (e.g. De Palma *et al.*, 2005; Tami and Gallagher, 2009; Valsecchi *et al.*, 2010; Ward *et al.*, 2008) has never been addressed this topic. There was also a study on the behaviour of Labradors confined to yards (Kobelt *et al.*, 2007) but was not given importance if the animals had access to pools or lakes, to play with the water.

Water environments (i.e. work in this environments) were the main reason for what this breed was initially developed and shaped. Yet, as the interaction of this breed with water has never been studied, it was never assessed behavioural variability achieved in these environments. Additionally, we don't know how the isolation of Labradors from water environments and from the opportunity of interact with water can affect the welfare of this breed.

One of the "Five Freedoms" of the Farm Animal Welfare Council (FAWC) states that animals should have the "Freedom to express normal behavior by providing sufficient space, proper facilities, and company of the animal's own kind", suggesting that animals have needs to perform natural behaviour patterns (Jensen and Pedersen, 2008). The deprivation of behavioural (or ethological) needs is a crucial feature of poor welfare in

animals, although animals have a certain (but limited) degree of plasticity to adapt their behavioural repertoire to the demands of the environment (Vinke *et al.*, 2008).

Providing richer environments to the animals enables them to express a larger variety of their species-typical behaviour, allowing them to express its natural behaviour repertoire; that generally increases behavioural diversity of the animal. However, not doing so may impair the welfare of the animals, causing stress (Dawkins, 1990; Kleiman *et al.*, 2010; Rogers, 2010; Scott, 2005). However, it is often unclear what natural behaviour is, because there is no single standard for natural behaviour or a natural environment (Newberry, 1995).

Can the interaction with water be a behavioural need of this breed? Does it involve species-typical behaviour, or, in this case, breed-typical behaviour? Can water environments be an important feature of the welfare of Labrador Retrievers?

Many breeders of these animals may not turn available the opportunity of contact with water environments in their breeding farms and, as we know, much of the tasks as service dogs that this breed preforms keep them away from water environments. Still, if this jeopardizes the welfare of the animals, it can also jeopardize the ability to perform that social task (Vincent and Leahy, 1997). Therefore, it is important, both for ethical and social reasons, to begin a scientific topic on this issue.

THESIS METHODOLOGY

As this is the first study on this subject, it was important to begin with the basis of ethological studies and conduce a descriptive compilation of the behaviours of Labrador Retrievers in water environments (ethogram). The need to know what natural behaviour is for each animal is the basis of studies developing ethograms, that also provide a standard reference against which we can measure behavioural deviations (Banks, 1982; Gonyou, 1994). This is extremely important for further studies on the subject. Following, we wanted to understand if this breed showed some sort of preference for water contact, using an arena test. Therefore, this dissertation is constituted by two studies with the overall aim of identify the behaviour of the breed in this environments and start a scientific understanding about whether or not this breed is attracted to water.

In Chapter 2, an ethogram was elaborated, through observation of Labradors in two main types of environments (containing deep and shallow water). Furthermore, in addition to

the naturalistic observation, semi-structured situations of retrieving were also created, being an important feature of this breed. The information was entirely qualitative and it was then also essential in the subsequent study, to compare the relative preference of Labradors for the water stimulus, in an arena test.

Therefore, in Chapter 3, an arena test was created to see the relative preference of Labradors for three non-aversive stimuli: water (in a swimming pool), a human and a dog from the same breed. The impetus for this experiment was the idea that the dogs would approach more and interact more time with the stimuli that were more attractive to them and, being all the stimuli considered positive to this breed and, in the case of the human stimulus even appealing (Jakovcevic *et al.*, 2010; Wilsson and Sundgren, 1997), if the dog preferred the water to the other stimuli it would suggest that it must have some relative importance to Labradors and it this would be a subject worth studying in the future. To our knowledge, although arena tests are highly used in behavioural testing in dogs, this was the first time that was developed an arena test with a swimming pool (see review in Diederich and Giffroy, 2006), so that we could create a stimulus water.

This sort of experiment can indicate us the relative preference of the dogs, and therefore suggest us the relative importance of this feature to this animal (Hemsworth *et al.*, 2011). However, it is argued that the expression of an animal's preference does not indicate how important it is the resource to the animal; to do so is necessary to measure the strength of an animal's preference or his motivational strength, e.g. imposing varying levels of cost of access to perform a behavioural pattern, or to gain access to a resource (Hemsworth *et al.*, 2011; Jensen and Pedersen, 2008; Kirkden and Pajor, 2006). This has been taken into account in the discussion and, therefore, the conclusions of the results obtained have been made with caution.

In Chapter 3, as the number of approach and interaction behaviours were different to each stimulus, the total frequency and duration of its approach and interaction was calculated as a proportion of the cumulative frequency and the cumulative duration of the approach and interaction behaviours towards each stimulus, respectively. This was done to prevent incorrect results and conclusions. For having a small sample, nonparametric Friedman's test followed by Wilcoxon signed ranks tests were chosen to test the significance of the approach and interaction from the difference between stimuli.

Alternatively to this study, we attempted to create a Y maze test, which would allow us to obtain quantitative measures of the importance of the stimulus water for the Labradors;

this test is based on the number of choices that the animal does, between two resources in study, after depriving animals of access to either or both of the two of the resources under study, that could indicate the motivation of the animals to choose them and their relative importance (Hemsworth *et al.*, 2011). However, with the time and the budget that we had to this master's research it was not possible to do it; we attempted to create an Y maze structure with cloths but pilot trials demonstrated that dogs need a much stronger structure (e.g. wooden structure) or they will be able to exit the maze and go to the handler; for being such social animals, dogs will not stay alone in an Y maze willingly, they will try to get out in order to seek contact with the hander that placed them in the maze. Therefore, although also interesting to do, it was not possible to develop this sort of studies.

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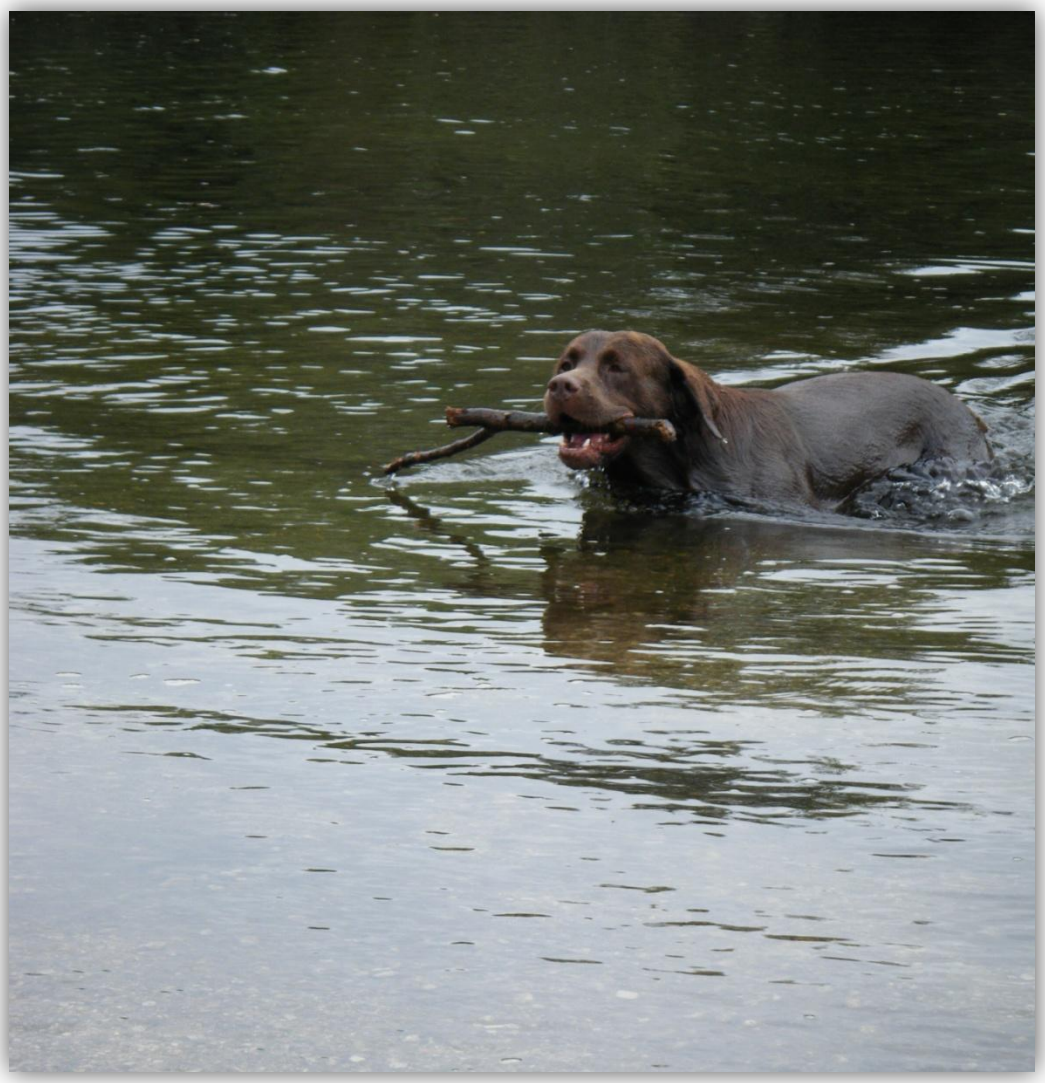


CHAPTER 2
ETHOGRAM OF THE BEHAVIOUR OF LABRADOR RETRIEVERS IN AQUATIC ENVIRONMENT

Most of the material presented in this chapter will be submitted to Applied Animal Behaviour

ABSTRACT

Labrador Retriever is a breed of domestic dog (*Canis familiaris*) developed to perform tasks related to the aquatic environment. However, the behaviour of these animals during interaction with water has never been described or included in any ethogram of the specie.

In this study, an ethogram of the behaviour of Labrador Retrievers in aquatic environments was developed. Previous ethograms of the domestic dog were reviewed to produce an inventory of typical dog behaviours. Thirteen Labrador Retrievers were observed, videotaped and photographed in two kinds of aquatic environments for a total of 118 min, in order to identify and obtain detailed descriptions of the observed behaviours.

A total of 55 behaviours were catalogued and classified into seven categories. These included exploratory behaviour (six entries), water play (25 entries), approach behaviour (three entries), comfort behaviour (seven entries), emotional cues (4 entries), physiological behaviour (five entries) and retrieving behaviour (five entries).

The resulting ethogram offers a practical tool for quantitative research and further studies on the influence of these environments to this breed. Furthermore, it enriches the knowledge about the behaviour of the domestic dog and aids to the progress of developing a complete ethogram for this specie.

INTRODUCTION

The domestic dog, *Canis familiaris*, can be found in large number in our society, as companion animals and for a variety of purposes (e.g. for hunting, herding, as assistance dogs, detection dogs for the police), causing behavioural observations to be increasingly important and fascinating because of the significant and growing dog–human relationship(Maejima *et al.*, 2007; Miklósi, 2007; Svartberg and Forkman, 2002). The interest in this dual relationship of attachment and affection is growing, given that dogs are the most popular specie of companion animal and has been integrated in the human society longer than others (Prato-Previde *et al.*, 2003).

The dog is the result of almost 100,000 years of domestication (Vilà *et al.*, 1997), in which humans selected and created various breeds according to the function and “utility” of their main behavioural characteristics (Pongrácz *et al.*, 2005). Thereby, dogs have been bred for a practically infinite variety of uses and there are some tasks that depend on specific

breeds, e.g. the wide category of assistance dog (including guide dogs, dogs for the deaf, service dogs for people in wheelchairs and therapy dogs) (Allen and Blascovich, 1996; Pongrácz *et al.*, 2005; Weiss and Greenberg, 1997).

Labrador Retriever is one of the most used breeds as a assistance dog, especially as guide dog (Weiss and Greenberg, 1997), and is also one of the most popular breeds used as a companion animal, for hunting (especially of aquatic birds), as a detection dog (for firefighters and the police) and rescue dog; all this makes the knowledge about this breed extremely important.

Labrador Retriever was selected to be a working dog, resistant and equally talented in land and in the water (Wiles-Fone, 2003); this breed was developed to perform tasks associated with water environments, possessing important characteristics to work with the fishermen, which makes him an excellent water dog. In fact, they are excellent water dogs and possess a weather-resistant coat, an unique tail (similar to the tail of an otter, because of its shape) and webbed toes that make them excellent swimmers (Davis, 2008).

There are already ethograms of the domestic dog (e.g. De Palma *et al.*, 2005) and studies have been conducted on the behaviour of Labradors confined to yards (Kobelt *et al.*, 2007) but it was not given importance to water, the main reason why the breed was selected, having never been studied the behavior of this breed in interaction with water. Furthermore, these new social tasks as assistance dogs, keep them away from the water and we don't know how this can affect their welfare. This is a very important issue as the ability to perform these social tasks is related, among other things, with their welfare (Vincent and Leahy, 1997). Therefore, it is most important the realization of this ethogram and the assessment of the resulting behavioral variability.

The aim of this study is to create an ethogram of the behaviour of Labrador Retrievers in the aquatic environment, with the intention to initiate a new topic about the behaviour of the domestic dog, gathering information that expands the knowledge of the behaviour of Labrador Retrievers; we think that this can be a precedent and the basis to future research that can lead to scientific understanding of the importance of water interaction in breeds selected to perform tasks in aquatic environments.

METHODS

GENERAL APPROACH

Initially, we reviewed the existing literature on ethograms of the domestic dog (De Palma *et al.*, 2005; Tami and Gallagher, 2009; Valsecchi *et al.*, 2010; Ward *et al.*, 2008), to create an inventory of typical dog behaviours. Subsequently, original observations of Labrador Retrievers in aquatic environments were made and recorded on video camera. The behaviours were analyzed and compiled in an ethogram with a catalog format, for a simple and practical organization of the information.

OBSERVATIONS

In order to obtain a complete ethogram of the behaviour of Labrador Retrievers in aquatic environments, as well as photographic and video documentation, direct observations were made in two types of these environments: with only deep water (with a water pool) and with deep and shallow water (in a river). Furthermore, semi-structured situations of retrieving were created, with a human (that not the observer) throwing wooden-sticks, so that the dogs could retrieve it.

Thirteen Labrador Retrievers (with ages between 2 to 13 years old) were observed and videotaped, in a total of 118 min, during June to September 2011. Photo-documentation was also made during observations.

BEHAVIOUR ANALYSIS AND ETHOGRAM

The video records were analysed for descriptive text documentation of the behaviours observed. In addition, line drawings to illustrate the behaviours were also prepared, when conceivable.

Therefore, each entry of the ethogram includes: the name for each behaviour, a line drawing representation of the behaviour (when applied), a text description and examples of other ethograms where similar behaviours were referred (when applied). Finally, in some descriptions we also included comments clarifying certain aspects of the behaviour.

We did not aim to provide an exhaustive description of the behaviours, rather than an easily discernible and practical one.

Behaviours were also grouped by their proposed meaning or function. In addition to these catalogue entries, representative photographs were included to better illustrate some of the behaviours.

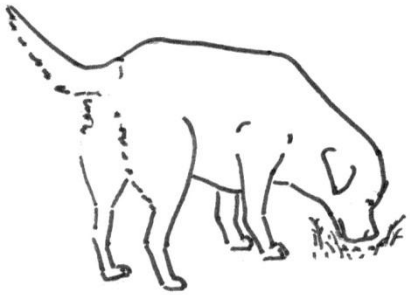
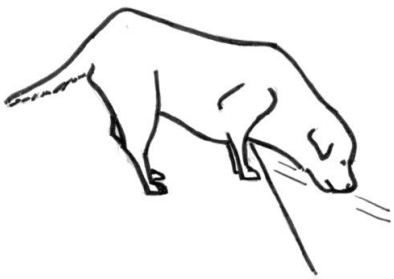
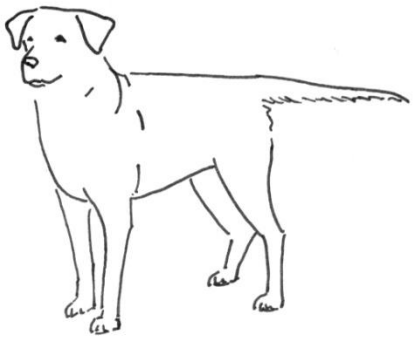
RESULTS

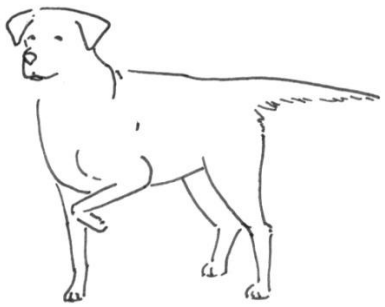
The resulting ethogram is presented in Table 2, composed by 55 cataloged behaviours. There were classified into seven categories: exploratory behaviour includes six entries, water play includes 25 entries, approach behaviour includes three entries, comfort behaviour includes seven entries, emotional cues includes 4 entries, physiological behaviour includes five entries and retrieving behaviour includes five entries.

Photographs illustrating some of the behaviours were appended (Figs. 1-8).

TABLE 2. ETHOGRAM OF THE BEHAVIOUR OF LABRADOR RETRIEVERS IN AQUATIC ENVIRONMENT.

1. Exploratory behaviour Exploratory behaviour includes activities directed toward the physical aquatic environment or even animated aspects of this environment, such as animals of another species (e.g. frogs). Exploratory behaviour can take place proximate or in the water. The following six entries represent the commonly observed exploratory behaviours of Labrador Retrievers in aquatic environments. The behaviour *Alert/Attention* was also present in retrieving situations but was not included in the category retrieving behaviour because was also observed without the stimulation of the retrieving situation.	
Looking at environment	The dog observes the various objects of the environment. *Other references*: As also been described in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).

Looking at water	The dog stays near the water looking at it, unmoving in a still position for a while.
Sniffing environment 	With his head down, the dog putts the muzzle on the ground or on objects in the environment, the dog sniffs, moving the nostrils, trying to perceive odor. *Comments*: Sniffing environment can be done still or while walking or trotting and the tail of the dog can be still or waving. *Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Sniffing water 	The dog lowers his muzzle under the shoulders, approaching it from the water, moving the nostrils trying to perceive odor, with no contact between the water and the muzzle.
Alert/Attention 	The dog is attentive. The ears are raised, turned forward (normally moving when a sound is caught), their eyes are opened and watchful, showing attention, his neck is stretched and the mouth usually closed. The tail is normally horizontal and may be still or moving slightly from side to side. *Comments*: This behaviour occurs when something of interest takes place within the surrounding environment (e.g. a sound from a frog or the other dog diving in the water).
Raising foreleg	This position resembles the one described for *Alert/Attention* but the dog is looking away with one foreleg raised and unmoving.

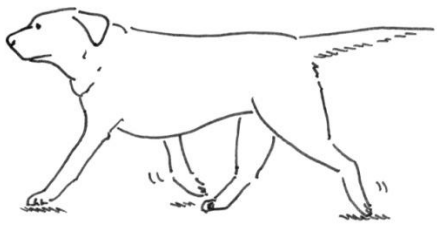
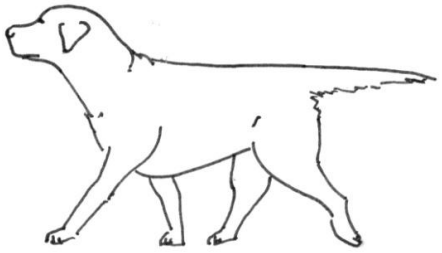
	*Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).

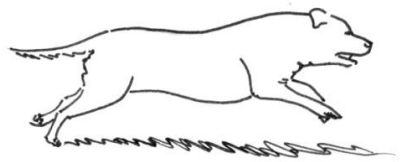
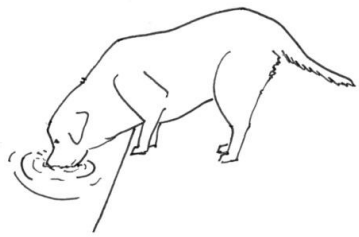
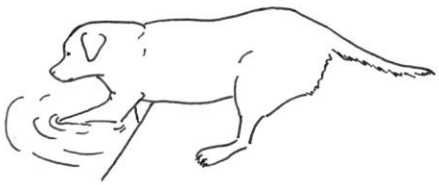
2. Water play

Water play incudes any play behaviour performed in the aquatic environment, proximate or inside the water. Therefore, this category includes behaviours of: locomotion play, play with/in the water, swimming play and play with the physical aspects of the environment (which includes object play).The following 25 entries represent the observed water play behaviours of Labrador Retrievers in aquatic environments.

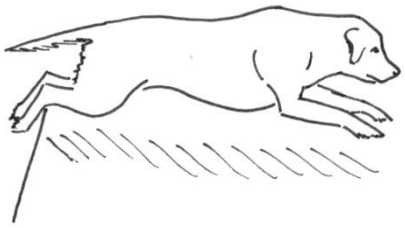
The behaviour *Pelican's gulp* is included in water play because of the fact that the dog drinking water is a consequence of the behaviour and not the goal, which it is to play with the water.

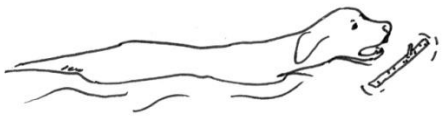
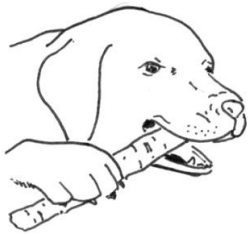
Some of these behaviours that involve locomotion play, swimming play and object play (i.e. *running, controlled* and *disorderly swimming, pick up, carry and drop while swimming, adjust*) are obviously present in retrieving situations. Nevertheless, they were not classified as retrieving behaviour because they were also observed without the stimulation of the retrieving situation.

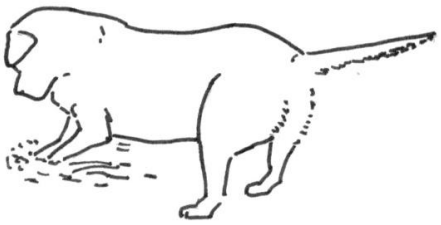
Trotting 	The dog moves, walking briskly with no apparent destination, near or inside shallow water. *Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Walking 	The dog moves, leisurely walking with no apparent destination, near or inside shallow water. *Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).

Running 	The dog moves, hurrying, with no apparent destination, near or inside shallow water. *Comments*: The dog usually runs when excited, with a play face and waving tail.
Skip over 	The dog jumps over an obstacle mostly with hindlimb propulsion, with the forelegs leaving the ground first followed by the hindlegs. This propulsion can be considerable or just slight, not properly observing a jump, appearing that the dog is just walking over the target object.
Nuzzling water 	Touching the water very quickly with the muzzle. *Comments*: The majority of the times the mouth is closed but sometimes the dog opens the mouth and puts the tongue out very quickly just touching the water, with no intention to drink.
Pawing 	The dog hunkers down by the poolside and, with an object as an apparent target (e.g. leaves or waterlilies), puts one foreleg inside the water, extending it quickly in a forward direction followed by a backward, toe-dragging movement as if digging or rowing. This is typically repeated several times in succession. *Comments*: Sometimes the dog may lose his balance and slip into the pool, diving in the water.
Pelican's gulp 	The dog fills his mouth with water, positioning it opened in the water (reminding of a pelican feeding), and when the mouth is full with water he closes it and swallows all in one gulp.

Wagging muzzle 	While lying down in shallow water, the dog, with his mouth slightly open, wags his muzzle from one side to the other, splashing water. This behaviour can be repeated several times in succession.
Muzzle in the water 	The dog dips his muzzle in the water, slightly vertically positioned in relation to the water.
Quick spin 	Turning away (changing direction) in a quick, sharp motion, pivoting around their hindlegs, near or inside water.
Standing in water 	The dog remains standing with his legs or only his forelegs inside the water, or even with the entire body in the water, with exception of his head. *Comments*: The dog may carry out other behaviours in this position, e.g. looking at the water, the environment, drinking, nuzzling water, pelican's gulp or sniffing the water.
Bouncing in water 	While in shallow water, the dog makes repeated several small jumps, moving forward, mostly with hindlimb propulsion, forelegs leaving the ground first and then the hindlegs.

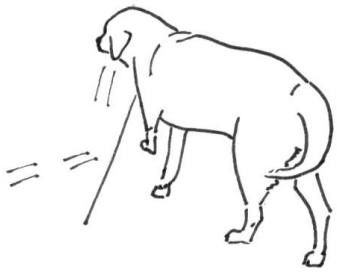
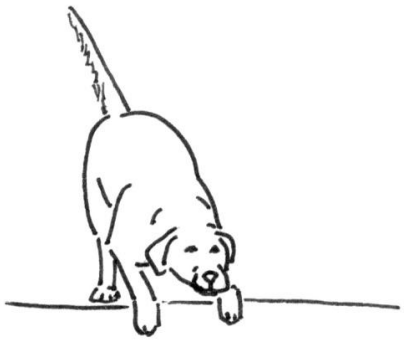
Roll over 	The dog lies down and rolls over his back, and can repeat this several times in succession before returning to the initial position.
Progressive diving 	The dog enters in the water in a gradual way, first putting the forelegs in the water, then the hind legs and finally entering the water with the propulsion of a small jump.
Belly flop 	The dog enters the water by jumping and diving horizontally, with his abdomen hitting flat against the surface of the water.
Controlled swimming 	The dog swims with control. His head is kept well out of the water and his tail is straight out from the body, does not suddenly change direction often, looks forward-facing and does not splash significantly while paddling. His breathing is constant and hardly and sporadically audible.
Disorderly swimming 	The dog swims more nervously with his head not kept well above the surface of the water and occasionally dives his muzzle in the water. His tail is straight out from the body. The dog change directions often, seeming to swim in circles, and gazes around. While paddling, the dog splashes considerably and his breathing is rapid and easily audible.

Pick up while swimming 	An object is grabbed between the jaws while the dog is swimming. *Comments*: The object (e.g. a wooden-stick) can be already on the surface of the water or can have just been thrown to the dog retrieve.
Carry while swimming 	Following pick up while swimming, the object is held between the jaws as the animal swims.
Drop while swimming 	Following pick up while swimming or carry while swimming, the dog can release the object (opening the upper and lower jaws), dropping it and carry on swimming.
Adjust	The dog open and close his jaws to fit the position of the object in the mouth, until it is secure and steady.
Chew 	The dog masticates an object (e.g. a wooden-stick) taken into the mouth with a grinding motion of upper and lower jaw. *Comments*: This behaviour can occur while the dog is standing or lying down, near or inside shallow water.
Mouth 	Without entering the pool, the dog places himself by the poolside and crouches, trying to reach with the muzzle and take objects on the surface of the water into the mouth (e.g. leaves). *Comments*: This behaviour is usually followed by chew.

Dig 	The dog excavates the ground, near the water, with his forelegs. This is accomplished by extending the forelegs quickly forwards and then backwards, in a toe-dragging movement. This is repeated several times in succession, one foreleg at a time or even both at the same time.
Exiting water	The dog leaves the water walking/running or, in a pool situation, first with his forelegs and using his hind legs to propel him out. *Comments*: This is usually followed by body shaking.

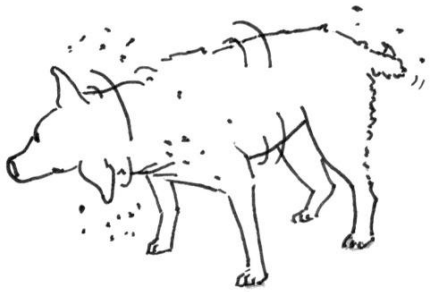
3. Approach behaviour

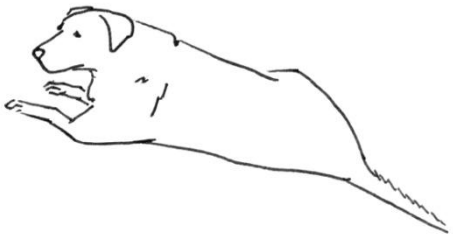
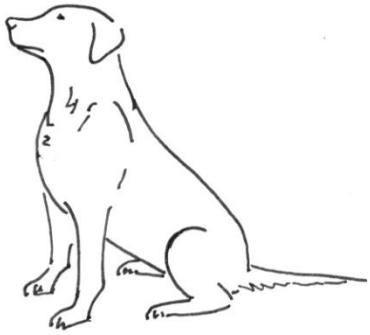
Approach behaviour includes any behaviours that constitute an attempt to approximate the water and make contact with it. The following three entries represent the commonly observed approach behaviours of Labrador Retrievers in aquatic environments.

Approach water	Move towards the water, while clearly visually oriented to the water.
Jazz move 	The dog dislocates himself (trotting or walking) along the side of the pool facing the water (muzzle oriented to it) and slightly sidelong, always crossing one foreleg in front of the other. *Comments*: This behaviour is often interrupted to do nuzzling water and may be continued subsequently.
Intention to dive 	The dog positions himself by the poolside with his forelegs close to the edge and lowers his muzzle under the shoulders several times, as gaining impetus to dive in the water.

4. Comfort behaviour

Comfort behaviour involves activities to increase the physical comfort of the dog in the aquatic environment. These activities can develop proximate or inside the water. The following seven entries represent the commonly observed approach behaviours of Labrador Retrievers in aquatic environments.

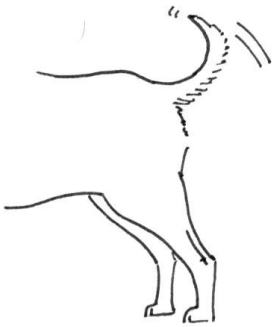
Body shaking 	The dog waggles the body rapidly from side to side, mostly to clean the coat from water. *Comments*: The dog can do this near the water or even inside shallow water, with his legs still inside the water. Sometimes the dog only shakes his head and not the entire body. *Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Head shaking while swimming 	While swimming, the dog quickly waggles his head from side to side, mostly to clean it from water.
Rubbing ears 	The dog lays down his muzzle sideways on the ground and rubs his ears on it. *Comments*: This behaviour can be accomplished with the dog bended down with the forelegs outstretched and the rear end upwards (can occasionally lay down the rear end), or with the dog completely lying on the ground.
Lying down	The dog rests his body on the ground, near or inside shallow water (where he stays with his head out of the water).

	*Comments*: The dog is normally relaxed and observing the environment, usually with play face and waving tail.
Sitting 	The dog rests with the rump leaning on the ground. *Other references*: As also been described in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Yawning 	The dog opens his mouth, inhaling and exhaling air. *Other references*: As also been described in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Forelegs on the poolside 	While the dog is swimming, he approaches the poolside and places his outstretched forelegs on the poolside for a moment, trying to exit the pool or to rest. *Comments*: The dog can shake his head while in this position.

5. Emotional cues

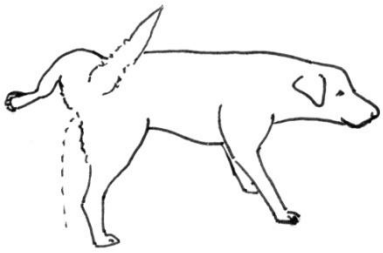
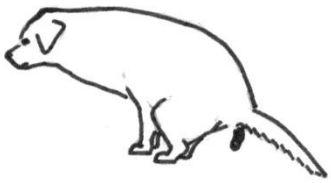
Emotional cues include behaviours that provide cues about the emotional state of the animal within the aquatic environment. The emotional cues observed denote excitement and are closely related to feelings of happiness and welfare. The following four entries represent the commonly observed emotional cues of Labrador Retrievers in aquatic environments.

The behaviour *Panting* is also a method of evaporative body cooling and, therefore, a physiological behaviour. Nevertheless, is closely linked to play and excitement, constituting an important emotional cue.

Play face 	The mouth is opened and relaxed with the tongue out, often hanging on the side, ears relaxed and soft look. *Comments*: The play face is usually combined with a waving tail and constant panting. *Other references*: As also been mentioned but not described in a dog ethogram based on participant's decriptions (Tami and Gallagher, 2009).
Waving tail 	The dog wags his tail. *Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Barking	Vocalization characteristic of dogs. *Other references*: As also been described in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Panting	Rapid and repetitive open-mouthed breathing (normally with overhanging tongue). *Other references*: As also been mentioned but not described in a dog ethogram based on participant's decriptions (Tami and Gallagher, 2009).

6. Physiological behaviour

Physiological behaviour involves activities regarding requirements of the dog's body. This activities occur proximate or in the water. *Panting* was included in emotional cues because in this context highlights the emotional state of the animal, but can also be considered a physiological behaviour. The following five entries represent the commonly observed physiological behaviour of Labrador Retrievers in aquatic environments.

Drinking 	Drinking water, using their tongue to scoop up the water.
Urinating 	Emitting urine in a crouching position or with one hind leg raised, so that the urine goes beside the body. *Other references*: As also been mentioned, with similar description, in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Defecating 	Emitting faeces in a crouching position. *Other references*: As also been described in an ethogram of domestic dog in shelters (De Palma *et al.*, 2005).
Sneeze	The dog sneezes, pushing air out through their nose. *Comments*: This can sporadically happen while the dog is sniffing the environment.
Spit out	The dog seems to be choked and spits out, expelling saliva.

7. Retrieving behaviour

Retrieving behaviour involves behaviours observed in a retrieving situation ("to find and

bring back game") of objects in the water, including the moments before, during and after the object was thrown into the water and retrieved. Other behaviours obviously present in retrieving situations (*alert/attention* – in exploratory behaviour –, *running, controlled* and *disorderly swimming, pick up, carry and drop while swimming, adjust* – in water play) were not included in this category because they were also observed without the stimulation of the retrieving situation.

The following five entries represent the commonly observed retrieving behaviour of Labrador Retrievers in aquatic environments.

Retrieve	The dog dives and swims, after the object (e.g. a wooden-stick) has been thrown into the water, with the purpose of getting it back. *Comments*: The object may or may not be recovered in the water by the dog. Furthermore, if the dog succeeds to find it in the water and after picking it up he might drop it, but can also go back swimming and re-grab it with his jaws.
Prompt to Retrieve	The dog keeps gazing the object (e.g. a wooden-stick) thrown into the water and is ready to spring and dive towards the stimulus, with the ears raised and the whole body vibrating. The dog shows intention to retrieve but did not initiate it and can run through the poolside from side to side with excitement, following the object with the eyes. The dog may or may not initiate retrieve.
Periscope swimming 	While the dog is retrieving and after the object has been thrown into the water and the dog dived to retrieve it, he may not immediately find the object on the surface of the water and swims while searching for it. The dog keeps the neck extremely stretch out and the head completely out of the water (resembling a periscope of a submarine) with large and watchful eyes, looking around to find the object on the water.
Drop/toss	If the dog is successful in retrieving the object,

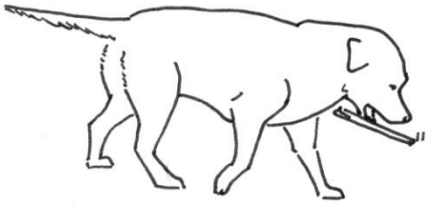
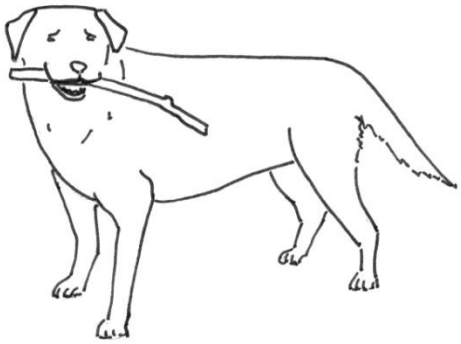
	after leaving the water with the object in the mouth he places it on the ground. *Comments*: The dog can re-grab the object and carry it in his mouth.
Carry 	After leaving the water, the object is carried in the mouth of the dog, held between the jaws.

FIG. 1. LABRADOR RUNNING IN THE WATER.

FIG. 2. LABRADOR LOOKING TO THE ENVIRONMENT.

FIG. 3. LABRADOR SUCCEFULLY RETRIEVED THE WOODEN-STICK.

FIG. 4. LABRADOR LYING DOWN INSIDE THE WATER.

FIG. 5. BODY-SHAKING BEHAVIOUR.

FIG. 6. RETRIEVE BEHAVIOUR.

FIG. 7. LABRADOR STANDING INSIDE THE WATER ONLY WITH HIS HEAD OUT.

FIG. 8. LABRADOR SWIMMING WHILE CARRYING A WOODEN-STICK.

DISCUSSION

We included in this ethogram the behaviour of Labrador Retrievers in and towards the aquatic environment, based on observations in generalist water environments (deep and shallow waters) and always taking into account other ethograms of the domestic dogs found in the literature (e.g. De Palma *et al.*, 2005).

It is important to take in consideration that this is the first study of the behaviour of Labrador Retrievers in relation with aquatic environments and, as not all of existing water environments has been covered (e.g. beach), this is the first approach to this matter. However, this ethogram pretends to be a practical and precise yet wide-ranging base for further studies.

During the observations it became clear that certain basic behaviours (e.g. *running*, *lying down*) present in ethograms of the domestic dog in other situations as shelters (De Palma *et al.*, 2005) or in the Strange Situation test (Valsecchi *et al.*, 2010) gain a new perspective in this completely different context of the aquatic environment, denoting much

more than just locomotion or passive behaviour. The great majority of the behaviours catalogued are intrinsically connected to the emotional state (e.g. excitement) that these environments trigger in this breed. Therefore, this ethogram is more complementary than comparable with any other ethogram of the domestic dog already described. Also for this reason, it was crucial, for full understanding of the behaviours, to contemplate in separate ethogram entries the elements regarded as emotional cues.

A related difficulty was to categorize certain behaviours, especially deciding whether or not a particular behaviour was associated with play. For example, *walking* and *trotting* are locomotive behaviours that can or cannot be elements of play. However, the analysis of the emotional cues and the behavioural context and sequences in which they were made suggested that, in great majority, these behaviours are directly related with play. Therefore, the context of the behaviours and the emotional cues are extremely important to categorize it.

An example where the distinction between behaviours and their corresponding category was clear concerns to *nuzzling water*, ***pelican's gulp*** and *drinking*. The first two behaviours are play behaviours, with the dog playing with the water, in a playful investigating manner, with no primary intention of ingesting water (especially in ***pelican's gulp***, where ingesting water is clearly a consequence of the behaviour, not the objective). On the other hand, *drinking* the water is a physiological need and the only objective of the dog is to ingest it. In addition, there was not observed any repeated sequence between the behaviours, confirming that they are different and independent behaviours.

Retrieving behaviour was considered apart from the water play because, although it involves playfulness, it is also a consequence of the dominant characteristic of Labrador Retrievers – the retrieving instinct. This breed has more than an inclination to retrieve, but a high degree of desire to do it, so this behaviours have to be considered more than play behaviours, in a way that this desire to do it tends almost to a physiological need of this breed (Davis, 2008).

It is interesting to note that the aquatic environment generates unique play behaviours in Labradors Retrievers, e.g. *wagging muzzle*, *nuzzling water, pawing,* in addition to some other more common play behaviours of the domestic dog in non-water environments (e.g. Valsecchi *et al.*, 2010). Furthermore, water play involves a greater variety of behaviours involving water interaction than just swimming, i.e. from the 25 entries of water play only two were types of swimming.

Generally, we can conclude that aquatic environments increase greatly the behavioural diversity of this breed, with numerous behaviours directed to the water stimulus, and the large majority of the behaviours observed implicate water play. The observation of play can be an important feature to welfare assessment, not being performed in stressful situations and being proposed as a positive indicator of animal welfare (Vinke *et al.*, 2008). Additionally, it has been shown in rats that play involves opioids (involved in rewards processes), which indicates that play has a high rewarding value, suggesting that it is important to the animals (Vanderschuren *et al.*, 1995a,b). Furthermore, it is well known that providing a richer environment to the animals enables them to express a larger variety of their species-typical behaviour, generally increasing behavioural diversity, allowing them to express its natural behaviour repertoire, and not doing so may affect the animals, causing stress, a physical response to poor welfare (Dawkins, 1990; Kleiman *et al.*, 2010; Rogers, 2010; Scott, 2005). The need to know what normal behaviour is for each animal is the basis of studies developing ethograms, that also provide a standard reference against which we can measure behavioural deviations (Banks, 1982; Gonyou, 1994).

This ethogram catalogues the behaviour of Labrador Retrievers in the aquatic environment, being entirely descriptive rather than quantitative. It enriches the existing but not complete ethogram of the domestic dog but also expands the knowledge of the behaviour of Labrador Retrievers and raises many important questions: Can we speak in breed-typical behaviour? Can isolating Labrador Retrievers from water environments impair the welfare of this breed? Are aquatic environments merely enriching or indispensable to this breed? Further studies are needed to answer these questions and to expand the understanding of the behaviour of Labrador Retrievers in aquatic environments (e.g. how hierarchy, age or gender influences it).

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CHAPTER 3
ETHOLOGICAL STUDY OF LABRADOR RETRIEVERS' WATER INTERACTION AND RELATIVE PREFERENCE

Most of the material presented in this chapter will be submitted to Applied Animal Behaviour

ABSTRACT

Labrador Retriever is a breed of domestic dog (*Canis familiaris*) with great importance in our current society. It was primarily selected to be an excellent water dog and work with the fishermen, they are also very sociable dogs that approach and seek human contact, besides contact with other dogs. In this study, an arena test with a swimming pool was designed to initiate an understanding of the relative importance of water environments for this breed. Therefore, we evaluated differences in approach and interaction towards three stimuli: water, dog and human. This was measured during 2 min periods for each Labrador Retriever, in three trials, with all of the stimuli present at the same time in the arena. Nonparametric Friedman's test followed by Wilcoxon signed ranks tests were used to test the significance difference between stimuli. The water stimulus had a significantly superior approach frequency and duration of interaction than the dog and the human, revealing a relative preference from Labrador Retrievers for this stimulus and suggesting some relative importance of water environments to this breed.

INTRODUCTION

The Labrador Retriever is currently one of the most popular breed in the world and is the most commonly registered breed in the American Kennel Club (AKC, 2010). The characteristics and temperament of this versatile breed allows them to excel as assistance dogs, especially as guide dogs (Weiss and Greenberg, 1997), as detection dogs (for firefighters and the police) and rescue dogs, for hunting (especially of aquatic birds) and as a companion animal (Ley *et al.*, 2009; Maejima *et al.*, 2007). It is undeniable that the knowledge about a breed so valuable in our society and responsible for the increasing dog–human relationship is extremely important.

Labrador Retrievers are originally from Newfoundland and were selected to work with the fishermen, helping them pulling in nets and catching fish that could escape from fishing lines (Wiles-Fone, 2003); excellent water dogs, they possess characteristics that emphasise it: weather-resistant coat, unique tail (similar to the tail of an otter because of its shape) and webbed toes that make them excellent swimmers. This breed is a firm water lover (Davis, 2008).

Furthermore, this breed is a family-friendly breed, with a kindly nature and an aptitude to please the owner. In general, dogs are social animals, with great need for contacting with

humans and other dogs (Rooney *et al.*), being attracted to these social stimuli. There is already some evidence that, for having a high sociability, Labrador Retrievers approach and seek human contact (Wilsson and Sundgren, 1997) and have tendency to be friendly towards unfamiliar persons, with high-level of curiosity/fearlessness (Svartberg, 2006). Jakovcevic *et al.* (2010) discovered that Retrievers gaze significantly more to humans than other breeds; in this article is also reported unpublished data of recent findings that would indicate that gaze duration positively correlates with sociability measures, meaning that more sociable dogs gaze significantly more to the human face than less sociable ones.

Our modern society tends to move this breed away from the water; can this influence the welfare of Labrador Retrievers? This is a very important issue as the ability to perform social tasks is related, among other things, with their welfare *(Vincent and Leahy, 1997).* In order to initiate a scientific understanding on this matter, we created an arena test to comprehend the relative importance of water environments for this breed.

ARENA TEST IN DOG'S BEHAVIOURAL TEST

Commonly, there are not standard environmental stimuli or standard place for dog testing, in exception for some particular aptitude tests, such as explosives detection tests, but, generally, arena tests (known or unknown) are among the most frequently mentioned in literature (see review in Diederich and Giffroy, 2006). Unknown arenas can sometimes induce fear of new environments, which may represent a problem in social animals (Le Scolan *et al.*, 1997). Furthermore, the stimuli novelty (being known or unknown) is also important, in a way that novel stimuli attracts animals to explore and inspect it, due to their curiosity. Therefore, a part of stimuli preferences and aversions, the motivation to explore and play, will depend on the novelty of the stimuli, habituation of responses with increased exposure to stimuli and recovery of habituation (Fox and Spencer 1969). It has been demonstrated that rats prefer "new" objects rather than familiar ones (Berlyne, 1950; Berlyne and Slater, 1957). Therefore, the novelty of both arena and stimuli to the animals has to be considered.

To the best of our knowledge, there was never used, in any other study, an aquatic environment (e.g. water pool, lake) in an arena test, as stimulus. Therefore, in this study, an arena test with a water pool was developed, to allow us to observe and measure the interaction of Labrador Retrievers with this stimulus. Furthermore, two other stimuli were

included in the arena test, considered as standard social stimuli (Diederich and Giffroy, 2006): a friendly dog and a friendly human.

The three stimuli are positive and non-aversive to this specific breed; thus, the consistent selection of one over the others can suggest us the animal's relative preference (Hemsworth *et al.*, 2011) for the non-aversive stimuli available in the situation test. We considered that although all of the stimuli were positive, the dog would deliberately approach and interact some stimuli more than others, according to his choice (relative preference) and that would indicate how each stimulus attract Labrador Retrievers.

The objectives of this experiment were to determine if an arena test with a pool could detect differences of interaction and approaching behaviours towards the different stimuli presented (water, human, dog), known to be non-aversive and even appealing to this breed, and to understand, based on those behaviours, whether Labrador Retrievers would show a relative preference for aquatic environments.

We predicted that Labrador Retrievers would interact more with the stimulus water than with the stimuli human and dog, being the water more attractive to this breed.

MATERIAL AND METHODS

The ethical guidelines of the International Society for Applied Ethology were read and all animals procedures conduced are in compliance.

ANIMALS

Ten Labrador Retrievers (2-13 years of age) were used in this study. These animals had been raised together on a farm kennel in Oliveira de Azeméis, Portugal. Therefore, they would have some contact with each other regularly, being familiar to one another. In addition, the dogs had, for the most of their lives, regular contact with humans and with water fountains or pools, were they could play with/in the water. The animals are fed two times a day but have *ad libitum* access to water, to satisfy all metabolic needs.

One of the dogs had to be substituted after the first trial and we selected another similar Labrador Retriever from the farm kennel (the same gender and approximately with the same age).

EXPERIMENTAL SETUP

The behaviours directed to the three stimuli were tested in a modified arena test. The arena was created around a swimming pool (Fig. 9), in an isolated part of the farm kennel but already a familiar environment to the dogs (in order to reduce the effects of novelty on the behavioural responses). The arena measured 21.5 m x 18.5 m and the swimming pool 17.5 m x 17.5 m, with 1.2 m deep. The swimming pool had a ramp through which the dogs could enter or exit the water. The arena also had a closed area (with approximately 5 m x 2.8 m) with an open side facing the pool and a large opening facing the entrance of the arena (through which the human could see the entire arena and be seen by the dogs). Inside this closed area was always a handler, not visible to the dogs, which could intervene (only in ultimate necessity) if any dog struggled to get out of the pool and could not find the ramp to exit the water (the time while the handler was in the testing area and influenced the behaviour of the dogs was not accounted).

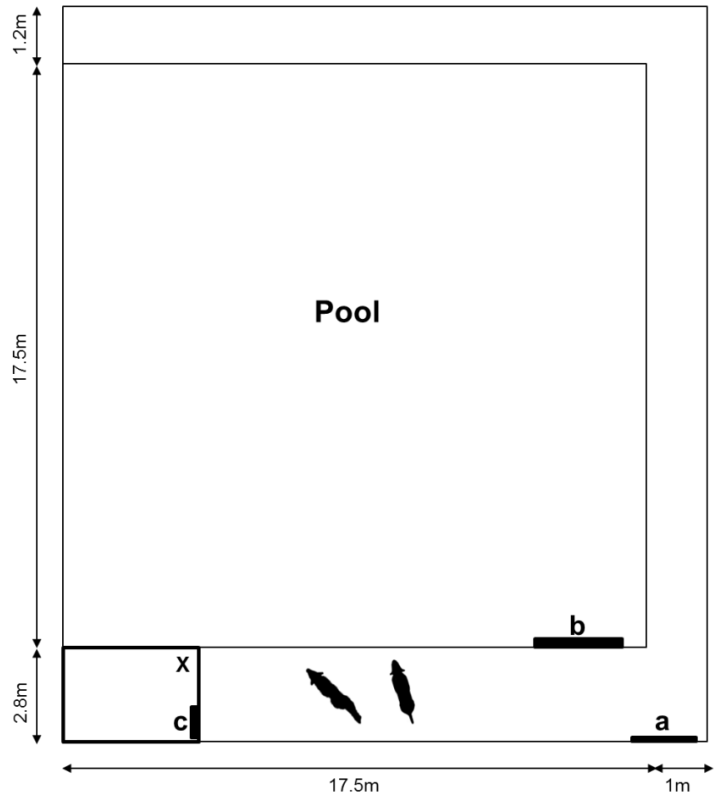

FIG. 9. ARENA TEST DIMENSIONS. THE 'X' MARKS THE PLACE WHERE THE STIMULUS HUMAN WAS STANDING IN THE CLOSED AREA (BLACK RECTANGLE) IN ORDER TO SEE AND BE SEEN THROUGH THE LARGE OPENING. 'C' MARKS THE DOOR OF THE CLOSED AREA. 'B' MARKS THE RAMP OF THE POOL. 'A' MARKS THE ENTRANCE OF THE ARENA.

The three stimuli were: the water (in the pool), the human (female) in the closed area and the other dog in the arena. All the stimuli were known to the dogs tested. The human was the same in all trials and remained standing immobile in the closed area, not interacting with the dogs and just following them with the eyes. The dogs were tested in pairs so that they could be the stimulus dog of each other. This pairs were randomly assigned for each test day (without repeating pairs), as well as the order in which the pairs were tested.

PROCEDURE AND BEHAVIOUR MEASUREMENT

All tests occurred in June/July 2011 and were performed between 15:30 and 18:15 h. Three trials were made in three non-consecutive days.

On each day of testing, each pair of dogs was moved right before their moment to be tested, by two handlers, from the kennel to the arena test (approximately 35 m distance). With the human stimulus in place, a handler opened the gate entrance of the arena for the dogs to enter, and 30 sec later, the test started. Each dog was tested for 2 min and all the behaviours during the test period were recorded with a video camera (positioned in the closed area) for further analysis. When the test was over, the dogs were taken again by two handlers into the kennel.

The videotaped trials were analysed, using The Observer XT 7.0 (Noldus information Technology, Wageningem Netherlands) computer software to quantify (frequency and duration) the behaviours of the Labrador Retrievers towards the three stimuli (Table 3). These behaviours were grouped as approach behaviours, if they involved an attempt to get physically closer to the stimulus, or as interaction behaviours, if they involved an attempt to relate with the stimulus.

TABLE 3. BEHAVIOURS TOWARD EACH STIMULUS RECORDED IN THE ARENA TEST.

Categorie	Stimuli	Behaviours	Description
Approach	Water	Approach water	Move towards the water while clearly visually oriented to the water
		Jazz move	The dog moves along the side of the pool facing the water (muzzle oriented to it) and slightly sidelong, crossing one foreleg in front of the other
		Intention to	The dog positions himself by the poolside with

		dive	his forelegs close to the edge of the pool and lowers his muzzle under the shoulders level, several times, as gaining impetus to dive into the water
	Human	Oriented to person	Remaining still, near the human, while clearly oriented to him
		Oriented to door	Staring fixedly at the door of the closed area, clearly oriented to it
	Dog	Approach dog	Move towards the dog, while clearly visually oriented to it. The dog doesn't chase the other dog, nor follows him around
		Slide along side	The dog catches up the play partner and approaches his muzzle to the one of the other animal, orienting himself to the direction that the other dog is moving, moving together side by side
		Follow around	The dog pursues the other one around, going after him when he switches areas. The animal is not interacting with the other dog but follows him to the new location if he changes place
Interaction	Water	Looking at water	The dog observes the water, unmoving in a still position
		Sniffing water	The dog lowers his muzzle under the shoulders, approaching it to the water, moving the nostrils, trying to perceive odor, with no contact between the water and the muzzle
		Drinking	Drinking water from the pool, using their tongue to scoop up the water
		Nuzzling water	Touching the water very quickly with the muzzle
		Forelegs in water	The dog remains standing with the forelegs in the water
		Diving	The dog enters in the pool, jumping or entering gradually, using the ramp of the pool
		Swimming	The dog enters in the pool and swims in the water
		Pawing in the	The dog hunkers down by the poolside and puts

		water	one foreleg inside the water, extending it quickly in a forward direction followed by a backward, toe-dragging movement as if digging or rowing. This is typically repeated several times in succession.
		Mouth	Without entering the pool, the dog places himself by the poolside and crouches, trying to reach the water with the muzzle and grabbing, with his mouth, objects (e.g. leaves) on the surface of the water
		Pelican's gulp	The dog fills his mouth with water, putting it open in the water (reminding a pelican feeding), and when it's full, closes his mouth and swallows it all in one gulp
	Human	Looking at human	The dog gazes to the human
	Dog	Looking at dog	The dog gazes at the other dog
		Chase	The dog runs after or towards the other dog
		Muzzle bite	The dog places his mouth around the other dog's muzzle
		Evasive jump	The dog avoids contact with the other dog by propelling the forebody of the ground away from the approaching dog
		Nudging	One dog collides with another dog, with his body or with his muzzle, quickly and with small power
		Play bow	The dog invites another dog to play. Oriented to the other animal, the dog bends down with the forelegs outstretched on the ground (touching or nearly touching forelimbs to the ground) and the rear end upwards
		Bouncing	The dog seeks attention from another dog, jumping around him, mostly with hindlimb propulsion, forelegs leaving the ground first and the hindlegs second, even if just slightly
		Anogenital sniffing	Pointing the muzzle towards the genital zone of another dog, dilating the nostrils and moving

		them to perceive odors of the other dog's genital zone
	Follow by the poolside	The dog runs through the poolside following the movement of the other dog swimming in the pool
	Reception	The dog waits and receives the other dog by the entrance of the pool

DATA ANALYSIS

To each stimulus, the total frequency and duration of its approach and interaction was calculated as a proportion of the cumulative frequency and the cumulative duration of their respective behaviours towards each stimulus.

To understand whether our data gave us any significant indication of relative preference, we assumed that all subjects were equally likely to select each of the three stimuli in each trial.

Under this hypothesis we compared the total frequency and duration of approach and interaction to each stimulus. Nonparametric Friedman's test followed by Wilcoxon signed ranks tests were used to test the significance of the difference between stimuli. All statistical tests were performed using SPSS version 19 (SPSS Inc., 2010) and $p<0.05$ was considered as indicating statistical significance.

RESULTS

APPROACH

There are significant differences between the mean frequencies of approach to each stimulus ($\chi^2(2df)=15.211$, $p<0.001$, Friedman's test). The Wilcoxon signed ranks test revealed that the water approach frequency is significantly different from the dog approach frequency ($z=-2.805$, $p=0.005$) and from the human approach frequency ($z=-2.194$, $p=0.028$) and that the human approach frequency is significantly different from the dog approach frequency ($z=-2.312$, $p=0.021$) (Fig. 10).

In relation to the mean duration of approach, there are also significant differences between stimuli ($\chi^2(2df)=11.744$, p=0,003, Friedman's test). The Wilcoxon signed ranks test revealed that the water approach duration is significantly different from the dog approach duration (z=-2.803, p=0.005) but not from the human approach duration (z=-0.663, p=0.508) and the human approach duration is significantly different from the dog approach duration (z=-2.194, p=0.028) (Fig. 11).

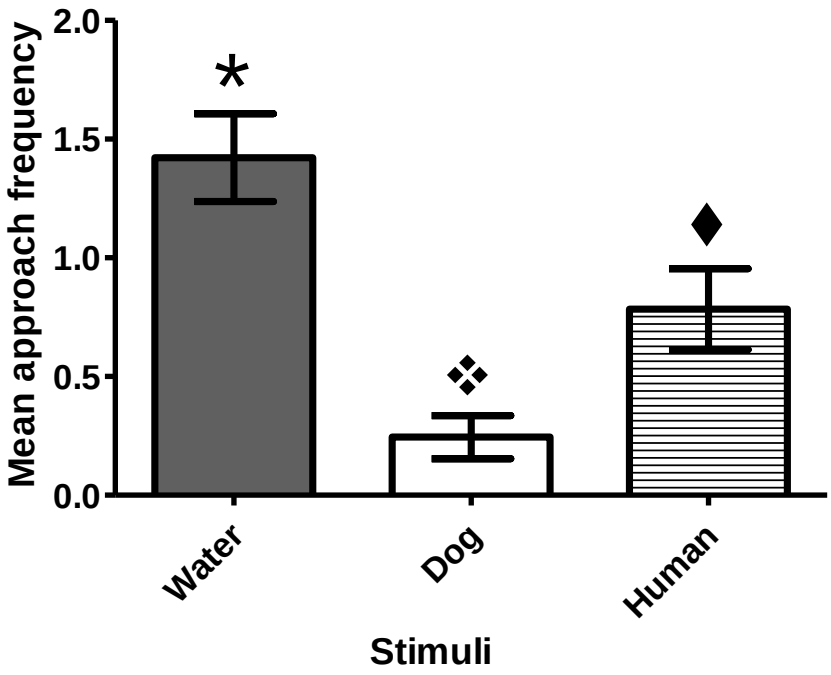

FIG. 10. MEAN APPROACH FREQUENCY (± S.E.M.) OF LABRADOR RETRIEVERS TOWARDS EACH STIMULUS. BARS WITH DIFFERENT SYMBOLS ARE SIGNIFICANTLY DIFFERENT (P<0.05).

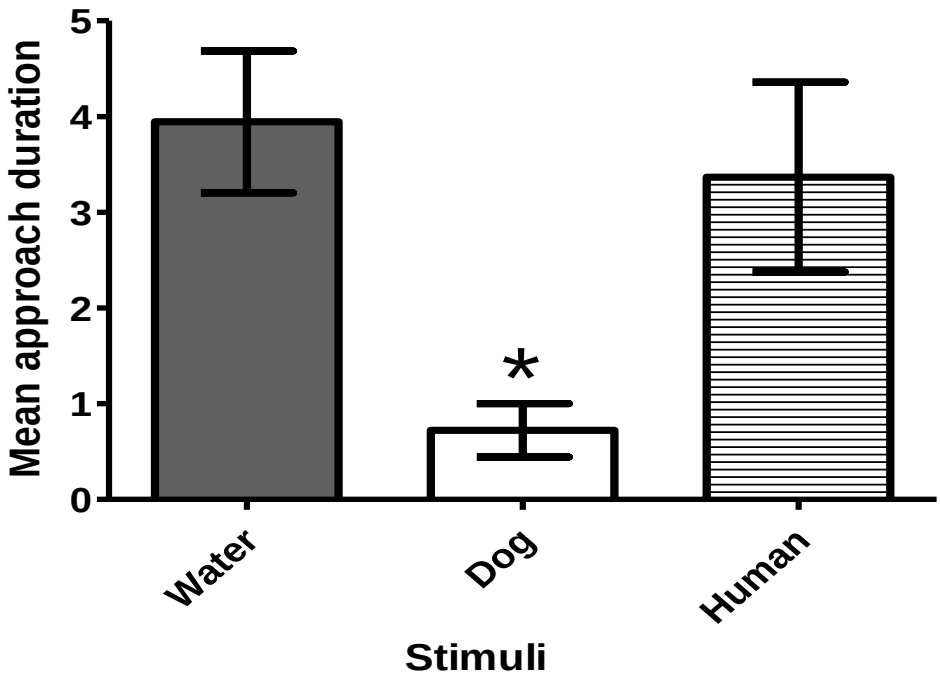

FIG. 11. MEAN APPROACH DURATION (± S.E.M.) OF LABRADOR RETRIEVERS TOWARDS EACH STIMULUS. THE * REPRESENTS THAT THE DOG STIMULUS IS SIGNIFICANTLY DIFFERENT FROM THE OTHER TWO STIMULI (P<0.05).

INTERACTION

There are no significant differences between the mean frequencies of interaction to the three stimulus (χ^2(2df)=5.600, p=0.061, Friedman's test). However, the Wilcoxon signed ranks test revealed that there are significant differences between the human interaction frequency and the dog interaction frequency (z= -2.090, p=0.037) (Fig. 12).

In relation to the mean duration of interaction, there are significant differences between stimuli (χ^2(2df)=7.800, p=0.02, Friedman's test). The Wilcoxon signed ranks test revealed that the water interaction frequency is significantly different from the dog interaction frequency (z=-2.497, p=0.013) and from the human interaction frequency (z=-2.090, p=0.037) but the human interaction frequency is not significantly different from the dog interaction frequency (z=-0.561, p=0.575) (Fig. 13).

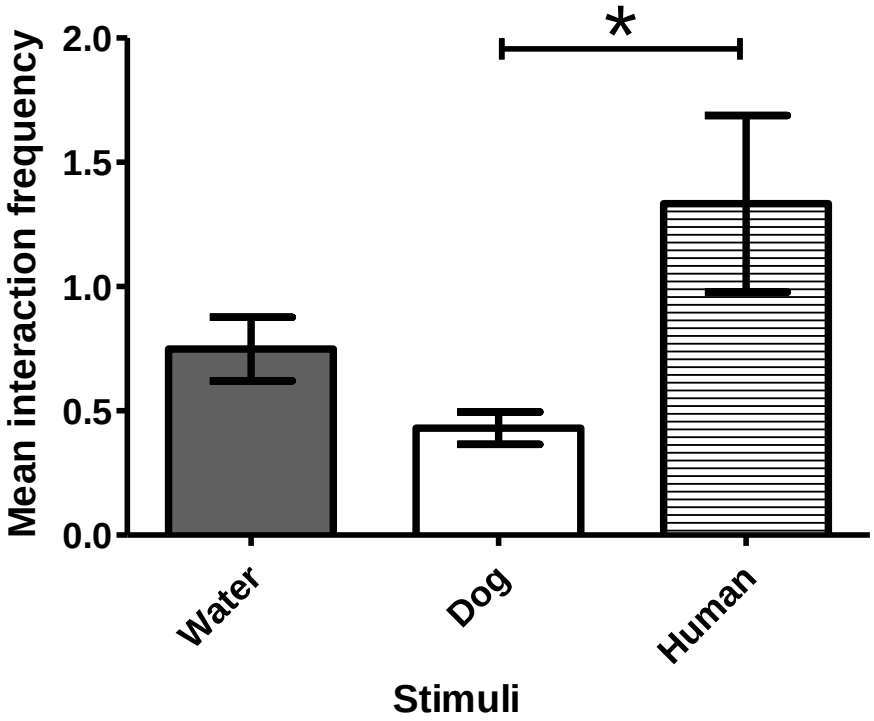

FIG. 12. MEAN INTERACTION FREQUENCY (± S.E.M.) OF LABRADOR RETRIEVERS TOWARDS EACH STIMULUS. THE * REPRESENTS THAT THE DOG STIMULUS AND THE HUMAN STIMULUS ARE SIGNIFICANTLY DIFFERENT (P<0.05).

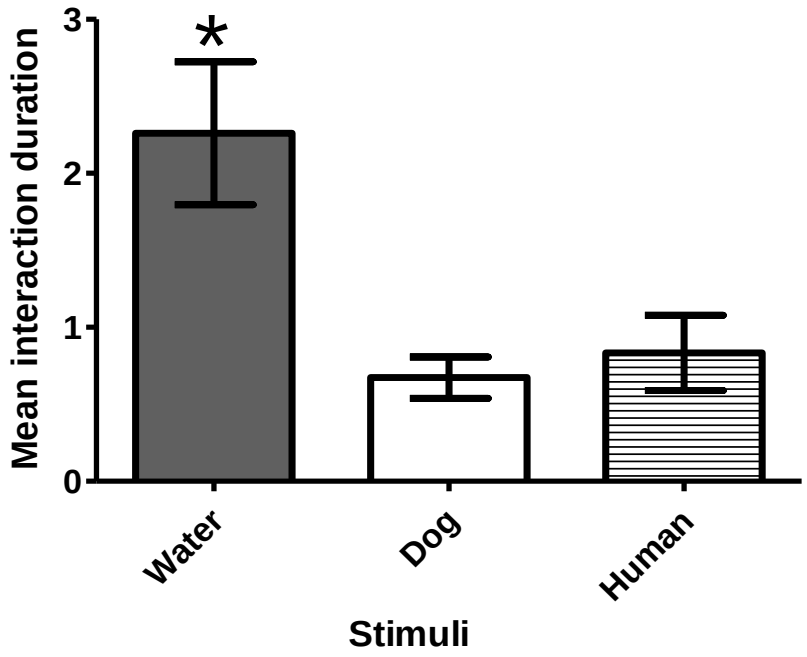

FIG. 13. MEAN INTERACTION DURATION (± S.E.M.) OF LABRADOR RETRIEVERS TOWARDS EACH STIMULUS. THE * REPRESENTS THAT THE WATER STIMULUS IS SIGNIFICANTLY DIFFERENT FROM THE OTHER TWO STIMULI (P<0.05).

DISCUSSION

We predicted that Labrador Retrievers would interact more with the stimulus water than with the stimuli human and dog. In fact, the stimulus dog was the least compelling of the three, since Labrador Retrievers approached and interacted (both in frequency and duration) significantly less with it. In relation to the stimuli water and human, we didn't observe significant differences in the frequency of interaction, but our prediction was correct considering the duration of interaction and the frequency of approach of the water, suggesting that the water is more attractive to this breed than the human stimulus. The duration of approach to the water, although higher, is not significantly different from the one to the human, which can be explained by the need of Labrador Retrievers to approach and seek human contact (Wilsson and Sundgren, 1997).

The results suggest that both bond with human and the attraction to the water are stronger than conspecific interaction (dog stimulus). On the other hand, we considered the fact that the dogs had some regular contact with each other for most of their lives and, although we make sure that all the stimuli (as the arena) are known to the dogs, the stimulus dog could be considered the one that they were most accustomed to. Due to habituation, it could be argued that this stimulus would trigger less curiosity and, therefore, less motivation to approach and play (Fox and Spencer, 1969). On the other hand, O'Keefe and Nadel (1978) discussed that novelty consists in new configurations of familiar elements and thus " would seem to depend on a long-term memory sensitive to contextual (typically spatial) configurations and capable of remembering single occurrences", being novelty a matter of "an item in a place". This would apply both to neutral as to biologically meaningful stimuli. In fact, studies in fishes (Peeke and Veno, 1973) and in birds (Shalter, 1975) demonstrated that habituation (decrement in response with increasing familiarity) depended on the location of the stimulus, being its specificity conferred by everchanging spatial contexts. Wilz and Bolton (1971) also discovered that changes in the spatial orientation of familiar objects was as effective in eliciting responses as a novel environment. This suggests that in this testing situation, the stimuli where equally new to the dogs tested, because it was a completely new spatial context and the most familiar element, the stimulus dog, was in a new configuration, since they were not used to go in pairs to the arena test. Therefore, we can infer that Labrador Retrievers chose not to interact or approach the other dog as much as the human or the water, not so much due to the lack of curiosity that the stimulus dog could arouse, but mostly due to their relative preference.

In relation to the interaction with human stimulus, the duration is significantly lower with the human stimulus than with the water stimulus. Nevertheless, the frequency, although not significantly different from the frequency of interaction with the water stimulus, is higher. This suggest that Labrador Retrievers would frequently attempt to interact with the human, gazing the human face, which is in conformity with the expected from such a sociable breed (Jakovcevic *et al.*, 2010). The small value of human interaction duration is probably also due to the fact that the human did not interact with the dog and, despite the various attempts of interaction made, the human would not correspond, not encouraging the dog to keep or develop the interaction.

As we could distinguish, the water stimulus was the most appealing one. This leads us to suppose that the water environment must have a certain relative importance for this breed and could, thus, have implications on their welfare. It would be essential to develop further studies to access how important is the water environment to the animal, measuring the strength of an animal's preference or his motivational strength, e.g. imposing varying levels of cost of access to perform a behavioural pattern, or to gain access to a resource (Hemsworth *et al.*, 2011; Jensen and Pedersen, 2008; Kirkden and Pajor, 2006). This could help us understand the implication of water environments to the welfare of Labrador Retrievers, given that if an animal is strongly motivated to do something (in this case, interact and play with the water) but the environment where it's kept prevents him from doing it, the animal's welfare will be impaired and it's probable to be poor (Dawkins, 1990).

Various shelters, breeding farms or dog trainers do not possess this kind of resources available for these animals and, in general, the social tasks isolate Labrador Retrievers from it. Therefore, it would be important to understand if water environments are an indispensable stimulus, a conditional need or a luxury and not a need for Labrador Retrievers. Providing a richer environment to the animals enables them to express a larger variety of their species-typical behaviours, generally increasing behavioural diversity, and not doing it may affect the animals, causing stress (Dawkins, 1990; Kleiman *et al.*, 2010; Rogers, 2010). Recent findings showed that presenting Labrador Retrievers to aquatic environments increases greatly the behavioural diversity of this breed, with numerous behaviours directed to the water stimulus, and the large majority of the behaviours observed implicate play behaviour (Tavares et al., unpublished data). Play behaviour has been proposed as a positive indicator of animal welfare and it is not performed in stress inducing situations (Vinke *et al.*, 2008). As a whole, these findings seem to indicate some relative preference towards the water stimulus and some relative importance for this breed.

CONCLUSIONS

The results of this study suggest that the arena test with a pool can detect differences of interaction and approaching behaviours towards different non-aversive stimuli presented.

The water stimulus was the most appealing, with a significantly superior approach frequency and duration of interaction, followed by the human stimulus and lastly the dog stimulus. This reveals relative preference from Labrador Retrievers for this stimulus and suggests, therefore, some relative importance of aquatic environment to this breed.

Future studies are needed to access how important is the water environment to this breed and the implications that the isolation of Labrador Retrievers from this kind of environments can have on their welfare.

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CHAPTER 4
GENERAL DISCUSSION

The behaviour and welfare of the domestic dog is a matter with rising concern and value to our current society. Nevertheless, a complete ethogram of the domestic dog, as of others domestic animals, is nonexistant. Although a complete ethogram of this specie would be ideal, there is still much systematic information that has not been described. Furthermore, we have to consider the differences between the breeds of the domestic dog and their different characteristics, which ultimately have repercussions on their behaviour. Therefore, there is still a great extent of information about the domestic dog (and the various breeds) to discover and identify.

Labrador Retriever is, among the breeds of dogs, one of the most popular and social valuable one. Moreover, the reasons to the selection of this breed and the water work that they performed make it a very interesting breed. Currently, the circumstances have changed and the environments where this breed is found may not provide the water interaction that it had in the past (i.e. working with the fishermen).

For this reason, and the impacts that it may possibly have in Labradors and their welfare, knowledge about the behaviour of the breed and the attractiveness of the water to them is extremely important. If it proves to be needed, richer environments should be provided to this breed, in particular water environments, so that the possibility of swimming and water play would be presented. In order to reach a scientific understanding on this kind of themes, never discussed before, pioneer studies like the research conducted in this dissertation are fundamental to create the bases to future studies.

MAJOR FINDINGS

This dissertation presents the first approach to the behaviour of Labrador Retrievers in the environment for which the dog was first selected (and shaped for). Furthermore, it is the first work to address the behaviour of the domestic dog in water environments, also complementing the knowledge about the specie.

The results of each study have been discussed in detail in Chapter 2 and 3; in this section the overall findings of each study will be discussed and related, in order to make enhanced deductions.

RESULTING ETHOGRAM

A total of 55 behaviours were catalogued and classified into seven categories in the ethogram of behaviour of Labrador Retrievers in aquatic environments (Chapter 2). It comprised exploratory behaviour (6 entries), water play (25 entries), approach behaviour (3 entries), comfort behaviour (7 entries), emotional cues (4 entries), physiological behaviour (5 entries) and retrieving behaviour (5 entries).

It is noteworthy to highlight that there is more interaction behaviours with the water than just swimming or being in or out of the water. In addition to some more common behaviours of the domestic dog that also take place in aquatic environment (e.g. running), this sort of environment also generates unique play behaviours in Labrador Retrievers (e.g. wagging muzzle). The environment allowed a great increase of the behavioural diversity of this breed. This can be associated with the fact that providing richer environments to the animals enables them to express a larger variety of their species-typical behaviour, generally increasing behavioural diversity; on the other hand, not doing so may affect the animals, impairing their welfare (Dawkins, 1990; Kleiman *et al.*, 2010; Rogers, 2010; Scott, 2005). In the case of Labrador Retrievers, we might consider that this environment allows them to express a great diversity of their breed-typical behaviour. This benefit of increasing behavioural diversity might be a behavioural scientific evidence that environmental enrichment improves welfare, has it was shown in a study with pigs (Stolba and Wood-Gush, 1989).

There were a great number of behaviours directed to the water, being it a stimulus to the animal, and the large majority of the behaviours observed implicates water play. Play has being proposed as a positive indicator of animal welfare, not being performed in stressful situations (Vinke *et al.*, 2008). Therefore, the observation of play can be an important feature to welfare assessment and, given the large amount of play behaviours observed, the results suggest that this environment may be relevant to the welfare of this breed.

RELATIVE PREFERENCE FOR THE WATER STIMULUS

In the arena test (Chapter 3), the water stimulus had a significantly superior approach frequency and duration of interaction than the dog or the human stimuli. The dog stimulus was the least compelling of the three and Labrador Retrievers approached and interacted (both in frequency and duration) significantly less with it. It is relevant to underline that the need of this breed to approach and seek human contact (Wilsson and Sundgren, 1997)

was reflected on the duration of approach to the stimulus human. Furthermore, in relation to the interaction with human stimulus, the frequency was higher than the frequency of interaction with the water stimulus, what could be expected from such a sociable breed, which has been proven to gaze the human face considerably (Jakovcevic *et al.*, 2010). The small value of duration of interaction with the human stimulus can be due to the fact that the human would not respond to the attempts of interaction, interacting back, what could discourage the dogs to maintain the interaction.

The results indicated that the water was the most appealing of the stimuli, revealing a relative preference from Labrador Retrievers for this stimulus and suggesting some relative importance of water environments to this breed. Therefore, this study insinuates that there is the possibility that this sort of environments have some impact on the welfare of Labradors.

Combined, both studies (Chapter 2 and 3) show attractiveness from Labradors for water and suggest that it might benefit the welfare of this breed.

Undoubtedly, there is still many interesting matters to approach related with the behaviour and welfare of the domestic dog. Furthermore, especial attention should be directed to the different characteristics of the various breeds within this specie. With these studies we achieved evidence that this is an issue about the welfare and behaviour of Labrador Retrievers that is worth studying.

This work exposes the importance of developing ethogram of the species. Furthermore, brings to light the idea that the aquatic environment is not only important to aquatic animals but can also be essential for animals that have a strong connection to the water, and that have interaction with the aquatic environments in the nature, with their natural habitats involving water, e.g. studies have been made in farmed minks to access the importance of swimming water for them (see review in Vinke *et al.*, 2008); the aquatic environment is linked to more species than only the aquatic animals.

METHODOLOGICAL CONSIDERATIONS

In this work, the use of video recording and analysis was selected for allowing more sensitivity in the identification, description and quantification of expressed behaviours, more difficult to do with quality in real time.

In Chapter 2, is taken into consideration that not all of existing water environments were covered (e.g. beach). However, the more general ones were included, which allowed to observe the behaviour of this breed in water environments with deep and shallow water, and, therefore, cover a wide number of behaviours. For a first approach to this subject we think that a very practical, well-defined and wide-ranging ethogram was obtained that will definitely be a valuable base for further studies.

In Chapter 3, the arena test created appears to be appropriated to detect differences in relative preference of Labradors to various stimuli; using nonparametric Friedman's test followed by Wilcoxon signed ranks tests we were capable to detect differences of interaction and approaching behaviours towards different non-aversive stimuli, especially stimuli that could have similar attractiveness to the dogs, which we didn't knew before the test.

One important feature to consider when using methods such as the arena test is the novelty of the environment as well of the stimuli. Fear of novel environments is a problem in testing social animals (Le Scolan *et al.*, 1997), that can change the natural behaviour of the animals. Therefore, the experiment carried out in this dissertation was performed in a familiar environment to the dogs, since they knew the water pool and the surroundings.

The novelty of the stimuli was also an important feature to consider in this test. Novel stimulus attracts animals to explore and inspect it, due to their curiosity. It has been demonstrated that rats prefer "new" objects instead of familiar ones (Berlyne, 1950; Berlyne and Slater, 1957). This implicates that a part for the stimuli preferences and aversions, the motivation to explore and play will depend on the novelty of the stimuli, habituation of responses with increased exposure to stimuli and recovery of habituation (Fox and Spencer, 1969). It is very important to consider this, since the purpose is to measure the relative preference of Labradors for the stimuli through their approach and interaction to each stimulus. But can we consider that the stimuli were equally novel to the animals? Or, due to habituation, some stimulus would trigger less curiosity and, consequently, less motivation to approach and play? Initially, we would think that no; they were not equally novel, since the dogs had some regular contact with each other for most of their lives, so the stimulus dog could be considered the one that they were more habituated to; they knew that specific pool and would had access to it but not regularly; the human stimulus was known to the dogs, although recently and with few and not regular interactions with the animals. However, O'Keefe and Nadel (1978) discussed that novelty consists in new configurations (typically spatial) of familiar elements, both neutral as biologically meaningful stimuli, being novelty a matter of "an item in a place". Wilz and

Bolton (1971) discovered that changes in the spatial orientation of familiar objects was as effective in eliciting responses as a novel environment. Furthermore, studies in fishes (Peeke and Veno, 1973) and in birds (Shalter, 1975) demonstrated that habituation depended on the location of the stimulus, being its specificity conferred by everchanging spatial contexts. This suggests that in the arena test, the stimuli where actually equally new to the dogs, given that it was a completely new spatial context and arrangement (of the three stimuli) for the animals. Therefore, even the most familiar element, the stimulus dog, could be considered as novel as the others for being in a novel configuration, since they were not used to go in pairs to the arena test. Consequently, we can infer that Labrador Retrievers chose to interact and approach more with one stimulus than the others due to their relative preference.

FUTURE STUDIES

For being a pioneer study, this work raises many questions in relation to the behaviour of this breed but also to the implications on the welfare.

It would be interesting to better understand the behaviour of Labradors in aquatic environment, including observations in other situations, e.g. the beach. Furthermore, it would be interesting to see if the behaviour alters with hierarchy, age or gender and observe larger groups of Labradors in these behaviours. This work also questions if, in species as the domestic dog, we have to consider breed-typical behaviour and, therefore, it should be considered different behavioural necessities to the different breeds with different origins and characteristics.

In this dissertation is also raised a new and very important matter: can the isolation of Labrador Retrievers from water environments impair the welfare of this breed? It would be extremely important to understand if water environments are an indispensable stimulus, a conditional need or a luxury and, therefore, not a need for Labrador Retrievers. Therefore, it would be important to prove that these environments are exceptionally enriching and indispensable to this breed (e.g. reducing negative emotional states or improving physical health) that would justify that breeders and owners provide regular water play, which could imply more cost and extra work (Newberry, 1995).

It would be essential to develop further studies to access how important is the water environment to the animal, measuring his motivational strength (Hemsworth *et al.*, 2011; Jensen and Pedersen, 2008; Kirkden and Pajor, 2006), e.g. to discover the price that the

animals would pay for access to the water. The difficulty in this sort of studies will be to provide the water stimulus in a way that pleases the animals, since for them a plastic pool can be only a big bowl for water, not a swimming pool.

Finally, we can't help to question if there are individual differences, between animals from this breed, in the preference for water, but also if prior experience affects that preference, i.e. if Labradors with no contact with water environments can miss what they never experiment, the water interaction and play, although the breed has been selected to work in the water.

It would be interesting to address these subjects in further studies, which would be all complementary for a better understanding of this breed.

CONCLUSIONS

The results of this work indicate that there is attractiveness from Labradors for water, suggesting that it can have implications on the welfare of Labrador Retrievers.

The resulting ethogram (Chapter 2) enriches the knowledge about the specie and offers a practical tool for further studies. Furthermore, it shows that there is a great behavioural variety of this breed in aquatic environment. The results of the arena test (Chapter 3) reveal that there is a relative preference from Labradors for the stimulus water, suggesting some relative importance of aquatic environment to this breed.

There is still much to discover about the behaviour of the domestic dog and in the future should be given attention to the different characteristics and origins of the various breeds of dogs, that can implicate different needs for each.

This dissertation demonstrates that this issue about the welfare and behaviour of Labrador Retrievers is worth studying. Furthermore, it raises the awareness that the aquatic environment is not only important to aquatic animals but also to animals with a connection to it and that interact with the water. Further studies should be conducted to a better understanding of their behaviour and to access how important is the aquatic environment to this breed and the potential implications to the welfare of this animals.

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