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Veterinary MSc Thesis

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Changes in the activation of canine M. Biceps femoris and M. Quadriceps vastus lateralis at different water levels and speeds in a water treadmill

- With the use of acoustic myography

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Preface

This veterinary MSc thesis has been executed to fulfill the requirements of a master's degree in Veterinary Medicine at Copenhagen University, Faculty of Health and Medical Sciences. The requirements for this thesis constitute 30 ECTS points. The authors began their work at the 1st of February 2018 and handed in the thesis at the 6th of June 2018.

This thesis is written in cooperation between Tanja Andersen and Eja Oppenlænder Pedersen. It contains a theoretical part followed by an experimental part based on the trials conducted by the authors themselves.

The main supervision during the compilation of this master thesis has been provided by Adrian Paul Harrison, who is an associate professor at Copenhagen University and the inventor of the acoustic myography equipment used in the experimental part of this thesis. Further supervision was provided by Anne Désiré Vitger, who assisted during each clinical trial at the rehabilitation department, Copenhagen University Hospital for Companion Animals.

First, we would like to thank our supervisor Adrian Paul Harrison for providing inspiration and guidance during the process of conducting this master thesis. Furthermore, we would like to thank Myodynamik ApS, Copenhagen Denmark for lending us the equipment used throughout the data collection. In addition, we want to express our gratitude toward our co-supervisor, Anne Désiré Vitger, who has been there during every single trial to help us perform clinical assessments of the dogs. We would also like to thank Lene Høeg Fuglsang-Damgaard from Myodynamik ApS and PhD. student Waqas Ahmed, who has assisted us during the practical data collection and with technical difficulties during the experimental part of the thesis. Finally, we would like to give a special thanks to the many dog owners who participated with their cooperative dogs and made it possible for us to execute this thesis.

Date: 6/6-18

Signatures:

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Abstract

Water treadmills are increasingly used by veterinarians all over the world. Despite the frequent use no international guidelines concerning the effect of different water levels and speeds on muscle activity are available. The aim of this thesis was to investigate the effect on the activity of canine M. Biceps femoris and M. Quadriceps vastus lateralis when exposed to different water levels and speeds in a water treadmill. A controlled clinical trial was performed including 25 healthy dogs of different breeds. The muscle activity was measured by use of acoustic myography while the dogs walked at four different water levels at two different speeds. The study yielded conclusive results, regarding both muscles, for when the dogs were walking at 30 m/min at both water level to the hock and water level to the tibial plateau where a decrease in the frequency of the active muscle fibers were observed compared to when walking on dry land. Furthermore, conclusive results were found for M. Biceps femoris when the dogs were walking at a speed of 50 m/min with a water level to the mid femur where an increase of both the recruitment of muscle fibers and the frequency at which they fired were seen - along with a decreased efficiency/coordination of the muscle. Besides, the effect of speed alone was evaluated based on pre-baseline measurements without water. It was concluded that the increase in speed from 30 m/min to 50 m/min generated increased recruitment of muscle fibers and a decreased efficiency/coordination within both muscles. When water was added to the setting an increased frequency was observed as well indicating that walking in water increases the muscle activity further compared to when walking on dry land with the same speed increase. The conclusions of this thesis have provided a starting point for the formulation of future guidelines for canines concerning the use of a water treadmill.

Resumé

Vandløbebånd bliver i stigende grad anvendt af veterinærer over hele verden. På trods af den hyppige brug, findes der ingen internationale guidelines vedrørende effekten af forskellige vandhøjder og hastigheder på muskelaktiviteten. Formålet med denne afhandling var at undersøge effekten på aktiviteten af hundens M. Biceps femoris og M. Quadriceps vastus lateralis, når hunde udsættes for gang ved forskellige vandniveauer og hastigheder i et vandløbebånd. En kontrolleret klinisk undersøgelse blev udført, med inklusion af 25 raske hunde af forskellige racer. Muskelaktiviteten blev målt ved anvendelse af akustisk myografi, mens hundene gik ved fire forskellige vandhøjder, ved to forskellige hastigheder.
Undersøgelsen medførte konklusive resultater, i forhold til begge muskler, når hundene gik med en hastighed på 30 m/min ved både en vandhøjde til haseled og en vandhøjde til det tibiale plateau. Ved denne hastighed og disse vandhøjder sås en nedsat frekvens af de aktive muskelfibre, i forhold til når hundene gik uden vand. Derudover fandtes konklusive resultater for M. Biceps femoris, når hundene gik med en hastighed på 50 m/min ved en vandhøjde til midt på femur. Her sås en stigning i rekruttering af muskelfibre og en stigning i frekvensen af disse, samt en nedsat effektivitet/koordinering af musklen. Desuden blev effekten af hastighed alene vurderet på basis af pre-baseline målinger foretaget uden vand. Det blev her konkluderet, at en øgning af hastigheden fra 30 m/min til 50 m/min medførte en øget rekruttering af muskelfibre og en nedsat effektivitet/koordinering i begge muskler. Da vand blev tilføjet til opsætningen blev også en øget frekvens af muskelfibrene observeret, hvilket indikerer at gang i vand øger muskelaktiviteten yderligere, i forhold til gang på land ved samme hastighedsstigning.
Afhandlingens konklusioner udgør et springbræt til formuleringen af fremtidige retningslinjer, til brug ved træning af hunde i et vandløbebånd.

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Abbreviations

BF – M. Biceps femoris

QVL – M. Quadriceps vastus lateralis

MHC – Myosin heavy chain

CNS – Central nervous system

AMG – Acoustic myography

EMG – Electromyography

ROM – Range of motion

BCS – Body condition score

TP – Tibial plateau

MF – Mid femur

SD – Standard deviation

Introduction

Muscles

In the body of mammals three types of muscle tissue are present: cardiac muscle, smooth muscle and skeletal muscle. The skeletal muscles are the ones enabling locomotor movements. M. Biceps femoris (BF) and M. Quadriceps vastus lateralis (QVL), which are investigated in this study, are both skeletal muscles.

Skeletal muscles consist of muscle fascicles which are bundles of 20-50 muscle fibers that in turn are build up of myofibrils (Fischer & Lilje, 2014). Myofibrils are build up by sarcomeres containing filaments of the contractile proteins: actin and myosin (Fischer & Lilje, 2014; Kraemer & Spiering, 2006).

Four types of muscle fibers are present in the dog: Type I, Type IIA, Type IIX and Type IIB (Acevedo & Rivero, 2006; Fischer & Lilje, 2014; Toniolo et al., 2007), although Type IIB has only been found in the laryngeal and extraocular musculature (Acevedo & Rivero, 2006; Toniolo et al., 2007). Each muscle fiber type can be identified by their myosin heavy chain isoform (MHC) which are closely correlated with their ATPase isoform (Kraemer & Spiering, 2006).

Type I muscle fibers are also known as red fibers, since they contain more myoglobin than the other fiber types (Fischer & Lilje, 2014). Furthermore, Type I muscle fibers have the ability to store a high concentration of oxygen because of a higher number of mitochondria compared to the other types of muscle fibers (Fischer & Lilje, 2014). Type I fibers contain a slow isoform of ATPase and therefore has a slow contraction and relaxation cycle wherein ATP is used slowly and replaced before the muscle runs out of it which makes these fibers fatigue resistant (Goldspink, 1999; Kraemer & Spiering, 2006).

Type IIA muscle fibers is the most abundant type in the limb musculature of the dog (Toniolo et al., 2007). Type IIA are called white fibers, in comparison to Type I, since they have a lower concentration of myoglobin (Fischer & Lilje, 2014). Type IIA fibers contains a faster ATPase isoform and therefore has a faster contraction and relaxation cycle than Type I. Since the ATP is used up faster by the oxidative metabolism in this type of muscle fiber, it also relies partly on glycolytic metabolism. This cause the Type IIA fibers to be less fatigue resistant than Type I (Fischer & Lilje, 2014; Goldspink, 1999; Kraemer & Spiering, 2006; Toniolo et al., 2007).

Type IIX muscle fibers are, as Type IIA, known as white fast twitch muscle fibers (Fischer & Lilje, 2014), but has compared to Type IIA an even faster contraction and relaxation cycle because of a faster ATPase isoform (Goldspink, 1999; Toniolo et al., 2007). Like the Type IIA muscle fiber Type IIX relies partly on glycolytic metabolism. In dogs, however, the oxidative capacity of this fiber type is greater than in other mammals which means that dogs are not as easily fatigued (Acevedo & Rivero, 2006).

Hybrids of the above mentioned fiber types are also present in the skeletal muscles of the dog and represents one third of the total amount of muscle fibers (Acevedo & Rivero, 2006). There are two main forms of hybrids: Type I combined with Type IIA and Type IIA combined with Type IIX. These two are further divided in two based on which of the type-specific MHC they contain the most of (Acevedo & Rivero, 2006).

The ratio of oxidative vs. glycolytic metabolism within the fiber types and hybrid fiber types are as follows; starting with the most oxidative (Acevedo & Rivero, 2006): Type I>Type I+IIA>Type IIA>Type IIA+IIX>Type IIX.

In the dog, all fiber types use oxidative metabolism to a certain degree. This means that the dog has a high degree of fatigue resistance and is therefore a formidable performer locomotor wise.

Motor units and CNS regulation

A motor unit consists of a motor neuron and the muscle fibers that it innervates (Fischer & Lilje, 2014; Heckman & Enoka, 2012; Kraemer & Spiering, 2006). The muscle fibers within a motor unit are always of the same type (Zajac, 1989). The number of muscle fibers in a motor unit depends on the tasks performed by the muscle; if the muscle performs precise movements the number of muscle fibers can come down to as low as 5 per motor unit; if the muscle performs gross movements the number of muscle fibers can reach 2000 per motor unit (Fischer & Lilje, 2014; Heckman & Enoka, 2012).

Locomotion of the body is generated by contraction of muscles around joints. To graduate the desired contraction force of a specific muscle the CNS regulate the amount of recruited motor units, which correlates to the number of muscle fibers, and the frequency by which they are activated (Broman et al., 1985; Harrison et al., 2013; Heckman & Enoka, 2012; Kraemer & Spiering, 2006; Milner-Brown et al., 1973a; Zajac, 1989). The number of recruited muscle fibers is referred to as spatial summation while the frequency of the activated motor units is termed temporal summation (De Luca & Erim, 1994; Person & Kudina, 1972).

Force generation is regulated by both spatial and temporal summation. However, at low force levels the spatial summation is the main mode of force regulation while the temporal summation is used as a fine adjustment of the contractions (Milner-Brown et al., 1973a). When the required force level exceeds 70% of the maximum voluntary contraction force of the muscle mainly temporal summation regulates the force output (Broman et al., 1985; Heckman & Enoka, 2012; Milner-Brown et al., 1973a).

The recruitment of motor units follows a pattern determined by the size of the motor neuron; the bigger the motor neuron the higher threshold for activation. When following this pattern the small motor neurons, which innervate Type I muscle fibers, will be recruited firstly, secondly the intermediate size motor neurons, which innervate Type IIA muscle fibers and finally the biggest motor neurons, which innervate Type IIX muscle fibers (Fischer & Lilje, 2014; Henneman et al., 1965; Kraemer & Spiering, 2006; De Luca & Erim, 1994; Milner-Brown et al., 1973b; Person & Kudina, 1972). This recruitment order enables the muscle to resist fatigue for as long as possible.

Acoustic myography

Acoustic myography (AMG) is a non-invasive method for measuring muscle activity (Fenger & Harrison, 2017). Sensors covered with piezoelectric crystals on one side and a soundboard on the other side are placed on the skin, above the muscle of which measurements of the activity are desired, with the piezoelectric crystals towards the skin (Harrison, 2017; Harrison et al., 2013).

When the muscle contracts vibrations occur within the contracting muscle fibers which travels through the tissue to the skin surface where the AMG sensors capture them in the form of pressure waves (Harrison, 2017). Between the skin surface and the AMG sensors acoustic gel (MyoDynamik ApS, Copenhagen Denmark) is used to transmit the waves and prevent interference from air and external noise (Harrison, 2017). The pressure waves captured are then stored as a sound file in the AMG unit, referred to as a CURO (Picture 1) (MyoDynamik ApS, Copenhagen Denmark)(Harrison, 2017). The CURO measures three parameters on a scale from 0-10: The E-, S- and T-score.

Picture 1 - The CURO and two sensors. This picture is retrieved May 28, 2018 from http://www.myodynamikequine.com/amg/

The E-score is a parameter describing the efficiency/coordination of the muscle (Table 1, A). It is analyzed as the periods of activity versus inactivity in the selected sequence (Harrison, 2017). A high E-score represents a very coordinated muscle that is efficient in turning on and off (Harrison, 2017; Harrison et al., 2013).

The S-score is a parameter describing the spatial summation (Harrison, 2017). This parameter can be assessed as the amplitude of the sound signal and represents the number of muscle fibers recruited during the sequence (Harrison, 2017) (Table 1, B). A high S-score represents a low recruitment (Harrison, 2017; Harrison et al., 2013).

The T-score is a parameter describing the temporal summation (Fenger & Harrison, 2017; Harrison, 2017; Harrison et al., 2013). This parameter is analyzed as the sound frequency which corresponds to the frequency of the recruited muscle fibers (Fenger & Harrison, 2017; Harrison, 2017) (Table 1, C). A high T-score represents a low frequency of the active muscle fibers (Harrison, 2017; Harrison et al., 2013).

An average of the three parameters is designated by the ESTi-score. This parameter indicates whether the muscle achieves high or low scores but does not specify the functional activities within the muscle as when the E-, S- and T-scores are evaluated individually (Fenger & Harrison, 2017; Harrison, 2017; Harrison et al., 2013).

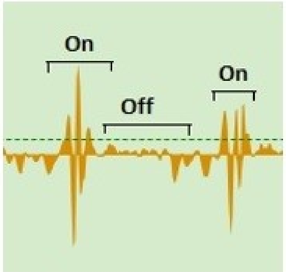
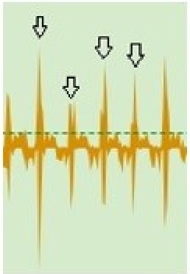
E-score	S-score	T-score
		
A: The E-score is describing the efficiency/coordination of the muscle. If the muscle is well coordinated it will be activating the muscle fibers very synchronized. A very synchronized activation will result in narrow periods of activity, which will translate to a high E-score. On the other hand, very broad periods of activity will result in a low E-score.	**B:** The S-score is determined by the amplitude of the sound signals. A high amplitude signifies a high recruitment of muscle fibers and would therefore result in a low S-score. A low amplitude signifies a low recruitment of muscle fibers and would result in a high S-score.	**C:** The T-score is determined by the frequency of the sound signal and can be translated directly to the frequency of the active muscle fibers. A low frequency will result in a high T-score, whereas a high frequency will result in a low T-score.

Table 1 – This table illustrates and describes the three parameters used to determine muscle activity by AMG measurements:

E-score (A)

S-score (B)

T-score (C)

A well-trained muscle will be expected to have high E-, S- and T-scores compared to a less trained muscle when both are doing the same amount of work. Since a well-trained muscle has adapted its energy expenditure to the task demanded it uses less energy by lowering the temporal and spatial summation and instead enhances its efficiency (Harrison et al., 2013)

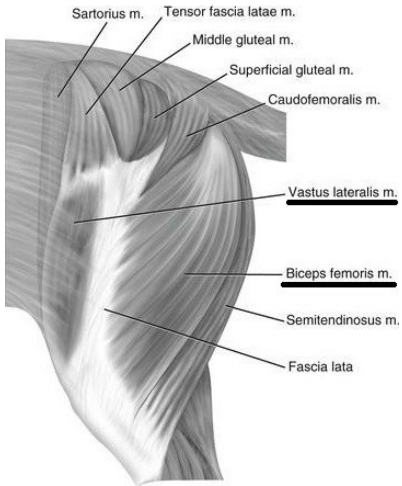
When performing an AMG analysis there are sudden signs of fatigue to be aware of. Early signs of a fatigued muscle would be irregular T- and/or S-scores combined with a low E-score (Harrison, 2017).

Muscle activity during terrestrial locomotion

During locomotion each limb of a quadrupedal animal runs in a repetitive cycle of stance and swing phases (Rossignol, 2011). Stance phase is the part of the cycle from where the limb touches the ground until the foot lifts off again (Fischer & Lilje, 2014). The swing phase begins at the lift off when the limb is brought forward and continues until the foot once again touches the ground (Fischer & Lilje, 2014). With increasing speed the total cycle time and the stance phase will become shorter while the swing phase will remain more or less constant in duration (Fischer & Lilje, 2014; Rossignol, 2011).

During locomotion flexor and extensor muscles have a stabilizing effect on each other. The extensor muscles contract isometrically to counteract the degree of flexion, and only when the extensors passively allow themselves to stretch flexion occurs (Fischer & Lilje, 2014).

The muscles in focus in this study are the antagonistic muscles M. Biceps femoris (BF) which is a flexor of the stifle and an extensor of the hip and M. Quadriceps vastus lateralis (QVL) which is an extensor of the stifle (Aspinall & Cappello, 2015) (Picture 2).



Picture 2 - The two muscles in focus in this study: M. Biceps femoris and M. Quadriceps vastus lateralis

This picture is retrieved May 28, 2018 from https://veteriankey.com/7-the-hindlimb/

QVL becomes active right before the foot touches the ground and stabilizes the stifle during most of the stance phase to prevent flexion due to gravity (Fischer & Lilje, 2014; Goslow et al., 1981).

BF consist of a pars cranialis and a pars caudalis. Both act as retractor muscles during locomotion which means that their main function is to exert the propulsive movement (Fischer & Lilje, 2014). Pars cranialis is active from the end of the swing phase and halfway through the stance phase (Fischer & Lilje, 2014). Pars caudalis is active from the end of stance phase into the first part of the swing phase and is therefore responsible for the flexion of the stifle at lift off (Fischer & Lilje, 2014). When looking at the muscle as one this means that BF is active from the end of swing phase, during 50-75% of stance phase and again in the start of the next swing phase (Deban et al., 2012; Fischer & Lilje, 2014).

Spring mass model vs. inverted pendulum

When quadrupeds are walking they make use of an energy saving mechanism termed "The inverted pendulum model" (Biewener, 2006; Fischer & Lilje, 2014; Goslow et al., 1981; Usherwood et al., 2007). By this mechanism an exchange between potential gravitational energy and kinetic energy happens (Biewener, 2006; Blickhan, 1989; Fischer & Lilje, 2014; Goslow et al., 1981; Lindstedt et al., 2002; Usherwood et al., 2007) which preserve about 60-70% of the energy (Goslow et al., 1981). The inverted pendulum model requires that the center of mass tilts over a completely stiff limb and assumes that each limb functions as an independent inverted pendulum (Biewener, 2006; Fischer & Lilje, 2014; Usherwood et al., 2007). During walking when the limb makes contact with the ground the animal decelerates and hereby reduces the kinetic energy which is then transformed to potential gravitational energy when the center of mass tilts over the supporting limb (Biewener, 2006). When the center of mass falls forward in the last half of the stance phase the animal accelerates and the potential gravitational energy will transform back into kinetic energy (Biewener, 2006). This closely resembles the mechanism of a simple inverted pendulum.

As mentioned the inverted pendulum model requires that the leg is kept completely stiff during locomotion. This is not always the case, since a slight compression of the joints happens during mid support of the step cycle (Biewener, 2006). However, studies support the theory that both the fore - and hindlimbs function as independent inverted pendulums during walking (Biewener, 2006).

With increasing speed the energy preserving mechanism known as "The spring mass model" will substitute the inverted pendulum mechanism (Biewener, 2006; Fischer & Lilje, 2014; Lindstedt et al., 2002; Usherwood et al., 2007). When speed, and hereby opposing forces, increases the muscles will elongate while activated and absorb the mechanical work in terms of elastic strain energy (Lindstedt et al., 2002). When the limb touches the ground, at higher speeds, the potential gravitational- and kinetic energy is converted into elastic strain energy in spring elements of the limb such as tendons and muscles which is then recovered and released at takeoff in the end of the stance phase (Biewener, 2006; Fischer & Lilje, 2014). This absorption and release of energy, while the muscles and tendons are stretched, is known as the stretch-shorten cycle (Lindstedt et al., 2002).

The change from use of the inverted pendulum model to the spring mass model does not happen at a specific speed but is individual from dog to dog (Biewener, 2006). Furthermore, studies have shown that some dogs use a bouncing gait at all times which implies the use of the spring mass model (Fischer & Lilje, 2014).

Resistance and buoyancy

When dogs are walking in water there are different properties of the water that affects the body; these include buoyancy, hydrostatic pressure, viscosity and resistance (Chiquoine et al., 2013).

Buoyancy can be described by the principle of Archimedes which state that an element immersed in water will be lifted upwards equivalent to the weight of displaced fluid (Chiquoine et al., 2013; Heywood et al., 2016). This means that with increasing water levels the compressive forces on the joints will decrease due to less weight bearing (Chiquoine et al., 2013; Heywood et al., 2016; Tranquille et al., 2017). Studies on dogs have shown that weight bearing decrease to 91% of land-based weight bearing with a water level to the hock, 85% with a water level to the stifle and to 38% with water to the level of trochanter major (Bertocci et al., 2018).

The hydrostatic pressure can be described by “Pascal’s law” which state that the pressure is equally distributed on the immersed body surfaces (Chiquoine et al., 2013). Thus, the hydrostatic pressure will be maximum at the highest water levels (Chiquoine et al., 2013).

The viscosity is the frictional resistance of the water (Chiquoine et al., 2013). Water is 15 times more viscous than air which means that a dog walking in water has to overcome a greater resistance than when walking on land (Chiquoine et al., 2013). The total resistance, also referred to as drag force, is furthermore influenced by two factors: the frontal area of the object moving in water and the speed at which the object moves (Heywood et al., 2016). The resistance increases exponentially with speed (Chiquoine et al., 2013).

The forces which the muscles has to overcome is crucial in regards to how many muscle fibers are being recruited within the muscle (Kraemer & Spiering, 2006). Since the drag force increases with increasing water level and speed, it would be expected that more fibers are being recruited at the higher water levels and at higher speeds. The activity of the muscles, when immersed in water, has so far been difficult to determine due to lack of equipment which can be used in water trials (Masumoto & Mercer, 2008). One study using electromyography (EMG) has, however, determined that the muscle activity of humans is greater when walking in water compared to when walking on land (Masumoto & Mercer, 2008). Furthermore, several studies have documented a greater range of motion (ROM) of both the stifle and hip joint when walking in water compared to when walking on land (Bertocci et al., 2018; Heywood et al., 2016).

Objectives and hypotheses

The purpose of this study was to investigate the effects of water level and speed in a water treadmill on the activation of canine M. Biceps femoris and M. Quadriceps vastus lateralis by use of acoustic myography. This was done by testing the following hypotheses:

1) The E-, S- and T parameters will decrease with increasing speed for both M. Biceps femoris and M. Quadriceps vastus lateralis.
2) The E-, S- and T parameters will decrease with higher water level for both M. Biceps femoris and M. Quadriceps vastus lateralis.

Baseline measurements were made prior to- and after the trials to determine whether fatigue occurred or not. Thus, another hypothesis was:

3) The E-, S- and T parameters will not change significantly from the pre-baseline measurements to the post-baseline measurements.

Materials and methods

Literature search

Relevant articles on the subject were found using the following databases: Web of Science and Ovid® (CAB Abstracts and Medline). When searching for articles in these databases the search words were: >dog* OR canine AND muscle* AND activity<, > dog* OR canine AND water treadmill AND muscle activity<, >dog* OR canine AND spring mass model<,>dog* OR canine AND inverted pendulum*<, >dog* OR canine AND elastic recoil<, >dog* OR canine AND locomotion<, >muscle* AND temporal summation AND spatial summation<, >acoustic myography AND electric myography<, >dog* OR canine AND hypertrophy AND mechanism*, >dog* OR canine AND hypertrophy AND eccentric<, >dog* OR canine AND eccentric AND concentric, >dog* OR canine AND muscle fiber* AND type<, >dog* OR canine AND aqua* locomotion<, >muscle* AND motor unit*<, >cachexia AND atrophy AND dog*<.
When relevant articles were found similar articles were suggested by the databases. These were looked through and occasionally used. Citings from the relevant articles were specifically searched for, by title, in the databases. When none of the scientific databases yielded a product of the search, or when "full text" was not available, Google Scholar was then used to find the full text. In a few cases the full text was requested from The Royal Copenhagen Library, since access was not granted by other means.

Animals and ethics

25 dogs were included in this study (table 1). The dogs were of different breeds (Labradors, German shepherds, Doberman pinschers, Golden retrievers, Malinois', mixed breeds etc.). They were all selected based on the inclusion criteria: height between 50 and 75 cm at the withers, age between 1,5 and 8 years old, body condition score (BCS) of 4-6/9 and no history of serious musculoskeletal injury or disease.

Name	Breed	Height (cm)	Age (years)	Weight (kg)	BCS (1-9)	Gender
Brutus	Swiss Shepherd	69	5	44	5	Intact male
Nelly	German Shepherd	63	7,5	39	5	Intact female
Kiki	Labrador Retriever/Border Collie	59	7	29	5	Intact female
Berta	Labrador Retriever/Golden Retriever/Samoyed	58	5,5	28	5	Neutered female
Nala	Golden Retriever	55	6	30	5	Neutered female
Schnuden	English Springer Spaniel	52	3,5	21	4	Intact male
Manny	German Shepherd	68	5	40	5	Neutered male
Luna	Golden Retriever	51	2,5	27	5	Intact female
Zimba	German Shepherd	59	7	33	5	Neutered female
Kofi	Newfoundland/Labrador Retriever	65	3,5	40	6	Neutered male
Saga	Labrador Retriever/Samoyed	57	4	27	6	Neutered female
Goonie	Malinois	59	4	23	4	Intact female
Perle	Labrador Retriever	50	3,5	19	5	Neutered female
Bounty	Border Collie	54	6	29	5	Intact male
Shiva	German Shepherd	58	6	35	6	Neutered female
Minnie	German Shepherd	55	2	28	5	Neutered female
Tanne	Labrador Retriever	54	8	29	6	Intact female
Donna	Labrador Retriever	55	8	35	6	Intact female
Lika	Labrador Retriever	57	3,5	29	5	Neutered female
Romeo	Saluki	68	3,5	28	4	Intact male
Barthez	Dobermann	72	4	43	5	Intact male
Andy	Labrador Retriever mixed breed	64	6	37	5	Neutered male
Koffi	Labrador Retriever	54	7,5	27	5	Intact female
Yuki	Labrador Retriever/Samoyed/ Japanese Spitz	53	2	19	5	Intact female
Piquet	German Shepherd	66	5	47	5	Intact male

Table 2 – This table illustrates the dogs included in this study; their names, breeds, heights at the withers, ages at the time of the trial (rounded to nearest half year), weights in kilograms, body condition scores (BCS) and their gender and description of whether they are neutered or not at the time of the trial.

The dogs were trained at different levels and by different methods at home (swimming, running, rally, hobby training etc.) which, besides the fact of different breeds included in the study, ensured a broad spectrum of animals for evaluation.

The participating dogs and owners were found using an advertisement on the social media Facebook (Appendix A). Owners of each dog were informed of the procedure prior to the study and signed a contract by which they stated full acceptance of the inclusion of their dog in the study, but reserved their right to stop the procedure at any point if they found their dog to be stressed or uncomfortable (Appendix B).

Procedure

The experimental design of this study was a controlled clinical trial. Each trial followed the same protocol (Appendix C); the dogs were given 10 minutes to get acquainted with the surroundings while the owners filled out a questionnaire (Appendix D). Subsequently, a lameness examination was performed by an authorized veterinarian specialized in the locomotion of small animals. After the lameness examination the dogs were introduced to the water treadmill (Hydro-Physio, Shropshire England) at the two speeds used in the trial (30 m/min and 50 m/min) without water and sensors.

Following this the AMG sensors (MyoDynamik ApS, Copenhagen Denmark) were applied to the muscles in pairs of right and left; one pair of sensors for M. Biceps femoris, and one pair of sensors for M. Quadriceps vastus lateralis (Picture 3). The sensors were always placed by the same person. Acoustic gel (MyoDynamik ApS, Copenhagen Denmark) (Picture 4) was applied between the skin surface, above the muscle in question, and the sensor. The sensors were then fastened by use of the self-adhesive pads, Snögg (Norgesplaster AS, Dep. Snøgg) (Picture 5). After placement the sensors were connected to the CURO (MyoDynamik ApS, Copenhagen Denmark) and tested, always by the same person, before recordings in the water treadmill were performed.

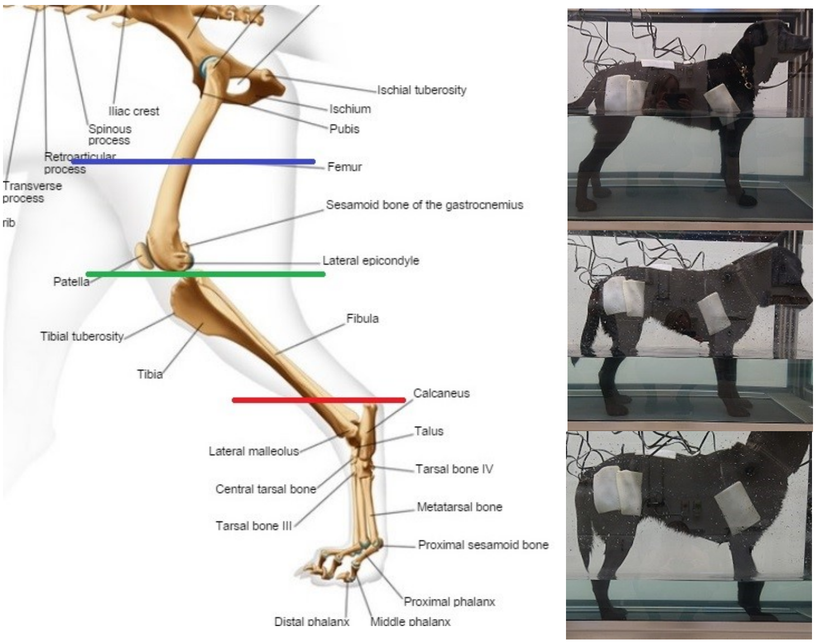
Picture 3 - Left hindlimb after the placement of sensors with acoustic gel and Snögg. Sensor to the right in the picture is placed on left M. Biceps femoris and the sensor to the left is placed on the left M. Quadriceps vastus lateralis

Picture 4 - The acoustic gel (Myodynamik ApS, Copenhagen Denmark), used between the skin surface and the sensor.

Picture 5 - The self-adhesive pads, Snögg (Norgesplaster AS, Dep. Snögg), used to fasten the sensors to the skin of the dog.

During the trial the owners were placed in front of the dog holding the leash while the person holding the CURO was placed on the right side of the dog, and if in need of assistance a helper was placed on the left side of the dog.

Measurements were obtained simultaneously from M. Biceps femoris and M. Quadriceps vastus lateralis while the dogs walked in the water treadmill. Recordings were carried out using a sampling frequency of 2000 Hz. All dogs completed measurements in the same order and with baseline recordings without water at the two speeds (30 m/min and 50 m/min), before and after the measurements at different water levels, to determine whether fatigue occurred during the trials. The three water levels used in the study were water to the hock, tibial plateau (TP) and mid femur (MF) (Picture 6). At each water level, and at the pre- and post-baseline measurements, the dogs performed at two different speeds (30 m/min and 50 m/min). Measurements were obtained when the person controlling the CURO found the dog to walk with a natural locomotion pattern for a continued period of at least 10 seconds, and when real-time recordings on an iPad showed a steady pattern for both muscle pairs.

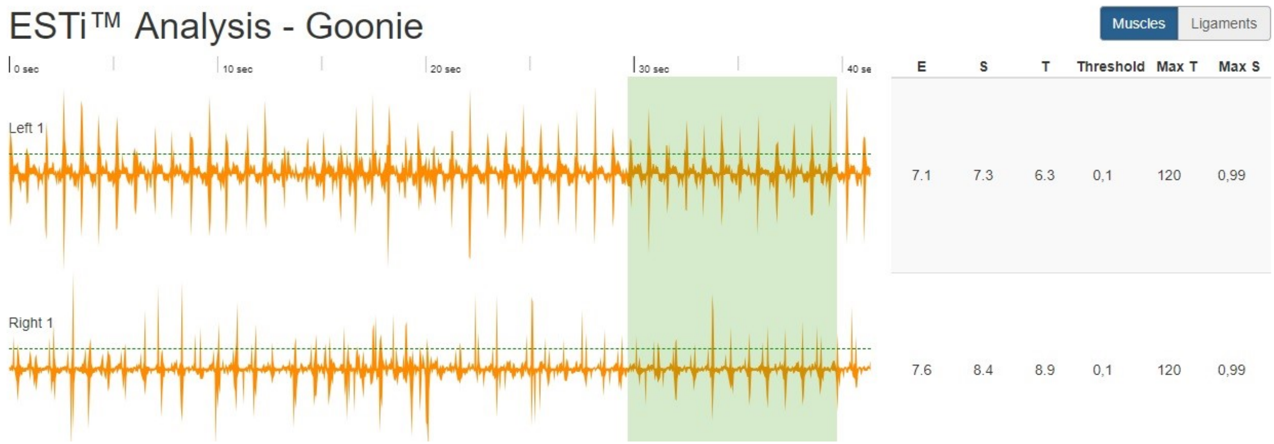


Picture 6 - Illustration of the water levels used in the study. To the left in the picture the water levels are illustrated by the lines of different colors; red line: hock water level, green line: TP water level, blue line: MF water level. The picture is retrieved May 28, 2018 from https://natom.extranet.royalcanin.org/html5/view?&lng=EN&specie=dog

To the right in the picture one of the participating dogs, with water to each of the water levels, is illustrated.

Data collection

The sound signals recorded were analyzed by use of the software provided at https://app.myodynamik.com. From here E-, S- and T-scores were extracted based on a 10 seconds sequence from each recording (Picture 7). Threshold for background noise were standardized to 0,1 bits for the E-, S- and T-scores. However, some dogs had very efficient muscles, thus less background noise was present, and threshold had to be lowered to an individual level (Appendix E).



Picture 7 – Illustration of the data processing in the pre-baseline measurements obtained from "Goonie" at 50 m/min.

The green area of the sound wave file is the selected 10 seconds sequence where the measurements are considered stable. To the right the E-, S- and T parameters for this sequence is given, as well as the default threshold, Max T and Max S values.

The E-score represents the periods of muscle activity vs. inactivity. The S-score is measured as the signal amplitude within a full 6dB signal, corresponding to 1 volt, which is converted to bits in the program and is shown as 0,99 bits as the Max S value. The T-score reflects the frequency at which the active muscle fibers fire. The Max T value in the program is set for 120 Hz. This should correspond with the frequency of the muscles in question as another study measured muscle firing frequencies of 70 Hz and 58 Hz in dogs walking, though in M. Gluteus superficialis and M. Longissimus lumborum (Fenger & Harrison, 2017).

In total 25 dogs participated in the study. On each dog BF and QVL were measured on both the right- and left side to ensure that every dog was in balance. Since no statistical comparison between the left and the right side were desired, all measurements for each muscle were pooled to establish a bigger sampling population for statistical evaluation. To verify that no obvious differences between the left- and right muscles were present the mean and the standard deviation (SD) for the left- and right side were calculated for both muscles at all water levels (Appendix F & G). An example of these results for each muscle is illustrated below.

QVL 30 m/min No water before	E-score	S-score	T-score
Mean Left	7,3042	7,775	7,2125
Mean Right	7,3292	8,05	7,175
SD left	1,7804	0,9944	1,3401
SD right	1,3763	0,7059	1,4207

Table 3 - Illustration of the calculated means and standard deviations for the E, S and T values of M. Quadriceps vastus lateralis from the pre-baseline measurements at a speed of 30 m/min. For comparison between left- and right measurements. The very similar values of the left- and right side confirms no obvious difference between the two and justify the pooling of these measurements (See appendix G for all calculations).

BF 30 m/min No water before	E-score	S-score	T-score
Mean Left	6,9625	8,0458	6,2667
Mean Right	7,2417	8,0917	6,9167
SD left	2,2535	0,9079	2,2259
SD right	1,8973	0,8325	2,2126

Table 4 - Illustration of the calculated means and standard deviations for the E, S and T values of M. Biceps femoris from the pre-baseline measurements at a speed of 30 m/min. For comparison between left- and right measurements. The very similar values of the left- and right side confirms no obvious difference between the two and justify the pooling of these measurements (See appendix F for all calculations).

No significant differences were found between the left- and the right side which allowed the measurements to be pooled. Exclusion of one dog from BF measurements and one dog from QVL measurements were needed due to technical difficulties. Therefore, 48 measurements were available for statistical analysis for BF and QVL, respectively, at each speed at pre-baseline-, hock-, TP- and post-baseline water level. At MF water level one dog began swimming instead of walking which would be misleading for the results and had to be excluded from the MF measurements. This resulted in 46 measurements at the mid femur level at each speed for both muscles. Each measurement consisted of an E-, S- and T-score which had to be analyzed separately. In total this amounted to 2856 measurements for statistical analysis.

Statistical analysis

The statistical analysis was performed using excel and the Real Statistics Resource Pack software 2013/2016 for Windows (Release 5.5, Copyright (2013 – 2018), Charles Zaiontz, www.real-statistics.com). The software was downloaded from the website http://www.real-statistics.com/free-download/real-statistics-resource-pack/ (Zaiontz, 2018) and installed as an add-in program in excel for advanced statistical analyzes.

Differences for the E-, S- and T-scores were calculated for the various combinations of speed and water levels (Appendix H & I). All groups of difference values were tested for normal distribution by carrying out a Shapiro-Wilk test (Appendix H & I). For the normally distributed data a two-tailed one sample t-test was conducted to define the p-value (Appendix H & I). For data sets not being normally distributed a two-tailed one sample Wilcoxon signed rank test were instead used to define the p-value (Appendix H & I). P-values below 0.05 were considered significant, thereby rejecting the null-hypothesis and supporting the alternative hypothesis.

H0 = The difference between the groups equals 0.
HA= The difference between the groups deviates from 0.

When a significance was found the mean of the differences was calculated to determine whether the parameter in question had increased or decreased.

Results

Exclusion of fatigue

Baseline measurements were made at each speed without water before and after the measurements at different water levels. These baseline measurements yielded E-, S- and T-scores that were compared against each other to exclude fatigue. If fatigue was present one would expect the differences between E-, S- and T-scores of the pre-baseline and the E-, S- and T-scores of the post-baseline to be a value other then 0. Therefore, in this case it was desirable to confirm H0 and reject HA to exclude fatigue.

The changes of the S- and T parameters at the 30 m/min speed were insignificant for both BF and QVL. This insignificance was also found for the E- and S parameters at the 50 m/min speed.

These were important findings, since they support the theory that no fatigue occurred during the trials.

When comparing the pre-baseline and post-baseline measurements at the speed 30 m/min the E-parameter increased significantly in both BF (p-value: 0,007) and QVL (p-value: 0,014) corresponding to an improved efficiency/coordination. This improvement would not be seen if the muscles were fatigued.

The results for the T parameters measured at 50 m/min differed between BF and QVL with only QVL having a significantly increased T value (p-value: 0,023) and BF showing no significant change. If the increase was to come from fatigue one would expect to see changes in the S parameter as well. Furthermore, it would be expected that the T parameter would drop instead of increase as a result of fatigue.

Effect of speed on muscle activity

Measurements were made at 30 and 50 m/min at each water level to test the effect of speed.

The differences between pre-baseline 30 m/min and pre-baseline 50 m/min showed a significant decrease of the E- and S parameter in both BF ($p\text{-value}_E$: 0,00, $p\text{-value}_S$: 0,00) and QVL ($p\text{-value}_E$: 0,00, $p\text{-value}_S$: 0,00). This was also the case for the difference between post-baseline 30 m/min and post-baseline 50 m/min in both BF ($p\text{-value}_E$: 0,00, $p\text{-value}_S$: 0,00) and QVL ($p\text{-value}_E$: 0,00, $p\text{-value}_S$: 0,00).

For comparison between walking at 30 m/min and 50 m/min there was a significant difference for all parameters at both hock, TP and MF water level. The E-, S- and T parameters dropped significantly when the dogs walked at 50 m/min compared to 30 m/min in both BF and QVL (For p-values see Appendix H & I).

Effect of water level on muscle activity

To establish the effect of water level on muscle activity, differences between water levels at the same speeds were calculated for both muscles.

Effect of water level at 30 m/min

Changes in muscle activity at 30 m/min from pre-baseline to hock water level were the same for both BF and QVL. Only the T parameter increased significantly (BF p-value$_T$: 0,00, QVL p-value$_T$: 0,01).

Changes in muscle activity at 30 m/min from pre-baseline to TP water level varied between the two muscles. Only the T parameter increased significantly in both BF and QVL (BF p-value$_T$: 0,00, QVL p-value$_T$: 0,00). Also, the E parameter increased significantly in QVL (p-value$_E$: 0,025) while no significant change for this parameter was observed in BF.

Changes in muscle activity at 30 m/min from pre-baseline to MF water level were only significant for the E- and S parameter in BF which both decreased (p-value$_E$: 0,009, p-value$_S$: 0,039). No significant changes were seen for QVL parameters.

No changes in muscle activity at 30 m/min were observed from hock water level to TP water level in neither BF and QVL.

Changes in muscle activity at 30 m/min from hock water level to MF water level were only seen for the E- and T parameters in BF which both decreased significantly (p-value$_E$: 0,0019, p-value$_T$: 0,004). No changes were significant in QVL.

From TP water level at 30 m/min to MF water level at 30 m/min all parameters changed significantly in both muscles. The E-, S- and T parameters decreased significantly in BF (p-value$_E$: 0,00, p-value$_S$: 0,008, p-value$_T$: 0,00). In QVL the E- and T parameter decreased significantly (p-value$_E$: 0,045, p-value$_T$: 0,043) while the S parameter increased significantly (p-value$_S$: 0,014).

Effect of water level at 50 m/min

Changes in muscle activity at 50 m/min from pre-baseline to hock water level were only significant for the S parameter in QVL which decreased (p-value$_S$: 0,037).

Changes in muscle activity at 50 m/min from pre-baseline to TP water level showed only a significant increase of the T parameter in BF (p-value$_T$: 0,007).

Changes in muscle activity at 50 m/min from pre-baseline to MF water level were significant for all parameters in BF (p-value$_E$: 0,00, p-value$_S$: 0,011, p-value$_T$: 0,031) which all decreased. In QVL only the E parameter decreased significantly (p-value$_E$: 0,002).

Changes in muscle activity at 50 m/min from the hock water level to TP water level were only observed in BF. The S parameter decreased significantly (p-value: 0,044) while the T parameter increased (p-value: 0,043).

Changes in muscle activity at 50 m/min from the hock water level to MF water level were seen for all parameters in BF which all decreased significantly (p-value$_E$: 0,00, p-value$_S$: 0,00, p-value$_T$: 0,005). In QVL only the E parameter decreased significantly (p-value$_E$: 0,001).

The changes in muscle activity at 50 m/min from TP water level to MF water level showed the same pattern with a significant decrease for all the parameters in BF (p-value$_E$: 0,00, p-value$_S$: 0,001, p-value$_T$: 0,00) while only the E parameter decreased significantly in QVL (p-value: 0,008).

Discussion

Exclusion of fatigue

When comparing the measurements from the pre-baseline with the post-baseline it was established that no fatigue was likely to have occurred.

For BF and QVL changes were seen in the muscle activity at the speed of 30 m/min where a bettering of the muscles' efficiency/coordination in the post-baseline measurements was observed. This could possibly be due to the setup of the trial causing a sudden change in resistance from walking at MF water level to walking without water at the post-baseline which could be responsible for an increased efficiency/coordination compared to the pre-baseline measurements.

For QVL it was also observed that the frequency decreased at the speed of 50 m/min from the pre-baseline to the post-baseline measurements. If this change were to come from fatigue one would expect the frequency to increase as well as a simultaneously increase in recruitment of fibers. The fact that a decrease in frequency is seen could be postulated to originate from the same cause as the increase in efficiency/coordination mentioned above.

The effect of speed

When comparing 30 m/min with 50 m/min without water a clear tendency is observed for both muscles. The efficiency/coordination decreases while the recruitment of muscle fibers increases with increasing speed. This observation rejects the hypothesis that all parameters would decrease with increasing speed, since no change of the T parameter was observed alongside with the E- and S-parameter. However, the results do imply that it requires more of the muscle to walk at a higher speed.

When introducing water to the water treadmill, regardless of water level, the results fully support the hypothesis that all parameters would decrease with increasing speed. The parameters all decrease in both muscles when comparing 30 m/min with 50 m/min at each water level, corresponding to a decreased efficiency/coordination and increases of both recruitment and frequency of the muscle fibers.

The effect of water level

The effect of water level to the hock

At the speed of 30 m/min a lower frequency of the active muscle fibers in both BF and QVL is observed compared to when walking on dry land. At this water level and speed it was noticed that the dogs were trying to lift their legs above the water surface, during the swing face, which is in agreement with the studies showing an increased ROM with increasing water level (Bertocci et al., 2018; Chiquoine et al., 2013). This change in gait may have caused a more bouncing gait making it possible for the dogs to save energy via the spring mass model (Fischer & Lilje, 2014) which explains the decrease in frequency. Due to this observation it could be postulated that walking at hock water level with a speed of 30 m/min is useful for endurance training of both muscles, since such training requires the muscle fibers to fire at a low frequency to avoid fatigue for as long as possible.

When changing the speed to 50 m/min an increased recruitment of fibers was observed in QVL. This increased recruitment could possibly be due to the stabilizing role of QVL on the stifle joint being challenged at this water level and speed compared to when walking on dry land.

The effect of water level to the tibial plateau

In BF the frequency decreases at both 30 m/min and 50 m/min when comparing the pre-baseline measurements to the measurements at the TP water level. This could again be explained by the increased ROM when the dogs were increasing their step height in order to step over the water surface (Bertocci et al., 2018; Chiquoine et al., 2013) which possibly caused a more bouncing gait allowing more energy to be stored as elastic potential energy and less energy to be lost - as reflected by the decrease in frequency. The same theory can be applied to QVL where the frequency decreases as well but only at 30 m/min when comparing the pre-baseline with TP water level. In addition, an increase is seen in the efficiency/coordination at 30 m/min in QVL. This can be due to the water supporting the dog when walking at a slow speed which during the trials was observed to initiate a slightly awkward gait before water was introduced. A further point, presented by Heywood et al.(2016, p.127), claims that the natural speed of walking decreases when walking in water, hereby allowing the slow speed of 30 m/min to approach the naturally preferred speed when water is introduced which could ease the coordination of the muscle.

It can be hypothesized that walking in water to the level of TP at 30 m/min, equal to walking in water to the hock level at 30 m/min, will be suitable for endurance training of both BF and QVL. This is supported by the comparison of the measurements showing no difference from walking at hock water level to walking at TP water level, at the speed of 30 m/min, in neither BF or QVL. This suggest that changing the water level from hock to TP does not require more force to be generated within the muscles at this speed, and both water levels to have a beneficial effect on the frequency useful for endurance training at 30 m/min.

However, when comparing the TP- and hock water level for BF, at 50 m/min, it is seen that the frequency decreases while the recruitment increases. This phenomenon could be due to the mechanics of regulating the force generation within the muscle. When the force required is less than 70% of MVC the muscle will upregulate the recruitment of fibers to generate force and use the frequency, either by increasing or decreasing it, to fine adjust the movement (Heckman & Enoka, 2012; Milner-Brown et al., 1973a). This increase in recruitment, and therefore force generation, suggest that the TP water level at 50 m/min requires more of BF than the hock water level at 50 m/min. This was to be expected, since the resistance, which BF has to overcome, increases with increasing frontal area immersed in water and increasing speed (Chiquoine et al., 2013; Heywood et al., 2016; Tranquille et al., 2017).

The effect of water level to mid femur

When comparing the measurements from the pre-baseline with the ones from MF water level at 30 m/min it is observed that the efficiency/coordination decreases and the frequency increases in BF while no change is seen in QVL. This proves that the MF water level at 30 m/min requires a greater force generation within BF compared to when walking without water at 30 m/min. This was again to be expected due to the dependency of the frontal area immersed in water on the resistance (Chiquoine et al., 2013; Heywood et al., 2016). BF being one of the muscles responsible for the propulsive movement, against the resistance, and QVL having the roles of weightbearing and a stabilizing effect on the stifle could explain why QVL is not influenced by the increasing resistance - while BF is, a view supported by the studies of Tranquille et al.(2017, p. 79).

The effect observed when comparing the measurements from the hock water level to the MF water level, at a speed of 30 m/min, is a decreased efficiency/coordination and an increased frequency, only in BF. This once again supports the theory of an increased resistance with increased water level, that mainly affects BF as a propulsive muscle, while no effect is observed in QVL.

When increasing the water level from the TP to the level of MF at a speed of 30 m/min a decrease is observed for all parameters in BF which once again supports the theory mentioned above. In QVL the efficiency/coordination decreases and the frequency increases while the recruitment decreases. The decreased recruitment can be translated to a lower force requirement for QVL at the MF water level at 30 m/min compared to what is required of the muscle at the TP water level at 30 m/min. It could be postulated that the TP water level requires a greater force generation of the QVL than the MF water level, at this speed, since the work of stabilizing the stifle is easier at the MF water level because of less weightbearing (Bertocci et al., 2018). The increased frequency could be due to a fine adjustment of the movement (Milner-Brown et al., 1973a) and could furthermore have an effect on the efficiency/coordination; with higher frequency it could be assumed that the periods of activity increases and inactivity decreases resulting in a lower efficiency/coordination.

The effect of the MF water level at the speed of 50 m/min is the same for all of the comparisons, namely: pre-baseline vs. MF water level, hock water level vs. MF water level and TP water level vs. MF water level.

The effect observed for BF is a decrease in efficiency/coordination and increases of both recruitment and frequency. This suggest that, when walking at a speed of 50 m/min, the MF water level is requiring more muscle force to be generated within BF than at any of the other water levels. This finding is consistent with the knowledge that the resistance is influenced by the frontal area immersed in water and the speed at which the object moves. The fact that walking at MF water level, at a high speed, increases the recruitment and the frequency in BF could make this setting useful for sprint training of this muscle, since such exercise is assumed to aim at activating fast muscle fibers which are only activated when the muscle force generation i.e. resistance is high (Fischer & Lilje, 2014; Goldspink, 1999; Milner-Brown et al., 1973b; Person & Kudina, 1972).

In QVL the only observation at 50 m/min is a decrease in efficiency/coordination, which indicates that the muscle is more turned on, than it is turned off at the MF water level compared to all the other water levels but is not required to generate enough force to initiate further recruitment or a higher frequency. The reason why a higher force level is not required of QVL at a speed of 50 m/min could be that the stance phase, wherein it functions as a stabilizer, is shortened in duration with increasing speed (Fischer & Lilje, 2014; Rossignol, 2011). This explains why the increased resistance does not affect QVL in the same way as it affects BF.

Verification or rejection of hypothesis

The hypothesis that the E-, S- and T parameters would not change significantly from the pre-baseline to the post-baseline measurements is rejected. However, the significant changes observed in the parameters are not decreases but increases which suggest that the muscles have bettered their performance from the pre-baseline to the post-baseline measurements. Therefore, it is assumed that no fatigue occurred.

As mentioned previously the effect of speed, before introducing water to the water treadmill, rejects the hypothesis that an increased speed results in a decrease in E-, S- and T parameters for both BF and QVL, since only the E- and S parameter decreased in both muscles. It could, however, be argued that speed does have an effect on the muscle activation but that an increase from 30 m/min to 50 m/min when walking on dry land does not require enough force to be generated within the muscles to decrease the T parameter, reflecting an increase of the frequency, as well. Further AMG studies examining the effect of a greater increase in speed, on dry land, will be needed to elucidate this area.

When introducing water to the treadmill the hypothesis is verified, since a decrease in both the E-, S- and T parameters, for both BF and QVL, is observed at all water levels with increasing speed. The fact that the hypothesis is verified when introducing water but not when comparing the two speeds without water suggest that the resistance from the water, present at even the lowest water level, requires more force to be generated within the muscle which leads to a decreased T parameter. To conclude anything regarding the effect of speed with this verification of the hypothesis should therefore be done with caution, since the decreased T parameter is probably partly due to the water resistance and not solely the increase in speed.

The hypothesis that an increased water level will result in decreased E-, S- and T parameters for both BF and QVL is rejected. Only at MF water level, when the dogs were walking at 50 m/min, was a decrease in all parameters observed for BF. However, this was a clear trend for BF which suggest that the MF water level, in combination with the speed of 50 m/min, is requiring the greatest force generation within BF compared to the other water levels used in this study. The results for QVL also indicate that the combination of the MF water level and a walking speed of 50 m/min have the most consistent effect on the muscle, since a decrease in the E parameter is observed in comparison with all of the other water levels. The fact that a decrease in all of the parameters, as the hypothesis state, is not seen in QVL was with hindsight to be expected, since the function of QVL is different from the one of BF.

Study bias

Inclusion and exclusion of participants

The inclusion criteria were, as mentioned, a height between 50 and 75 cm at the withers, an age between 1,5 and 8 years and a BCS between 4-6/9 according to the WSAWA standards (WSAVA, Global Veterinary Community).

The minimum height at the withers was chosen to ensure that the muscles were big enough to define when placing the AMG sensors at the skin above them. The maximum height was chosen to accommodate the size of the water treadmill, since a dog with a height above 75 cm at the withers would be at risk of compromising its locomotor pattern in the relatively small compartment of the water treadmill. It could be argued that the height criteria should have been narrowed if more uniform measurements were to be obtained. However, the locomotor pattern within dogs of different heights seemed very similar when observing the dogs walking in the water treadmill.

Even though only dogs within the height interval of 50 - 75 cm at the withers were included, the water levels used in the study were defined by anatomical landmarks which is assumed to make the results transferable to dogs of other heights. However, further studies are needed to ensure that this is the case.

Related to the attempt of ensuring transferable results, dogs of different breeds were included in this study. If dogs of just one breed were to be included the results would only represent a very specific population. The research area of locomotion in a water treadmill within breeds could, however, be very interesting to investigate but was not possible within the scopes of this study.

All dogs included in this study had an age between 1,5 - 8 years at the time of their trial. The reason for the minimum age of 1,5 years was that the dogs had to be fully grown in order to have a well-developed musculoskeletal system. The maximum age of 8 years was determined with the hopes of excluding dogs with undiagnosed age related musculoskeletal injuries. For future reference one could consider whether the maximum age should be lowered further in the attempt of minimizing this bias even more. Though, in this study precautions were made to minimize the bias in the form of obtaining a full anamnesis from the owner and having an authorized veterinarian perform a lameness examination prior to inclusion.

The last inclusion criteria of the dogs having a BCS of 4-6/9 according to the WSAVA standards (WSAVA, Global Veterinary Community) was determined since both overweight and underweight dogs would give rise to misleading results. Overweight dogs, with a BCS above 6/9, could be suspected to have a non-representable locomotor pattern for the population. Furthermore, when overweight a greater amount of fat is deposited in the tissue between the muscle and the AMG sensor on the skin surface which could be assumed to interfere with the measurements. On the other hand, when dogs are underweight they are at risk of having atrophic muscle tissue (Gerdin et al., 2016) that could be assumed to cause misleading results for the purpose of this study. To minimize bias regarding BCS the score was determined for each dog by an authorized veterinarian.

Experimental design

The experimental design of this study was, as mentioned previously, a controlled clinical trial. All dogs were exposed to the different water levels and speeds in the same order which might have given rise to bias in the form of an increased E parameter in the post-baseline measurements, discussed previosly. Thus, in hindsight one could consider applying a random order of which the dogs were tested at each water level and speed and hereby making it a randomized controlled trial.

Technical aspects

Obtaining measurements of muscle activity in an aquatic environment has so far been challenging, since no devices detecting muscle activity are made for this purpose (Masumoto & Mercer, 2008). Therefore, one could be skeptical about the influence of water on the results obtained by use of acoustic myography in this study. However, previous studies performed on humans have shown no influence from sweat on the results (Harrison, 2017; Harrison et al., 2013). It is therefore reasonable to expect no negative effect on the measurements as a consequence of introducing water to the environment. This theory is supported by the similarity of the pre-baseline and the post-baseline measurements. Furthermore, the acoustic gel placed between the skin surface and the sensor was observed to remain in sufficient quantities after the trials (Picture 5).

Picture 8 – Illustration of the amount of acoustic gel present after the trials.

When conferencing with different anatomical illustrations a possible bias occurs. Some illustrations suggest that M. Quadriceps vastus lateralis is partly covered by M. Tensor fascia latae (Aspinall & Cappello, 2015). If this is to be true one could consider whether the measurements obtained for M. Quadriceps vastus lateralis originates from M. Tensor fascia latae. This bias has been handled by performing autopsies on dog cadavers, donated to the University of Copenhagen for educational purposes, to confirm correct placement of the sensors and hereby ensure obtainment of measurements from M. Quadriceps vastus lateralis.

Another bias worth considering, with regards to the functionality of the sensors, is whether the thickness of the fur would influence the quality of the measurements. During the placement of the sensors it proved to be more difficult to establish contact between the skin and the sensor for the thick-coated dogs than for the short-haired dogs, but with care it was done. To evaluate this bias the measurements from the thick-coated dogs were compared to those of the short-haired dogs, by comparing the real-time recordings on the iPad, and no differences were observed. Therefore, this bias is considered not to have influenced the results.

One could furthermore question if the lack of habituation to walk in a water treadmill would influence the measurements. In attempt to prevent this bias the dogs were introduced to the water treadmill, without water at both speeds, prior to the sensors being placed. During this introduction a slightly awkward locomotion pattern was observed but after the sensors were placed, and the dogs walked in the water treadmill for the second time, a more natural locomotion pattern was observed. This was to be expected, since the work of Fischer & Lilje (p. 50, 2014) established that habituation occurs after a few minutes of introduction when walking on a treadmill without water. Furthermore, this bias was prevented by only using sequences of measurements obtained while the dogs were observed to walk with a natural locomotion pattern.

Further perspectives

Rehabilitation after cranial cruciate ligament rupture

Water treadmills are frequently used in rehabilitation following surgical stabilization of cranial cruciate ligament-deficient dogs (Bertocci et al., 2018).

The immobilization that occurs as a result of the surgical procedure will naturally cause atrophy of the pelvic limb muscles (Goldspink, 1999; Hawke & Garry, 2001). The aim of the rehabilitation is therefore to rebuild muscle mass as well as decrease the impact on the stifle joint during locomotion. To accommodate these requirements the water treadmill is an ideal choice of rehabilitation tool.

With increasing water level in the water treadmill, a clear effect on the locomotor pattern is observed. This is reflected by an increase in cycle time and swing phase while the stance phase is decreased (Bertocci et al., 2018). The decrease in stance phase will reduce the compressive forces affecting the stifle (Bertocci et al., 2018) and probably shorten the period at which QVL acts as a stabilizer. The increased swing phase, on the other hand, will activate the propulsive muscles such as BF working against the resistance of the water. This is supported by the results of this study where it is observed that the MF water level at 50 m/min is activating BF significantly more compared to lower water levels. The increased activation of BF seen at the MF water level at 50 m/min is assumed to stimulate hypertrophy in an atrophic BF, since the resistance training achieved by this setting can be hypothesized to cause minor myo-traumas in an atrophic muscle, stimulating proliferation and differentiation of satellite cells responsible for rebuilding muscle tissue (Hawke & Garry, 2001; Kraemer & Spiering, 2006). However, this hypothesis needs supportive basis from further studies.

Conclusion

The aim of this study was to investigate the effects of water level and speed in the water treadmill on the activation of M. Biceps femoris and M. Quadriceps vastus lateralis by use of acoustic myography.

To form the basis for further conclusions it was important to determine whether or not fatigue occurred during the trials. Since none of the AMG parameters decreased from the pre-baseline to the post-baseline measurements, it can be concluded that no fatigue occurred.

The results proved consistent effects on muscle activity when changing the speed from 30 m/min to 50 m/min. This increase in speed is therefore concluded to cause a decrease in efficiency/coordination and an increase in recruitment of muscle fibers. It could be theorized that the increase in speed applied in this study is simply not big enough to cause an increase in frequency as well. Further studies are needed to elaborate this theory.

When water was introduced, no matter the water level, an increase of the frequency was added to the effects of speed. It is therefore concluded that the resistance of the water, combined with the speed increase from 30 m/min to 50 m/min, initiates a higher activity of the muscles compared to when exposed to the same speed increase on dry land.

Furthermore, the use of hock-, tibial plateau- and mid femur water level showed consistent effects on muscle activity; at both hock- and tibial plateau water level, at a speed of 30 m/min, it was observed that the frequency of the recruited muscle fibers decreased in both M. Biceps femoris and M. Quadriceps vastus lateralis; when walking at mid femur water level, at a speed of 50 m/min, M. Biceps femoris showed a decrease of efficiency/coordination and increases in both recruitment and frequency of muscle fibers while M. Quadriceps vastus lateralis showed only a decreased efficiency/coordination.

Considering these results, the hock and tibial plateau water level, at a speed of 30 m/min, will be appropriate if endurance training is desired of both M. Biceps femoris and M. Quadriceps vastus lateralis while the mid femur water level at 50 m/min is suitable when sprint training of M. Biceps femoris is the purpose of the water treadmill exercise. Furthermore, this setting could be argued to be useful for rehabilitation following surgical stabilization of cranial cruciate ligament-deficient dogs.

The scope of this study has only allowed evaluation of the effect of two speed settings and four water levels on the muscle activity when comparing these based on a single trial for each participant. Consequently, further studies within the area of muscle activation during water treadmill locomotion is required in order to clarify the possible effects of other speed- and water level settings and furthermore to evaluate the long-term effects of water treadmill exercise.

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Appendix

Appendix A: Facebook advertisement for participants

SEARCH OF DOGS FOR MASTER THESIS – PLEASE SHARE

Does your dog love water?

Is your dog 50-75 cm high at the withers?

Is your dog 1,5-8 years old?

We are two veterinary students who are looking for dogs to participate in our master thesis.

We are going to investigate the most efficient way of activating the hind limb muscles by walking in a water treadmill. This means, that we will need healthy dogs to walk in a water treadmill at different speeds and at different water levels, while they are wearing sensors measuring the muscle activity. The sensors will be fastened by use of self-adhesive pads (this is a non-invasive procedure and your dog will not need to be shaved).

All in all, this takes 2-3 hours including an examination of your dog prior to the testing in the water treadmill.

It will take place on Tuesdays and Thursdays, from week 6 to week 19, at the University Hospital for Companion Animals at Dyrlægevej 16, Frederiksberg.

If this has your interest, please contact us at 22424392 or 60169978

Best regards Eja and Tanja

P.S. Please share this post to help us find as many dogs as possible for our project.

Appendix B: Contract between the dog owner and the authors

UNIVERSITY OF COPENHAGEN

Contract between the owner of the dog, Tanja Andersen and Eja Oppenlænder Pedersen

Pt. 1) The owner of the dog, ______________________________, hereby grants the students, *Tanja Andersen* and *Eja Oppenlænder Pedersen,* permission to use the data collected from this study in their master thesis.

Pt. 2) The dog owner can stop the experiment at any point in time if he/she feels that the dog is uncomfortable with the situation.

Pt. 3) The dog owner is not obligated to participate in further examination of the dog. Likewise, the dog owner is not entitled to further examinations than those required for the thesis.

Pt. 4) Since all measurements are done with non-invasive equipment, and have not given rise to injuries before, the students *Tanja Andersen* and *Eja Oppenlænder Pedersen,* renounces all responsibility for any injuries that might occur during the trials.

Pt. 5) The examination is free of charge.

By the signatures below, both the dog owner and the students agree with the contract and the conditions covered in Pt. 1-5.

Date: ______________________

Signature, Dog owner: ____________________________

Date: ______________________

Signature, Tanja Andersen: ____________________________

Signature, Eja Oppenlænder Pedersen: ____________________________

Appendix C: Protocol

Master Thesis
Tanja Andersen (vlz125)
Eja Oppenlænder Pedersen (pmw809)

Date: __________

Name of owner: ____________________ Name of dog: ___________ BCS (1-9): _______________

Breed of dog: ______________________ Age of dog: _____________ Weight: _________________

Height of dog: ______________________ Gender of dog: __________ Intact (yes/no): ___________

Checklist – Master Thesis Trials	
Aprox. 10 min where the dog is being acquainted with the surroundings of the rehab area, while owner fills out questionnaire.	
Introduction of the dog to the water treadmill without CURO sensors	
Lameness examination of the dog	None / Lame
Placement of sensors at M. biceps femoris connected to port L1 and R1 using Lenes CURO.	
Placement of sensors at M. quadriceps vastus lateralis connected to port L2 and R2 using Lenes CURO.	
The dog is placed in the water treadmill and the owner is placed in front of the dog (if they choose to stay in the room) with treats.	
Baseline measurements without water at 30 m/min	Time:
Baseline measurements without water at 50 m/min	Time:
Measurements with water to the hock at 30 m/min	Time:
Measurements with water to the hock at 50 m/min	Time:
Measurements with water to the tibial plateau (TP) at 30 m/min	Time:
Measurements with water to TP at 50 m/min	Time:
Measurements with water to mid femur level (MF) at 30 m/min	Time:
Measurements with water to MF at 50 m/min	Time:
Measurements without water at 30 m/min (to compare with baseline)	Time:
Measurements without water at 50 m/min (to compare with baseline)	Time:

Appendix D: Questionnaire

Master Thesis
Tanja Andersen (vlz125)
Eja Oppenlænder Pedersen (pmw809)

Date: ___________

Owner information:

Name	
Telephone number	
e-mail address	

Dog information:

Name of the dog	
Birthdate	
Breed	
Training/use (hunting, agility, swimming etc.)	
Diagnosed injuries of the musculoskeletal system	
Other disease history of the musculoskeletal system	

Appendix E: Individual results after data processing – Changed thresholds are marked with yellow

Nelly			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.1	8.4	6.1	7.5	-2.6	8.8	7.8	8.6	8.4
S-max: 0.99 bits		50m/min	6.5	8.3	3.9	6.2	-3.9	6.3	8	8.3	7.5
Treshold: 0.1 bits											
	Hock	30m/min	7.9	8.5	6.7	7.7	-1.8	7.9	7.9	9.1	8.3
		50m/min	4.7	8.1	6.7	6.5	-3.3	6.5	7.8	8.5	7.6
	Tibial plateau	30m/min	8.2	8.7	6.9	7.9	-2.9	8.7	8.3	9.7	8.9
		50m/min	6.9	8.5	6.5	7.3	-2.4	6.8	8.3	9.2	8.1
	Mid femur	30m/min	8.1	8.5	2.8	6.5	-6.8	8.8	8.4	9	8.7
		50m/min	5.3	8.2	4	5.8	-7.5	7.7	8.4	8.9	8.3
	Post-baseline	30m/min	8.7	8.5	4.7	7.3	-3.8	8.9	7.6	9.2	8.6
		50m/min	6.3	8.2	5.2	6.6	-6.2	8.2	8.5	9.2	8.6
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.4	8.7	6.5	7.9	-0.5	8.9	8.9	6.3	8.0
S-max: 0.99 bits		50m/min	7.2	8.2	5.8	7.1	0.2	6.9	8.8	5.3	7.0
Treshold: 0.08 bits											
	Hock	30m/min	8.8	7.9	3.9	6.9	-6	9.7	8.9	8	8.9
		50m/min	6.9	7.5	5.4	6.6	-5.8	8.4	8.9	8.3	8.5
	Tibial plateau	30m/min	7.8	8.3	7.4	7.8	-3.7	9.7	9.1	8.4	9.1
		50m/min	5	8.1	7.9	7.0	-4.3	9.5	8.8	7	8.4
	Mid femur	30m/min	8.6	8.9	9	8.8	0.1	9.7	9.1	7.6	8.8
		50m/min	7.3	8.6	8.9	8.3	-2.5	9.7	9	8.6	9.1
	Post-baseline	30m/min	8.7	8.4	8.6	8.6	-3	9.8	9	9.9	9.6
		50m/min	7.6	7.6	6.5	7.2	-5	8.4	8.8	9.5	8.9

Kiki			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.7	5.8	9.5	8.3	0.2	8.9	8.6	7.3	8.3
S-max: 0.99 bits		50m/min	5.2	7.1	8.9	7.1	-1.1	7	7.7	7.6	7.4
Treshold: 0.1 bits											
	Hock	30m/min	7.6	7.8	8.5	8.0	0.7	7.6	7.9	7.7	7.7
		50m/min	7	8.6	7.6	7.7	3.7	5.4	7.3	6.8	6.5
	Tibial plateau	30m/min	9.4	8.8	7.5	8.6	0.5	8.6	8	8.6	8.4
		50m/min	5	7.7	5.1	5.9	-5.5	8	8.3	7	7.8
	Mid femur	30m/min	7.8	8.2	5.6	7.2	0.7	5.8	7.8	7.3	7.0
		50m/min	2.9	6.8	6	5.2	0.3	2.9	6.3	6.2	5.1
	Post-baseline	30m/min	9.8	8.7	8.4	9.0	-0.9	9.7	8.7	9.4	9.3
		50m/min	8.8	8.1	8.4	8.4	-0.6	8.7	8.2	9	8.6
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.5	8	7.8	7.8	-1.4	7.9	7.7	9.1	8.2
S-max: 0.99 bits		50m/min	4.3	7.7	5.9	6.0	-6	7.5	7.3	9.1	8.0
Treshold: 0.1 bits											
	Hock	30m/min	5.8	6.7	7	6.5	-4.4	7.4	7.4	9.1	8.0
		50m/min	2.8	6.4	5.7	5.0	-6.6	5.5	7.4	8.6	7.2
	Tibial plateau	30m/min	6	6.5	7.7	6.7	-3	9.2	7	7	7.7
		50m/min	3.2	5.9	7.4	5.5	-1.7	4.4	5.1	8.7	6.1
	Mid femur	30m/min	6.9	8	6.5	7.1	3.2	7.4	3.9	6.9	6.1
		50m/min	3.1	7.5	8	6.2	-0.5	4.4	6.9	7.8	6.4
	Post-baseline	30m/min	7.8	8.2	9.4	8.5	2.6	7.9	6.8	8.1	7.6
		50m/min	3.9	7.2	9.1	6.7	-6.8	9.6	8.9	8.5	9.0

Nala	Water level	Speed	Left				Balance	Right			
			E	S	T	ESTi	Balance	E	S	T	ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	5	8	7	6.7	-4.6	9	8.6	7	8.2
S-max: 0.99 bits		50m/min	5.4	8.2	7.2	6.9	-3.8	8.1	8.5	8	8.2
Treshold: 0.1 bits											
	Hock	30m/min	7.7	8.4	8	8.0	-3.2	9.4	9	8.9	9.1
		50m/min	6	8.2	8.1	7.4	-3.8	7.9	8.7	9.5	8.7
	Tibial plateau	30m/min	6.5	8.5	8.1	7.7	-3	9.3	8.6	8.2	8.7
		50m/min	5.9	8.2	5.7	6.6	-5.9	8.5	8.7	8.5	8.6
	Mid femur	30m/min	4.1	8	4.5	5.5	-3.4	9.8	8.8	1.4	6.7
		50m/min	3	7.8	5.3	5.4	-9.2	9.7	8.9	6.7	8.4
	Post-baseline	30m/min	6	8.4	7.6	7.3	-2.7	8.1	8	8.6	8.2
		50m/min	4.7	8.3	7	6.7	-3.8	7.4	8	8.4	7.9
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.7	7.7	7.3	7.6	-1.9	8.3	8.6	7.7	8.2
S-max: 0.99 bits		50m/min	7.1	7.6	5.5	6.7	-1.2	7	7.6	6.8	7.1
Treshold: 0.1 bits											
	Hock	30m/min	8.7	8.3	7.4	8.1	-0.1	8.4	7.2	8.9	8.2
		50m/min	7.6	7.6	7.9	7.7	0.2	7.9	6.7	8.3	7.6
	Tibial plateau	30m/min	8.3	8.5	8.4	8.4	-0.8	8.9	8.6	8.5	8.7
		50m/min	8	8	7.6	7.9	1.2	6.6	7.8	8	7.5
	Mid femur	30m/min	8.4	8.6	8.3	8.4	0.5	8.5	8.7	7.6	8.3
		50m/min	6.6	8.4	8.4	7.8	1.8	6.8	7.2	7.6	7.2
	Post-baseline	30m/min	8.9	8.2	9	8.7	1.3	8.5	7.6	8.7	8.3
		50m/min	8	8.2	7.1	7.8	1.1	6.9	7.7	7.6	7.4

Berta	Water level	Speed	Left				Balance	Right			
			E	S	T	ESTi	Balance	E	S	T	ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	0	0	0	0	0	0	0	0	0
S-max: 0.99 bits		50m/min	0	0	0	0	0	0	0	0	0
Treshold: 0.1 bits											
	Hock	30m/min	0	0	0	0	0	0	0	0	0
		50m/min	0	0	0	0	0	0	0	0	0
	Tibial plateau	30m/min	0	0	0	0	0	0	0	0	0
		50m/min	0	0	0	0	0	0	0	0	0
	Mid femur	30m/min	0	0	0	0	0	0	0	0	0
		50m/min	0	0	0	0	0	0	0	0	0
	Post-baseline	30m/min	0	0	0	0	0	0	0	0	0
		50m/min	0	0	0	0	0	0	0	0	0
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.7	8.5	9.5	9.2	1.6	8.9	9.1	8.1	8.7
S-max: 0.99 bits		50m/min	9.7	9.3	9.9	9.6	8.4	6.1	7.3	7.1	6.8
Treshold: 0.06 bits											
	Hock	30m/min	9.8	8.9	8.9	9.2	3	8.6	8.8	7.2	8.2
		50m/min	8.8	8.6	9.4	8.9	13.4	5.1	7.6	0.7	4.5
	Tibial plateau	30m/min	8.9	8.9	9.5	9.1	3.3	9.8	5.2	9	8.0
		50m/min	9.7	9.3	9.4	9.5	8.4	9.5	8.8	1.7	6.7
	Mid femur	30m/min	9.2	9.1	9.9	9.4	5.2	8.3	8.3	6.4	7.7
		50m/min	9.5	9.2	9.6	9.4	13.6	3.3	8.7	2.7	4.9
	Post-baseline	30m/min	9.8	9	8.9	9.2	-0.2	9.8	9.2	8.9	9.3
		50m/min	9.9	9.4	9.4	9.6	10	6.1	6.7	5.9	6.2

Luna	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	3.1	6.2	7.3	5.5	-5.1	8.2	8.5	5	7.2
S-max: 0.99 bits		50m/min	1.7	4.5	7.8	4.7	-8	7.3	8.2	6.5	7.3
Treshold: 0.1 bits											
	Hock	30m/min	4.7	6	8.3	6.3	-4.2	8	8.8	6.4	7.7
		50m/min	2.3	5.2	5.2	4.2	-4.7	6.2	7.9	3.3	5.8
	Tibial plateau	30m/min	3.8	6.6	8.2	6.2	-5.7	7.7	8.6	8	8.1
		50m/min	1.3	3.8	6	3.7	-8.6	5.1	7.5	7.1	6.6
	Mid femur	30m/min	0	0	0	0.0	0	0	0	0	0.0
		50m/min	0	0	0	0.0	0	0	0	0	0.0
	Post-baseline	30m/min	6.5	8.5	7.5	7.5	2.4	8.2	8.7	3.2	6.7
		50m/min	5.5	8.3	8	7.3	0.5	7.1	8.1	6.1	7.1
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	6.3	6.8	8	7.0	-0.3	5.9	7.7	7.8	7.1
S-max: 0.99 bits		50m/min	5.1	6.5	7.9	6.5	-1.2	6.2	7.2	7.3	6.9
Treshold: 0.1 bits											
	Hock	30m/min	7	7.9	7.6	7.5	0.5	7.7	6.7	7.6	7.3
		50m/min	5.6	6.8	8	6.8	0.5	6.6	7.1	6.2	6.6
	Tibial plateau	30m/min	6.9	7.8	8.7	7.8	-0.4	7.4	8.3	8.1	7.9
		50m/min	5.7	7.8	8.1	7.2	-0.5	7	7.7	7.4	7.4
	Mid femur	30m/min	0	0	0	0.0	0	0	0	0	0.0
		50m/min	0	0	0	0.0	0	0	0	0	0.0
	Post-baseline	30m/min	7.5	7.6	6.2	7.1	-3.4	8.3	8.5	7.9	8.2
		50m/min	5.8	7.7	7.5	7.0	-2.1	7.6	7.8	7.7	7.7

Manny	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.2	8.5	5	6.9	-1.4	8.6	8.5	5	7.4
S-max: 0.99 bits		50m/min	6.5	7.9	4.7	6.4	0.4	7.6	8	3.1	6.2
Treshold: 0.1 bits											
	Hock	30m/min	7.3	8.2	5.9	7.1	-1.1	7.8	8.3	6.4	7.5
		50m/min	5.3	8.1	6.3	6.6	-1.4	7	8.4	5.7	7.0
	Tibial plateau	30m/min	7.8	8.5	5.9	7.4	-6.2	9.7	9	9.7	9.5
		50m/min	6	8.4	6.7	7.0	-3.6	7.7	8.7	8.3	8.2
	Mid femur	30m/min	6.8	8.1	3.8	6.2	-6.8	9.6	8.7	7.2	8.5
		50m/min	4.7	8.3	4.1	5.7	-7.8	9.5	8.6	6.8	8.3
	Post-baseline	30m/min	7.6	8	6.1	7.2	2.9	9.6	8.4	0.8	6.3
		50m/min	7.5	8	4.8	6.8	-7.2	9.1	8.8	9.6	9.2
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	0	0	0	0.0	0	0	0	0	0.0
S-max: 0.99 bits		50m/min	0	0	0	0.0	0	0	0	0	0.0
Treshold: 0.1 bits											
	Hock	30m/min	0	0	0	0.0	0	0	0	0	0.0
		50m/min	0	0	0	0.0	0	0	0	0	0.0
	Tibial plateau	30m/min	0	0	0	0.0	0	0	0	0	0.0
		50m/min	0	0	0	0.0	0	0	0	0	0.0
	Mid femur	30m/min	0	0	0	0.0	0	0	0	0	0.0
		50m/min	0	0	0	0.0	0	0	0	0	0.0
	Post-baseline	30m/min	0	0	0	0.0	0	0	0	0	0.0
		50m/min	0	0	0	0.0	0	0	0	0	0.0

Zimba			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8	8.7	5.5	7.4	-6.1	9.7	9.2	9.4	9.4
S-max: 0.99 bits		50m/min	5.3	8.4	1.5	5.1	-13.1	9.7	8.9	9.7	9.4
Treshold: 0.08 bits											
	Hock	30m/min	7.3	8.7	9.3	8.4	0.5	7.6	7.8	9.4	8.3
		50m/min	4.5	8.5	8.2	7.1	-2.9	6.8	8	9.3	8.0
	Tibial plateau	30m/min	8.1	8.7	7.9	8.2	-2.6	9.1	8.8	9.4	9.1
		50m/min	5.5	7.7	6.8	6.7	-2.6	6.7	6.4	9.5	7.5
	Mid femur	30m/min	5.3	8.1	1.2	4.9	-8.5	8	5.6	9.5	7.7
		50m/min	1.9	6.1	3.5	3.8	-9	5.5	6.9	8.1	6.8
	Post-baseline	30m/min	6	7.1	3.5	5.5	-10.1	9.4	8.1	9.2	8.9
		50m/min	2.6	7.1	2.1	3.9	-13	9.3	5.9	9.6	8.3
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.8	8.7	5.9	8.1	1	7.7	8.7	7	7.8
S-max: 0.99 bits		50m/min	9.4	8.8	7.8	8.7	3.6	6.3	8.5	7.6	7.5
Treshold: 0.1 bits											
	Hock	30m/min	9.6	8.6	9.3	9.2	0.1	9.6	8.6	9.2	9.1
		50m/min	9.4	8.7	9.7	9.3	4.5	6.7	8.2	8.4	7.8
	Tibial plateau	30m/min	9.7	8.7	9.5	9.3	2.7	8.2	8.6	8.4	8.4
		50m/min	9.8	9	4.7	7.8	1.2	5.3	8.2	8.8	7.4
	Mid femur	30m/min	8.2	6.9	5.9	7.0	-4	9.8	8.9	6.3	8.3
		50m/min	5.9	5.7	1.4	4.3	-10	6.9	8.6	7.5	7.7
	Post-baseline	30m/min	9.1	8.4	8.2	8.6	2.1	7.3	8.2	8.1	7.9
		50m/min	8.5	8.3	8	8.3	4.6	4.4	7.6	8.2	6.7

Kofi			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	2.8	7.1	0.6	3.5	-13.6	8.2	9.3	6.6	8.0
S-max: 0.99 bits		50m/min	2.3	5.7	1.9	3.3	-12.7	6.4	9.2	7	7.5
Treshold: 0.04 bits											
	Hock	30m/min	5.8	7.1	4.1	5.7	-11.5	9.2	9.5	9.8	9.5
		50m/min	4.3	8.4	4.9	5.9	-8.2	8.2	9.5	8.1	8.6
	Tibial plateau	30m/min	6.1	9	4.4	6.5	-5.5	9.8	9.4	5.8	8.3
		50m/min	3.5	8.3	6	5.9	-8.9	9.5	9.5	7.7	8.9
	Mid femur	30m/min	4.4	8.7	2.9	5.3	-9.6	9.8	9	6.8	8.5
		50m/min	1.2	7.7	0.1	3.0	-18.3	8.6	9.4	9.3	9.1
	Post-baseline	30m/min	6.2	8.4	2.6	5.7	-10.8	8.7	9.4	9.9	9.3
		50m/min	1.5	8.1	1.3	3.6	-15.2	8.2	9.3	8.6	8.7
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	8	7.4	6.5	7.3	0	5.5	7.9	8.5	7.3
S-max: 0.99 bits		50m/min	7.4	8.6	7.6	7.9	6.1	2.1	7.2	8.2	5.8
Treshold: 0.1 bits											
	Hock	30m/min	8.7	8.1	8.9	8.6	3	7	7.2	8.5	7.6
		50m/min	7.6	8	7.9	7.8	3.5	4.4	7	8.6	6.7
	Tibial plateau	30m/min	8.2	8	8.3	8.2	0.2	8.7	7.4	8.2	8.1
		50m/min	8.2	8.3	8.1	8.2	2.8	7.9	7	6.9	7.3
	Mid femur	30m/min	7.8	8.5	7.1	7.8	-0.2	6.3	8	9.3	7.9
		50m/min	5.6	5.4	4.2	5.1	-7.9	6.8	8.3	8	7.7
	Post-baseline	30m/min	8.1	6.6	5.2	6.6	-0.3	7.1	6.3	6.8	6.7
		50m/min	7.1	7.4	6.1	6.9	3	4.6	6.9	6.1	5.9

Saga			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.4	8.7	9.2	9.1	4.7	6.6	6.8	9.2	7.5
S-max: 0.99 bits		50m/min	7.8	8.4	9	8.4	5.4	5.3	5.7	8.8	6.6
Treshold: 0.1 bits											
	Hock	30m/min	8.4	8	9.1	8.5	0.4	8	7.6	9.5	8.4
		50m/min	6.9	8.3	9.1	8.1	3.3	5.2	6.9	8.9	7.0
	Tibial plateau	30m/min	8.6	8.1	9	8.6	0.5	8	7.8	9.4	8.4
		50m/min	3	7.1	8	6.0	-3.6	6.4	6.3	9	7.2
	Mid femur	30m/min	6.9	7.5	9	7.8	0.9	7.2	6.1	9.2	7.5
		50m/min	2.9	5	6.7	4.9	-4.1	4.3	5.5	8.9	6.2
	Post-baseline	30m/min	7.4	7.8	8.5	7.9	0.9	7.4	6.5	8.9	7.6
		50m/min	7.5	8	8.7	8.1	0	7.4	7.6	9.2	8.1
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.2	8.6	7.2	8.0	0.8	8.6	8.3	6.3	7.7
S-max: 0.99 bits		50m/min	7	8.2	7	7.4	-0.5	6.9	8.1	7.7	7.6
Treshold: 0.1 bits											
	Hock	30m/min	7.9	8.7	6.7	7.8	-2	9.2	8.8	7.3	8.4
		50m/min	4.4	8.5	6.9	6.6	-1.5	6.2	8.5	6.6	7.1
	Tibial plateau	30m/min	8.9	8.7	7.9	8.5	1.7	8.1	8.4	7.3	7.9
		50m/min	5.4	8.1	8.1	7.2	-2.7	6.6	8.7	9	8.1
	Mid femur	30m/min	9.2	8.9	6.5	8.2	3.7	7.2	8.1	5.6	7.0
		50m/min	3.8	8.3	7.3	6.5	7.4	2.1	6.2	3.7	4.0
	Post-baseline	30m/min	6.7	7.6	8.5	7.6	-1.6	8.4	7.7	8.3	8.1
		50m/min	6.8	8.1	6	7.0	-1.1	6.2	8.1	7.7	7.3

Goonie			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.9	7.6	7.6	7.7	-1	7.5	7.6	9	8.0
S-max: 0.99 bits		50m/min	7.1	7.3	6.3	6.9	-4.2	7.6	8.4	8.9	8.3
Treshold: 0.1 bits											
	Hock	30m/min	5.5	4.9	8.8	6.4	-3.3	6.5	6.9	9.1	7.5
		50m/min	5.9	7.5	6.3	6.6	-4	6.9	7.5	9.3	7.9
	Tibial plateau	30m/min	8.3	8.5	8.8	8.5	2.2	6.8	7.1	9.5	7.8
		50m/min	3.2	7.1	8	6.1	-5.6	7.4	7.3	9.2	8.0
	Mid femur	30m/min	5.9	7	7.4	6.8	-3.5	7.2	7.9	8.7	7.9
		50m/min	0.3	6	0.6	2.3	-9	2.6	7.1	6.2	5.3
	Post-baseline	30m/min	7.6	7.6	6.7	7.3	-4.3	8.5	8.2	9.5	8.7
		50m/min	6.4	7.6	5.4	6.5	-6.8	8.8	7.9	9.5	8.7
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	5.7	6.4	7.3	6.5	-1.6	6.8	7.6	6.6	7.0
S-max: 0.99 bits		50m/min	4.9	7.1	7.9	6.6	6.4	2.7	5.1	5.7	4.5
Treshold: 0.1 bits											
	Hock	30m/min	5.7	6.3	7.2	6.4	1.1	5.1	7.3	5.7	6.0
		50m/min	3.7	6.1	4.2	4.7	0.5	2.8	5.8	4.9	4.5
	Tibial plateau	30m/min	5.8	7.5	9	7.4	4.8	4.7	6.1	6.7	5.8
		50m/min	2.5	6.6	5.7	4.9	2.8	2.3	3.6	6.1	4.0
	Mid femur	30m/min	6.9	8	7.2	7.4	3.4	4.7	6.7	7.3	6.2
		50m/min	2.8	6.7	5.8	5.1	5	1.4	4.9	4	3.4
	Post-treatment	30m/min	6.1	6.6	8	6.9	1.1	5.9	7	6.7	6.5
		50m/min	5.1	6.5	8.4	6.7	2.3	3.9	7.6	6.2	5.9

Bounty	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.9	9.3	9.5	9.2	-0.6	9.5	9.2	9.6	9.4
S-max: 0.99 bits		50m/min	4.3	9	5.9	6.4	-1.1	6.6	9.2	4.5	6.8
Treshold: 0.06 bits											
	Hock	30m/min	6.5	8.2	8.4	7.7	-3.4	8.9	9.2	8.4	8.8
		50m/min	2.6	8.5	7.2	6.1	-5.2	6.4	9.1	8	7.8
	Tibial plateau	30m/min	5.3	8.1	9.1	7.5	-4.9	9	9.2	9.2	9.1
		50m/min	3.2	8.5	5.5	5.7	-2	4.6	9	5.6	6.4
	Mid femur	30m/min	4.8	8.8	6.6	6.7	0.9	7.2	8.9	3.2	6.4
		50m/min	0.8	7.5	0.1	2.8	-3.7	2.6	7.7	1.8	4.0
	Post-baseline	30m/min	8.4	8.9	4.6	7.3	1.1	8.8	9.1	2.9	6.9
		50m/min	0.8	5	8.1	4.6	-5.9	7.6	9.1	3.1	6.6
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.6	9.2	5.3	7.4	-4.7	8	9.2	9.6	8.9
S-max: 0.99 bits		50m/min	3.8	9	6.9	6.6	-3.9	8	9.3	6.3	7.9
Treshold: 0.06 bits											
	Hock	30m/min	8.8	9	8.5	8.8	0.4	8.6	7.4	9.9	8.6
		50m/min	3.6	8.8	7.7	6.7	-0.2	5.3	8.4	6.6	6.8
	Tibial plateau	30m/min	6.5	7.8	9.1	7.8	-2.3	8.8	7	9.9	8.6
		50m/min	2.8	7.2	6.6	5.5	-5.6	6.3	8	7.9	7.4
	Mid femur	30m/min	6.2	8.5	7.5	7.4	-4.5	8.3	8.8	9.6	8.9
		50m/min	3.5	7.2	2	4.2	-5.9	3.4	7.9	7.3	6.2
	Post-baseline	30m/min	9.8	9.4	8.9	9.4	4.2	8.8	9.3	5.8	8.0
		50m/min	8.4	9	6.9	8.1	-3.1	9.7	9.1	8.6	9.1

Perle	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.9	8.4	6.8	7.7	-0.7	8.1	7.6	8.1	7.9
S-max: 0.99 bits		50m/min	4.7	7.4	7.8	6.6	-1.9	5.7	7.6	8.5	7.3
Treshold: 0.1 bits											
	Hock	30m/min	9.9	8.9	8.9	9.2	3	7.3	8	9.4	8.2
		50m/min	5.4	7.9	7.8	7.0	2.5	3.4	7.2	8	6.2
	Tibial plateau	30m/min	9.4	7.9	9.1	8.8	3.3	6.5	7.3	9.3	7.7
		50m/min	5.1	7.6	9.2	7.3	5.6	3.1	5.4	7.8	5.4
	Mid femur	30m/min	6.2	7.6	8.9	7.6	-2.4	7.4	8	9.7	8.4
		50m/min	1.3	5.8	5.1	4.1	-8.2	4.3	7.6	8.5	6.8
	Post-baseline	30m/min	8.7	8.1	8.5	8.4	3.3	7.1	6.9	8	7.3
		50m/min	6	7.9	9.1	7.7	1.7	5.4	7.2	8.7	7.1
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.1	5.9	6.2	6.4	-2.2	6.4	7.4	7.6	7.1
S-max: 0.99 bits		50m/min	5.8	5	6.6	5.8	9.2	0.4	3.1	4.7	2.7
Treshold: 0.1 bits											
	Hock	30m/min	7	7.7	6.8	7.2	1.1	5	7	8.4	6.8
		50m/min	3.4	7.5	4.8	5.2	0.7	1.9	7.1	6	5.0
	Tibial plateau	30m/min	7.1	8.3	7.3	7.6	0.6	7	7.3	7.8	7.4
		50m/min	2.9	7.3	5.8	5.3	3.7	0.7	5.2	6.4	4.1
	Mid femur	30m/min	6.1	8.3	6.3	6.9	2.1	3.3	7.1	8.2	6.2
		50m/min	1.4	6.9	6.6	5.0	4.4	0.5	3.3	6.7	3.5
	Post-baseline	30m/min	7.5	7.8	7.2	7.5	1	7.4	6.9	7.2	7.2
		50m/min	6.5	6.6	6.2	6.4	6.1	1.6	5.4	6.2	4.4

Minnie			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.5	8.7	5.9	8.0	4	5.3	7.2	7.6	6.7
S-max: 0.99 bits		50m/min	5.9	8.3	9	7.7	5.9	4.8	7	5.5	5.8
Treshold: 0.1 bits											
	Hock	30m/min	9.5	8.5	9.3	9.1	8.8	4.9	5.9	7.7	6.2
		50m/min	9.1	8.6	9.3	9.0	9.2	4.4	6.9	6.5	5.9
	Tibial plateau	30m/min	9.8	8	9	8.9	3	8.6	8.7	6.5	7.9
		50m/min	8.4	8.6	8.8	8.6	10.1	3.7	5.3	6.7	5.2
	Mid femur	30m/min	7	7.8	8	7.6	2.1	5.1	7.1	8.5	6.9
		50m/min	5.2	7.3	7.1	6.5	1.2	5.1	7.7	5.6	6.1
	Post-baseline	30m/min	9.5	8.6	7.8	8.6	-0.1	8.5	8	9.5	8.7
		50m/min	6.3	7.1	8.7	7.4	-0.2	6.7	8.3	7.3	7.4
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.5	8.5	8.9	9.0	1.1	9	8.6	8.2	8.6
S-max: 0.99 bits		50m/min	7.7	7.8	9	8.2	1.6	8.1	8.6	6.2	7.6
Treshold: 0.1 bits											
	Hock	30m/min	8.2	7.3	9.7	8.4	-0.7	9	8.3	8.6	8.6
		50m/min	7.2	7.9	9.4	8.2	3.9	6.3	8.3	6	6.9
	Tibial plateau	30m/min	7.5	7.9	9.5	8.3	-3.4	9.9	9	9.4	9.4
		50m/min	6.5	7.4	9.3	7.7	-0.5	7.7	8.8	7.2	7.9
	Mid femur	30m/min	7.5	7.7	9.6	8.3	4.4	7	5.6	7.8	6.8
		50m/min	6.2	7.8	9.3	7.8	0	7.3	8.1	7.9	7.8
	Post-baseline	30m/min	9.1	8.3	9.9	9.1	1.1	9.8	8.5	7.9	8.7
		50m/min	6.7	8.2	9.4	8.1	1.6	9	8.9	4.8	7.6

Shiva			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.8	8.3	4.8	7.3	-3.8	8.9	8.4	8.4	8.6
S-max: 0.99 bits		50m/min	8.7	8.5	6.9	8.0	0.5	6.1	8.4	9.1	7.9
Treshold: 0.1 bits											
	Hock	30m/min	9.4	8.9	6.7	8.3	-1.8	9.5	8.4	8.9	8.9
		50m/min	8.4	8.8	5.2	7.5	2.8	6.3	8.4	4.9	6.5
	Tibial plateau	30m/min	9.5	8.7	9.5	9.2	1.9	8.7	7.3	9.8	8.6
		50m/min	9.6	8.7	6.9	8.4	2.3	6.4	7.7	8.8	7.6
	Mid femur	30m/min	8.6	8.5	6.6	7.9	-0.9	7.2	8.1	9.3	8.2
		50m/min	6.6	8.4	5	6.7	-2.7	6.2	7.4	9.1	7.6
	Post-baseline	30m/min	8.5	8.4	4.7	7.2	-5.2	9	7.9	9.9	8.9
		50m/min	0.9	2.9	3.5	2.4	-7.2	1.9	6	6.6	4.8
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	6.8	8.1	8	7.6	-2.4	8.2	8.5	8.6	8.4
S-max: 0.99 bits		50m/min	5	7.7	7.9	6.9	-1.7	5.9	8.5	7.9	7.4
Treshold: 0.1 bits											
	Hock	30m/min	8.6	8	7.6	8.1	-0.3	8.9	8.5	7.1	8.2
		50m/min	6.9	7.4	9	7.8	-1.2	8.4	7.8	8.3	8.2
	Tibial plateau	30m/min	8.7	7.5	7.9	8.0	-2.9	9.2	8.7	9.1	9.0
		50m/min	7.5	7.7	7.8	7.7	-0.1	6.2	8.3	8.6	7.7
	Mid femur	30m/min	8.7	8.6	7.3	8.2	-0.4	8.1	8.5	8.4	8.3
		50m/min	5.3	8.4	6.2	6.6	-3.3	6.7	8.6	7.9	7.7
	Post-baseline	30m/min	8.8	8.4	9	8.7	1	8.7	8.5	8	8.4
		50m/min	7.1	8	6.9	7.3	-1.2	7.4	8.1	7.7	7.7

Donna			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	5.2	7.8	6.2	6.4	-3.2	6.7	7.2	8.5	7.5
S-max: 0.99 bits		50m/min	2.3	7	4.4	4.6	-3.5	3.6	6.5	7.1	5.7
Treshold: 0.1 bits											
	Hock	30m/min	5	8.2	5.7	6.3	-4	7.2	6.9	8.8	7.6
		50m/min	1.7	5.3	3.3	3.4	-7.7	3	6.5	8.5	6.0
	Tibial plateau	30m/min	2.4	8.2	6.8	5.8	-4.5	6.5	6.9	8.5	7.3
		50m/min	0.4	3.8	6.1	3.4	-6.6	2.6	6.6	7.7	5.6
	Mid femur	30m/min	1.6	7.4	6	5.0	-5.6	5.2	7.3	8.1	6.9
		50m/min	0.3	3.7	4.8	2.9	-5.1	1.9	7	5	4.6
	Post-baseline	30m/min	6.4	8.8	7.8	7.7	-1.7	7.5	7.8	9.4	8.2
		50m/min	1.3	6.5	5.4	4.4	-8.4	5	8	8.6	7.2
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	6.7	6.3	6.1	6.4	-3.7	7.8	7.8	7.2	7.6
S-max: 0.99 bits		50m/min	4.1	6.4	7.2	5.9	-1.9	5.8	7.5	6.3	6.5
Treshold: 0.1 bits											
	Hock	30m/min	5.8	8.1	7.1	7.0	-6.4	8.8	8.9	9.7	9.1
		50m/min	3.5	7.9	7.4	6.3	2.6	4.8	3.3	8.1	5.4
	Tibial plateau	30m/min	6.3	8.4	8.2	7.6	-4.5	9.2	8.8	9.4	9.1
		50m/min	2.5	5.5	7.3	5.1	1.6	2	5.2	6.5	4.6
	Mid femur	30m/min	3.4	7	8.2	6.2	-0.4	5.4	8.3	5.3	6.3
		50m/min	1	5.8	6.4	4.4	-3.1	2.6	7.6	6.1	5.4
	Post-baseline	30m/min	7.1	8.3	9	8.1	3.2	9.7	8.8	2.7	7.1
		50m/min	3.9	6.6	7.9	6.1	-0.6	5.9	6.4	6.7	6.3

Tanne			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	5.2	7.8	7.6	6.9	-0.6	7.3	8.2	5.7	7.1
S-max: 0.99 bits		50m/min	4.5	5	4.7	4.7	-5.6	6.4	7.6	5.8	6.6
Treshold: 0.1 bits											
	Hock	30m/min	6.2	7.7	5.6	6.5	-5.3	8.9	8.7	7.2	8.3
		50m/min	3.9	4.9	7.3	5.4	-1.1	4.8	8.2	4.2	5.7
	Tibial plateau	30m/min	6.9	8	6.8	7.2	0.2	6.9	8.7	5.9	7.2
		50m/min	3.8	6	5.1	5.0	-2.2	4.3	7.8	5	5.7
	Mid femur	30m/min	3.2	7.5	7	5.9	-3.3	5.3	8.6	7.1	7.0
		50m/min	0.9	5.1	7	4.3	-1	1.6	7.3	5.1	4.7
	Post-baseline	30m/min	5.8	7.4	5.2	6.1	-5	8.9	8.2	6.3	7.8
		50m/min	4.5	7.1	4.8	5.5	-6.6	8.2	8.4	6.4	7.7
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7	6.3	5.3	6.2	-1.7	7	7	6.3	6.8
S-max: 0.99 bits		50m/min	5.4	7.1	5.4	6.0	-0.7	5.6	7.2	5.8	6.2
Treshold: 0.1 bits											
	Hock	30m/min	5.1	8.5	5.9	6.5	-4.8	7.8	8.1	8.4	8.1
		50m/min	4.8	7.9	6	6.2	4.6	3.8	6.7	3.6	4.7
	Tibial plateau	30m/min	6.8	8.3	6.9	7.3	2.2	7	6	6.8	6.6
		50m/min	5.3	7.8	6.5	6.5	4.1	4.1	7.4	4	5.2
	Mid femur	30m/min	4.4	8.5	6.7	6.5	1.4	4.2	8.1	5.9	6.1
		50m/min	0.9	7.7	2.8	3.8	-1.1	1.4	7	4.1	4.2
	Post-baseline	30m/min	7.4	8.2	3.1	6.2	-4.4	7.8	7.7	7.6	7.7
		50m/min	6.1	8.1	3.9	6.0	-1	5	8	6.1	6.4

Romeo	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.5	8.5	1.2	5.7	-0.1	6.1	7.6	3.6	5.8
S-max: 0.99 bits		50m/min	5.8	8.3	3.7	5.9	1.6	3.6	7.3	5.3	5.4
Treshold: 0.1 bits											
	Hock	30m/min	6.2	7.8	6.9	7.0	1.5	4.9	7.1	7.4	6.5
		50m/min	5.2	8.3	5.3	6.3	3.5	3.1	7.2	5	5.1
	Tibial plateau	30m/min	6.7	8.1	6.2	7.0	4.3	4.3	6.9	5.5	5.6
		50m/min	4.8	7	6.6	6.1	1.8	3.2	6.9	6.5	5.5
	Mid femur	30m/min	6.6	7.8	7.4	7.3	1.5	5.4	7.1	7.8	6.8
		50m/min	1.5	6.2	5.2	4.3	-5	3.3	7.4	7.2	6.0
	Post-baseline	30m/min	7.7	8.7	5.3	7.2	1.1	5.3	7.9	7.4	6.9
		50m/min	5.8	8.5	2.4	5.6	-2.3	4	7.4	7.6	6.3
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	4.4	7.6	7.3	6.4	-0.9	6.1	6.5	7.6	6.7
S-max: 0.99 bits		50m/min	3.1	6.2	5.1	4.8	-2.4	4.1	6.4	6.3	5.6
Treshold: 0.1 bits											
	Hock	30m/min	1.4	7.2	6.1	4.9	-3.2	2.8	7.2	7.9	6.0
		50m/min	1.7	5.7	5.1	4.2	-3.9	2.7	6.2	7.5	5.5
	Tibial plateau	30m/min	2.8	6.8	6.3	5.3	-3.8	4.1	7.1	8.5	6.6
		50m/min	1	6.7	6.8	4.8	-2.5	2.7	6.5	7.8	5.7
	Mid femur	30m/min	1.6	7.9	5.4	5.0	-6.4	6.1	7.6	7.6	7.1
		50m/min	0.9	6.8	5.6	4.4	-2.2	1.8	6.5	7.2	5.2
	Post-baseline	30m/min	2.6	8	6.3	5.6	-5	6.8	6.9	8.2	7.3
		50m/min	2.3	6.9	5.2	4.8	-3.9	4.1	6.2	8	6.1

Lika	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	3.6	8	7.2	6.3	-1.4	3.3	8.2	8.7	6.7
S-max: 0.99 bits		50m/min	2	7.3	6.4	5.2	1.1	1	7.4	6.2	4.9
Treshold: 0.1 bits											
	Hock	30m/min	5.4	6.8	8.3	6.8	2.6	3.9	6.6	7.4	6.0
		50m/min	3.7	6.3	5.1	5.0	2.1	1.8	6.2	5	4.3
	Tibial plateau	30m/min	6.5	8.1	8.6	7.7	-0.1	6.5	8.6	8.2	7.8
		50m/min	3.3	6.9	6.5	5.6	3.1	3.3	6.3	4	4.5
	Mid femur	30m/min	6.7	8.1	8.5	7.8	2.2	5.7	7.1	8.3	7.0
		50m/min	3.3	7.3	5.9	5.5	3.9	2.1	6.7	3.8	4.2
	Post-baseline	30m/min	4.7	7.6	7.8	6.7	0	3.9	8.2	8	6.7
		50m/min	2.7	7.2	7.3	5.7	1	2.3	7.3	6.6	5.4
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	6.2	8.6	7.4	7.4	0.4	6.1	8.5	7.2	7.3
S-max: 0.99 bits		50m/min	4	7.4	8	6.5	-0.4	4.8	8	7	6.6
Treshold: 0.1 bits											
	Hock	30m/min	8.3	8.7	9.1	8.7	3.5	7.8	7.7	7.1	7.5
		50m/min	4.8	7.5	8.2	6.8	2.7	5	4.6	8.2	5.9
	Tibial plateau	30m/min	8.7	6.8	9.7	8.4	1.4	8.9	6.9	8	7.9
		50m/min	5.3	7	9	7.1	0.3	6.7	8.3	6	7.0
	Mid femur	30m/min	8.5	8.2	9.6	8.8	2.1	8.9	8.7	6.6	8.1
		50m/min	8.3	8.3	8.9	8.5	3.8	6.8	8.6	6.3	7.2
	Post-baseline	30m/min	8.7	7.8	8.4	8.3	1.3	7.9	8.6	7.1	7.9
		50m/min	5.7	5.6	9	6.8	0.1	5.5	8	6.7	6.7

Barthez			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	3.2	6.4	5.9	5.2	-1.2	2.9	6.9	6.9	5.6
S-max: 0.99 bits		50m/min	1.4	2.4	3.7	2.5	-4.7	2.1	5	5.1	4.1
Treshold: 0.1 bits											
	Hock	30m/min	4.3	7.3	7.1	6.2	1.7	5.4	6.9	4.7	5.7
		50m/min	1.9	4.4	4.7	3.7	-1.5	3.1	5.4	4	4.2
	Tibial plateau	30m/min	4.8	6.7	5.7	5.7	-2.1	6.4	5.5	7.4	6.4
		50m/min	1.1	5	5.8	4.0	-2.8	3.1	6.1	5.5	4.9
	Mid femur	30m/min	5.2	6.3	4	5.2	-4.2	4.9	7.2	7.6	6.6
		50m/min	1.2	4.7	4.5	3.5	-4.6	4.2	5.8	5	5.0
	Post-baseline	30m/min	5.1	7.2	6	6.1	-0.5	5.6	6	7.2	6.3
		50m/min	2.6	5.7	3	3.8	-3.2	4.5	5.5	4.5	4.8
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	3.2	7.3	5.4	5.3	0.9	3.6	7.1	4.3	5.0
S-max: 0.99 bits		50m/min	3.2	4.2	5	4.1	1.1	1.8	5.2	4.3	3.8
Treshold: 0.1 bits											
	Hock	30m/min	4	7.1	5	5.4	-4.3	7.2	5.9	7.3	6.8
		50m/min	2.8	4.4	4.6	3.9	-2.3	3.2	5.7	5.2	4.7
	Tibial plateau	30m/min	5.3	7.2	6.2	6.2	-0.3	6	7.4	5.6	6.3
		50m/min	1.7	6.2	5.6	4.5	3.6	1.1	5.5	3.3	3.3
	Mid femur	30m/min	6.2	7.7	4.3	6.1	-2.2	7.2	8.1	5.1	6.8
		50m/min	3.2	7.6	6.5	5.8	2.1	2.5	7.9	4.8	5.1
	Post-baseline	30m/min	0.4	7.1	7.6	5.0	-4.2	5.5	7.2	6.6	6.4
		50m/min	3.4	6.2	7.3	5.6	2.5	3.2	5.9	5.3	4.8

Andy			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.8	8	6.7	7.5	1.1	5.8	7.8	7.8	7.1
S-max: 0.99 bits		50m/min	6.9	7.6	5.3	6.6	4.7	3.3	7.5	4.3	5.0
Treshold: 0.1 bits											
	Hock	30m/min	9.1	8.3	3.9	7.1	5.4	4.1	7.6	4.2	5.3
		50m/min	6.7	7.9	3.5	6.0	5.1	2.4	7.2	3.4	4.3
	Tibial plateau	30m/min	8.3	8.4	4.2	7.0	2.9	5.1	7.3	5.6	6.0
		50m/min	6.9	7.7	6.4	7.0	7.7	3.3	7	3	4.4
	Mid femur	30m/min	5.4	8.1	4.3	5.9	3.5	4.8	6.7	2.8	4.8
		50m/min	4	7	5	5.3	2.7	1.9	6.7	4.7	4.4
	Post-baseline	30m/min	8.1	8.5	2	6.2	-4.5	7.1	8.5	7.5	7.7
		50m/min	6.2	8.1	5.3	6.5	2.6	4	7.9	5.1	5.7
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	3.8	6.4	6.7	5.6	-3.1	6	7.1	6.9	6.7
S-max: 0.99 bits		50m/min	1.9	5.3	5.8	4.3	-4.4	4.1	6.5	6.8	5.8
Treshold: 0.1 bits											
	Hock	30m/min	3.9	7.8	5.9	5.9	-4	6.5	6.6	8.5	7.2
		50m/min	4.3	5	5.5	4.9	-3	4.6	6.6	6.6	5.9
	Tibial plateau	30m/min	4.7	4.7	7.8	5.7	-3.5	6.2	6.9	7.6	6.9
		50m/min	3.5	5.5	7	5.3	-0.3	4.5	6.8	5	5.4
	Mid femur	30m/min	4.9	6.8	7.6	6.4	-0.3	6.1	8.3	5.2	6.5
		50m/min	2.2	5.2	6	4.5	-2.2	3.1	6.5	6	5.2
	Post-baseline	30m/min	7.6	7.5	6.3	7.1	-1.5	8.5	7.3	7.1	7.6
		50m/min	4.9	7	6.8	6.2	-1.5	4.6	6.9	8.7	6.7

Koffi			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	4.3	7.8	6.8	6.3	0.8	4.9	6.2	7	6.0
S-max: 0.99 bits		50m/min	1	4.6	6.6	4.1	-7.5	4.6	7.9	7.2	6.6
Treshold: 0.1 bits											
	Hock	30m/min	3.4	7.3	7.4	6.0	-2	5.6	7.3	7.2	6.7
		50m/min	0.4	5	6.9	4.1	-4.7	3	7.4	6.6	5.7
	Tibial plateau	30m/min	5.9	8	8.1	7.3	2.5	4.3	7	8.2	6.5
		50m/min	1.7	6.9	5.9	4.8	-1.2	2.7	6	7	5.2
	Mid femur	30m/min	6.2	8	7	7.1	0.9	5.3	7.9	7.1	6.8
		50m/min	1.2	5.8	6	4.3	0.1	1.2	5.8	5.9	4.3
	Post-baseline	30m/min	4.1	7.8	3.9	5.3	-4	5.3	6.4	8.1	6.6
		50m/min	1	7	4.8	4.3	-0.5	0.1	5.6	7.6	4.4
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.2	7.1	5.7	6.7	-1	7.6	7.9	5.5	7.0
S-max: 0.99 bits		50m/min	6	7.7	7.7	7.1	1.6	6	8.3	5.5	6.6
Treshold: 0.1 bits											
	Hock	30m/min	8.1	7.1	7.1	7.4	-0.9	8.2	8.1	6.9	7.7
		50m/min	4.5	7	8.8	6.8	6.7	5	8	0.6	4.5
	Tibial plateau	30m/min	7.4	7.4	8.7	7.8	0.1	8.1	8.3	7	7.8
		50m/min	2	7.3	7.9	5.7	2.6	3.9	7	3.7	4.9
	Mid femur	30m/min	8.2	8.1	9.1	8.5	2.4	8.6	8.4	6	7.7
		50m/min	5	6.8	8.1	6.6	3	4.5	7.9	4.5	5.6
	Post-baseline	30m/min	6.8	6.4	3.9	5.7	-2.8	6.9	7.8	5.2	6.6
		50m/min	5.5	6	6.8	6.1	-0.4	3.9	8	6.8	6.2

Schnuden			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.8	9.5	8.6	9.0	7.5	6.1	9.2	4.1	6.5
S-max: 0.99 bits		50m/min	7.1	9.2	6.5	7.6	10	2.6	8.9	1.3	4.3
Treshold: 0.04 bits											
	Hock	30m/min	7.8	9.4	8.9	8.7	5.2	6.2	9.2	5.5	7.0
		50m/min	5	9.4	6.2	6.9	7.1	3.2	8.4	1.9	4.5
	Tibial plateau	30m/min	8	9.5	9.7	9.1	5.8	5.6	9.2	6.6	7.1
		50m/min	4.8	9.4	6.9	7.0	6.7	3	8.3	3.1	4.8
	Mid femur	30m/min	8.4	9	8.5	8.6	9.3	3.5	8.4	4.7	5.5
		50m/min	2.5	9	2.7	4.7	-2.1	1.9	8.8	5.6	5.4
	Post-baseline	30m/min	9.7	8.9	8.2	8.9	4.5	5.1	9.1	8.1	7.4
		50m/min	5.5	9.4	5	6.6	7.1	0.8	8.6	3.4	4.3
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.2	8.8	9.5	9.2	4.7	8.2	8.3	6.3	7.6
S-max: 0.99 bits		50m/min	9.4	8.5	8.6	8.8	5.4	6.3	8.3	6.5	7.0
Treshold: 0.1 bits											
	Hock	30m/min	9.8	8.9	8.3	9.0	1.6	8.4	8.3	8.7	8.5
		50m/min	6.6	8.4	8	7.7	4.3	4.4	8.1	6.2	6.2
	Tibial plateau	30m/min	9.6	8.7	4.3	7.5	-1.7	8.8	8.7	6.8	8.1
		50m/min	8.3	8.7	9.3	8.8	7.4	4.3	8.4	6.2	6.3
	Mid femur	30m/min	9.1	8.7	8.3	8.7	0.7	8.5	8.7	8.2	8.5
		50m/min	6.4	8.5	6.5	7.1	2.4	3.7	8.3	7	6.3
	Post-baseline	30m/min	9.2	8.6	7.3	8.4	5.1	7.9	6.9	5.2	6.7
		50m/min	8.3	8.7	10	9.0	10.2	3.7	6.6	6.5	5.6

Yuki	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.4	8.8	5.7	7.6	0	5.8	8.6	8.5	7.6
S-max: 0.99 bits		50m/min	5.9	8.1	7.6	7.2	-1.4	6.3	8.3	8.4	7.7
Treshold: 0.1 bits											
	Hock	30m/min	9.1	8.8	6.9	8.3	-1.8	9.5	8.9	8.2	8.9
		50m/min	4.9	8.3	4.2	5.8	-6.7	6.1	8.6	9.4	8.0
	Tibial plateau	30m/min	7.1	8.7	6.8	7.5	-3.6	9.2	8.8	8.2	8.7
		50m/min	6.8	7.5	5.3	6.5	-2.5	5.5	7.9	8.7	7.4
	Mid femur	30m/min	3.3	7.6	6.9	5.9	-0.1	3.9	7.9	6.1	6.0
		50m/min	1.8	7.4	5.3	4.8	-0.7	2.6	7.3	5.3	5.1
	Post-baseline	30m/min	7.2	8.4	5.3	7.0	-3.4	8.3	8.6	7.4	8.1
		50m/min	4.6	8.3	6.1	6.3	-3.2	5.7	8.6	7.9	7.4
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.8	8.4	7.8	8.0	-0.8	8	7.8	9	8.3
S-max: 0.99 bits		50m/min	7	8.7	8..4	7.9	-6.9	6.6	8.3	7.7	7.5
Treshold: 0.1 bits											
	Hock	30m/min	8.7	8.3	8.5	8.5	-1.6	8.8	8.4	9.9	9.0
		50m/min	5.8	8.2	7.6	7.2	-1.3	7.7	7	8.2	7.6
	Tibial plateau	30m/min	8.7	8.5	9	8.7	3	7.5	8.5	7.2	7.7
		50m/min	7.3	8.6	8.3	8.1	2.4	6.9	7.5	7.4	7.3
	Mid femur	30m/min	4.2	8.4	7.8	6.8	-2.5	5.7	8.6	8.6	7.6
		50m/min	3.6	8.2	7.8	6.5	-2.2	5.9	8.1	7.8	7.3
	Post-baseline	30m/min	7.7	8.8	8.3	8.3	0.4	7.3	8.5	8.6	8.1
		50m/min	6.3	8.6	8	7.6	1.4	5.8	8	7.7	7.2

Piqué	Water level	Speed	Left E	Left S	Left T	Left ESTi	Balance	Right E	Right S	Right T	Right ESTi
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.1	8.4	6.5	7.7	3.2	8.5	8.3	3	6.6
S-max: 0.99 bits		50m/min	7.7	8	5.2	7.0	0.1	8.1	7.7	5	6.9
Treshold: 0.1 bits											
	Hock	30m/min	7.6	8.5	6.5	7.5	-1.3	8.7	8.4	6.8	8.0
		50m/min	7.3	8.3	6.4	7.3	-1.4	7.8	8.5	7.1	7.8
	Tibial plateau	30m/min	8.6	8.8	8.3	8.6	-0.1	8.7	8.7	8.4	8.6
		50m/min	7.2	8.6	8.1	8.0	0.4	7.1	8.6	7.8	7.8
	Mid femur	30m/min	8.4	8.6	7.2	8.1	1.9	8.9	8.4	5	7.4
		50m/min	7.3	8.4	7.4	7.7	-0.5	7.2	8.7	7.7	7.9
	Post-baseline	30m/min	8.8	8.7	8.9	8.8	4.3	9.2	8.5	4.4	7.4
		50m/min	8.9	8.5	8.8	8.7	3	8.9	8.6	5.7	7.7
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	7.7	8.6	7.5	7.9	5.4	6.2	8.5	3.7	6.1
S-max: 0.99 bits		50m/min	7.3	8.4	7.4	7.7	4.8	5.7	8.3	4.3	6.1
Treshold: 0.1 bits											
	Hock	30m/min	8.4	8.8	7.7	8.3	4.4	6.2	8.4	5.9	6.8
		50m/min	8	8.2	7.1	7.8	1.1	8.9	8.3	5	7.4
	Tibial plateau	30m/min	8.5	8.8	5.7	7.7	3.9	6.6	8.3	4.2	6.4
		50m/min	8.3	8.3	5.8	7.5	-0.4	8.2	8.3	6.3	7.6
	Mid femur	30m/min	8.9	8.4	6.9	8.1	-0.9	8.3	8.7	8.1	8.4
		50m/min	8.4	8.7	6.2	7.8	-2.5	7.9	8.7	9.2	8.6
	Post-baseline	30m/min	8.1	8.6	7.1	7.9	5.3	5.9	8.4	4.2	6.2
		50m/min	8.3	8.6	7.7	8.2	3.2	7.3	8.4	5.7	7.1

Brutus			Left					Right			
	Water level	**Speed**	**E**	**S**	**T**	**ESTi**	**Balance**	**E**	**S**	**T**	**ESTi**
Biceps											
T-max: 120 Hz	Pre-baseline	30m/min	8.7	8.4	3.2	6.8	1.1	9.1	8.7	1.4	6.4
S-max: 0.99 bits		50m/min	7.4	8	4.5	6.6	0.8	8.4	8.3	2.4	6.4
Treshold: 0.1 bits											
	Hock	30m/min	7.2	7.6	5.5	6.8	1.4	6.6	8.1	4.2	6.3
		50m/min	8.3	8.5	7.4	8.1	7.6	7.7	8.4	0.5	5.5
	Tibial plateau	30m/min	9.8	9	10	9.6	5.3	9	8.2	6.3	7.8
		50m/min	9.5	8.8	9.6	9.3	4.4	6.9	8.3	8.3	7.8
	Mid femur	30m/min	9.8	8.9	5.2	8.0	2.4	9.1	8.7	3.7	7.2
		50m/min	7.7	8.2	2.7	6.2	6.6	5.3	6.5	0.2	4.0
	Post-baseline	30m/min	9.8	7.6	8.9	8.8	3.6	8.5	8.4	5.8	7.6
		50m/min	9.6	8.6	4.9	7.7	4.2	7.3	8.2	3.4	6.3
Quadriceps											
T-max: 120 Hz	Pre-baseline	30m/min	9.8	8.7	10	9.5	4	9.2	8.5	6.8	8.2
S-max: 0.99 bits		50m/min	8.6	8.7	6.9	8.1	-0.6	8.7	8.6	7.5	8.3
Treshold: 0.1 bits											
	Hock	30m/min	8.1	7.6	7.3	7.7	-2.7	8.7	8.7	8.3	8.6
		50m/min	8.9	8.6	8.9	8.8	0.8	8.4	8.4	8.8	8.5
	Tibial plateau	30m/min	9.5	8.7	9.5	9.2	1.5	9.7	8.7	7.8	8.7
		50m/min	9.7	8.8	8.9	9.1	0.1	8.9	8.4	10	9.1
	Mid femur	30m/min	9.9	9	6.8	8.6	-1.7	9.7	7.7	10	9.1
		50m/min	8.4	8.5	7.7	8.2	0.7	8.5	7.4	8	8.0
	Post-baseline	30m/min	8.2	8.3	5.8	7.4	-6	9.5	8.8	10	9.4
		50m/min	7.7	8.4	7.2	7.8	-2.1	7.8	8.5	9.1	8.5

Appendix F: M. Biceps femoris E-, S- & T-scores for all dogs at all water levels and speeds – Calculated means and standard deviations for right and left values are given at the bottom

		Pre-baseline 30 m/min			Pre-baseline 50 m/min			Hock 30 m/min			Hock 50 m/min		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	8.1	8.4	6.1	6.5	8.3	3.9	7.9	8.5	6.7	4.7	8.1	6.7
Left	Kiki	9.7	5.8	9.5	5.2	7.1	8.9	7.6	7.8	8.5	7	8.6	7.6
Left	Nala	5	8	7	5.4	8.2	7.2	7.7	8.4	8	6	8.2	8.1
Left	Luna	3.1	6.2	7.3	1.7	4.5	7.8	4.7	6	8.3	2.3	5.2	5.2
Left	Manny	7.2	8.5	5	6.5	7.9	4.7	7.3	8.2	5.9	5.3	8.1	6.3
Left	Zimba	8	8.7	5.5	5.3	8.4	1.5	7.3	8.7	9.3	4.5	8.5	8.2
Left	Kofi	2.8	7.1	0.6	2.3	5.7	1.9	5.8	7.1	4.1	4.3	8.4	4.9
Left	Saga	9.4	8.7	9.2	7.8	8.4	9	8.4	8	9.1	6.9	8.3	9.1
Left	Goonie	7.9	7.6	7.6	7.1	7.3	6.3	5.5	4.9	8.8	5.9	7.5	6.3
Left	Bounty	8.9	9.3	9.5	4.3	9	5.9	6.5	8.2	8.4	2.6	8.5	7.2
Left	Perle	7.9	8.4	6.8	4.7	7.4	7.8	9.9	8.9	8.9	5.4	7.9	7.8
Left	Minnie	9.5	8.7	5.9	5.9	8.3	9	9.5	8.5	9.3	9.1	8.6	9.3
Left	Shiva	8.8	8.3	4.8	8.7	8.5	6.9	9.4	8.9	6.7	8.4	8.8	5.2
Left	Donna	5.2	7.8	6.2	2.3	7	4.4	5	8.2	5.7	1.7	5.3	3.3
Left	Tanne	5.2	7.8	7.6	4.5	5	4.7	6.2	7.7	5.6	3.9	4.9	7.3
Left	Romeo	7.5	8.5	1.2	5.8	8.3	3.7	6.2	7.8	6.9	5.2	8.3	5.3
Left	Lika	3.6	8	7.2	2	7.3	6.4	5.4	6.8	8.3	3.7	6.3	5.1
Left	Barthez	3.2	6.4	5.9	1.4	2.4	3.7	4.3	7.3	7.1	1.9	4.4	4.7
Left	Andy	7.8	8	6.7	6.9	7.6	5.3	9.1	8.3	3.9	6.7	7.9	3.5
Left	Koffi	4.3	7.8	6.8	1	4.6	6.6	3.4	7.3	7.4	0.4	5	6.9
Left	Schnuden	8.8	9.5	8.6	7.1	9.2	6.5	7.8	9.4	8.9	5	9.4	6.2
Left	Yuki	8.4	8.8	5.7	5.9	8.1	7.6	9.1	8.8	6.9	4.9	8.3	4.2
Left	Piqué	8.1	8.4	6.5	7.7	8	5.2	7.6	8.5	6.5	7.3	8.3	6.4
Left	Brutus	8.7	8.4	3.2	7.4	8	4.5	7.2	7.6	5.5	8.3	8.5	7.4
Right	Nelly	8.8	7.8	8.6	6.3	8	8.3	7.9	7.9	9.1	6.5	7.8	8.5
Right	Kiki	8.9	8.6	7.3	7	7.7	7.6	7.6	7.9	7.7	5.4	7.3	6.8
Right	Nala	9	8.6	7	8.1	8.5	8	9.4	9	8.9	7.9	8.7	9.5
Right	Luna	8.2	8.5	5	7.3	8.2	6.5	8	8.8	6.4	6.2	7.9	3.3
Right	Manny	8.6	8.5	5	7.6	8	3.1	7.8	8.3	6.4	7	8.4	5.7
Right	Zimba	9.7	9.2	9.4	9.7	8.9	9.7	7.6	7.8	9.4	6.8	8	9.3
Right	Kofi	8.2	9.3	6.6	6.4	9.2	7	9.2	9.5	9.8	8.2	9.5	8.1
Right	Saga	6.6	6.8	9.2	5.3	5.7	8.8	8	7.6	9.5	5.2	6.9	8.9
Right	Goonie	7.5	7.6	9	7.6	8.4	8.9	6.5	6.9	9.1	6.9	7.5	9.3
Right	Bounty	9.5	9.2	9.6	6.6	9.2	4.5	8.9	9.2	8.4	6.4	9.1	8
Right	Perle	8.1	7.6	8.1	5.7	7.6	8.5	7.3	8	9.4	3.4	7.2	8
Right	Minnie	5.3	7.2	7.6	4.8	7	5.5	4.9	5.9	7.7	4.4	6.9	6.5
Right	Shiva	8.9	8.4	8.4	6.1	8.4	9.1	9.5	8.4	8.9	6.3	8.4	4.9
Right	Donna	6.7	7.2	8.5	3.6	6.5	7.1	7.2	6.9	8.8	3	6.5	8.5
Right	Tanne	7.3	8.2	5.7	6.4	7.6	5.8	8.9	8.7	7.2	4.8	8.2	4.2
Right	Romeo	6.1	7.6	3.6	3.6	7.3	5.3	4.9	7.1	7.4	3.1	7.2	5
Right	Lika	3.3	8.2	8.7	1	7.4	6.2	3.9	6.6	7.4	1.8	6.2	5
Right	Barthez	2.9	6.9	6.9	2.1	5	5.1	5.4	6.9	4.7	3.1	5.4	4
Right	Andy	5.8	7.8	7.8	3.3	7.5	4.3	4.1	7.6	4.2	2.4	7.2	3.4
Right	Koffi	4.9	6.2	7	4.6	7.9	7.2	5.6	7.3	7.2	3	7.4	6.6
Right	Schnuden	6.1	9.2	4.1	2.6	8.9	1.3	6.2	9.2	5.5	3.2	8.4	1.9
Right	Yuki	5.8	8.6	8.5	6.3	8.3	8.4	9.5	8.9	8.2	6.1	8.6	9.4
Right	Piqué	8.5	8.3	3	8.1	7.7	5	8.7	8.4	6.8	7.8	8.5	7.1
Right	Brutus	9.1	8.7	1.4	8.4	8.3	2.4	6.6	8.1	4.2	7.7	8.4	0.5
	Mean L	6.9625	8.0458	6.2667	5.1417	7.2708	5.8083	7.0333	7.9083	7.2792	5.0583	7.5542	6.3417
	Mean R	7.2417	8.0917	6.9167	5.7708	7.8	6.4	7.2333	7.9542	7.5958	5.275	7.7333	6.35
	SD L	2.2535	0.9079	2.2259	2.2635	1.6596	2.0753	1.7616	0.9956	1.5869	2.2411	1.4706	1.6389
	SD R	1.8973	0.8324	2.2125	2.1894	1.0104	2.2331	1.7272	0.9353	1.6828	1.978	0.9617	2.5545

		Tibial Plateau 30 m/min			Tibial Plateau 50 m/min			Mid Femur 30 m/min			Mid Femur 50 m/min		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	8.2	8.7	6.9	6.9	8.5	6.5	8.1	8.5	2.8	5.3	8.2	4
Left	Kiki	9.4	8.8	7.5	5	7.7	5.1	7.8	8.2	5.6	2.9	6.8	6
Left	Nala	6.5	8.5	8.1	5.9	8.2	5.7	4.1	8	4.5	3	7.8	5.3
Left	Luna	3.8	6.6	8.2	1.3	3.8	6	/	/	/	/	/	/
Left	Manny	7.8	8.5	5.9	6	8.4	6.7	6.8	8.1	3.8	4.7	8.3	4.1
Left	Zimba	8.1	8.7	7.9	5.5	7.7	6.8	5.3	8.1	1.2	1.9	6.1	3.5
Left	Kofi	6.1	9	4.4	3.5	8.3	6	4.4	8.7	2.9	1.2	7.7	0.1
Left	Saga	8.6	8.1	9	3	7.1	8	6.9	7.5	9	2.9	5	6.7
Left	Goonie	8.3	8.5	8.8	3.2	7.1	8	5.9	7	7.4	0.3	6	0.6
Left	Bounty	5.3	8.1	9.1	3.2	8.5	5.5	4.8	8.8	6.6	0.8	7.5	0.1
Left	Perle	9.4	7.9	9.1	5.1	7.6	9.2	6.2	7.6	8.9	1.3	5.8	5.1
Left	Minnie	9.8	8	9	8.4	8.6	8.8	7	7.8	8	5.2	7.3	7.1
Left	Shiva	9.5	8.7	9.5	9.6	8.7	6.9	8.6	8.5	6.6	6.6	8.4	5
Left	Donna	2.4	8.2	6.8	0.4	3.8	6.1	1.6	7.4	6	0.3	3.7	4.8
Left	Tanne	6.9	8	6.8	3.8	6	5.1	3.2	7.5	7	0.9	5.1	7
Left	Romeo	6.7	8.1	6.2	4.8	7	6.6	6.6	7.8	7.4	1.5	6.2	5.2
Left	Lika	6.5	8.1	8.6	3.3	6.9	6.5	6.7	8.1	8.5	3.3	7.3	5.9
Left	Barthez	4.8	6.7	5.7	1.1	5	5.8	5.2	6.3	4	1.2	4.7	4.5
Left	Andy	8.3	8.4	4.2	6.9	7.7	6.4	5.4	8.1	4.3	4	7	5
Left	Koffi	5.9	8	8.1	1.7	6.9	5.9	6.2	8	7	1.2	5.8	6
Left	Schnuden	8	9.5	9.7	4.8	9.4	6.9	8.4	9	8.5	2.5	9	2.7
Left	Yuki	7.1	8.7	6.8	6.8	7.5	5.3	3.3	7.6	6.9	1.8	7.4	5.3
Left	Piqué	8.6	8.8	8.3	7.2	8.6	8.1	8.4	8.6	7.2	7.3	8.4	7.4
Left	Brutus	9.8	9	10	9.5	8.8	9.6	9.8	8.9	5.2	7.7	8.2	2.7
Right	Nelly	8.7	8.3	9.7	6.8	8.3	9.2	8.8	8.4	9	7.7	8.4	8.9
Right	Kiki	8.6	8	8.6	8	8.3	7	5.8	7.8	7.3	2.9	6.3	6.2
Right	Nala	9.3	8.6	8.2	8.5	8.7	8.5	9.8	8.8	1.4	9.7	8.9	6.7
Right	Luna	7.7	8.6	8	5.1	7.5	7.1	/	/	/	/	/	/
Right	Manny	9.7	9	9.7	7.7	8.7	8.3	9.6	8.7	7.2	9.5	8.6	6.8
Right	Zimba	9.1	8.8	9.4	6.7	6.4	9.5	8	5.6	9.5	5.5	6.9	8.1
Right	Kofi	9.8	9.4	5.8	9.5	9.5	7.7	9.8	9	6.8	8.6	9.4	9.3
Right	Saga	8	7.8	9.4	6.4	6.3	9	7.2	6.1	9.2	4.3	5.5	8.9
Right	Goonie	6.8	7.1	9.5	7.4	7.3	9.2	7.2	7.9	8.7	2.6	7.1	6.2
Right	Bounty	9	9.2	9.2	4.6	9	5.6	7.2	8.9	3.2	2.6	7.7	1.8
Right	Perle	6.5	7.3	9.3	3.1	5.4	7.8	7.4	8	9.7	4.3	7.6	8.5
Right	Minnie	8.6	8.7	6.5	3.7	5.3	6.7	5.1	7.1	8.5	5.1	7.7	5.6
Right	Shiva	8.7	7.3	9.8	6.4	7.7	8.8	7.2	8.1	9.3	6.2	7.4	9.1
Right	Donna	6.5	6.9	8.5	2.6	6.6	7.7	5.2	7.3	8.1	1.9	7	5
Right	Tanne	6.9	8.7	5.9	4.3	7.8	5	5.3	8.6	7.1	1.6	7.3	5.1
Right	Romeo	4.3	6.9	5.5	3.2	6.9	6.5	5.4	7.1	7.8	3.3	7.4	7.2
Right	Lika	6.5	8.6	8.2	3.3	6.3	4	5.7	7.1	8.3	2.1	6.7	3.8
Right	Barthez	6.4	5.5	7.4	3.1	6.1	5.5	4.9	7.2	7.6	4.2	5.8	5
Right	Andy	5.1	7.3	5.6	3.3	7	3	4.8	6.7	2.8	1.9	6.7	4.7
Right	Koffi	4.3	7	8.2	2.7	6	7	5.3	7.9	7.1	1.2	5.8	5.9
Right	Schnuden	5.6	9.2	6.6	3	8.3	3.1	3.5	8.4	4.7	1.9	8.8	5.6
Right	Yuki	9.2	8.8	8.2	5.5	7.9	8.7	3.9	7.9	6.1	2.6	7.3	5.3
Right	Piqué	8.7	8.7	8.4	7.1	8.6	7.8	8.9	8.4	5	7.2	8.7	7.7
Right	Brutus	9	8.2	6.3	6.9	8.3	8.3	9.1	8.7	3.7	5.3	6.5	0.2
	Mean L	7.325	8.3167	7.6917	4.8708	7.4083	6.7292	6.12	8	6.06	2.95	6.86	4.53
	Mean R	7.625	8.0792	7.9958	5.3708	7.425	7.125	6.74	7.81	6.87	4.44	7.37	6.16
	SD L	1.9277	0.6505	1.5956	2.5369	1.4773	1.2678	1.989	0.6407	2.1362	2.2279	1.3964	2.1024
	SD R	1.6796	0.97	1.4442	2.1183	1.1807	1.8921	1.9416	0.9087	2.3449	2.6245	1.0615	2.2803

		Post-baseline 30 m/min			Post-baseline 50 m/min		
	Dog	E	S	T	E	S	T
Left	Nelly	8.7	8.5	4.7	6.3	8.2	5.2
Left	Kiki	9.8	8.7	8.4	8.8	8.1	8.4
Left	Nala	6	8.4	7.6	4.7	8.3	7
Left	Luna	6.5	8.5	7.5	5.5	8.3	8
Left	Manny	7.6	8	6.1	7.5	8	4.8
Left	Zimba	6	7.1	3.5	2.6	7.1	2.1
Left	Kofi	6.2	8.4	2.6	1.5	8.1	1.3
Left	Saga	7.4	7.8	8.5	7.5	8	8.7
Left	Goonie	7.6	7.6	6.7	6.4	7.6	5.4
Left	Bounty	8.4	8.9	4.6	0.8	5	8.1
Left	Perle	8.7	8.1	8.5	6	7.9	9.1
Left	Minnie	9.5	8.6	7.8	6.3	7.1	8.7
Left	Shiva	8.5	8.4	4.7	0.9	2.9	3.5
Left	Donna	6.4	8.8	7.8	1.3	6.5	5.4
Left	Tanne	5.8	7.4	5.2	4.5	7.1	4.8
Left	Romeo	7.7	8.7	5.3	5.8	8.5	2.4
Left	Lika	4.7	7.6	7.8	2.7	7.2	7.3
Left	Barthez	5.1	7.2	6	2.6	5.7	3
Left	Andy	8.1	8.5	2	6.2	8.1	5.3
Left	Koffi	4.1	7.8	3.9	1	7	4.8
Left	Schnuden	9.7	8.9	8.2	5.5	9.4	5
Left	Yuki	7.2	8.4	5.3	4.6	8.3	6.1
Left	Piqué	8.8	8.7	8.9	8.9	8.5	8.8
Left	Brutus	9.8	7.6	8.9	9.6	8.6	4.9
Right	Nelly	8.9	7.6	9.2	8.2	8.5	9.2
Right	Kiki	9.7	8.7	9.4	8.7	8.2	9
Right	Nala	8.1	8	8.6	7.4	8	8.4
Right	Luna	8.2	8.7	3.2	7.1	8.1	6.1
Right	Manny	9.6	8.4	0.8	9.1	8.8	9.6
Right	Zimba	9.4	8.1	9.2	9.3	5.9	9.6
Right	Kofi	8.7	9.4	9.9	8.2	9.3	8.6
Right	Saga	7.4	6.5	8.9	7.4	7.6	9.2
Right	Goonie	8.5	8.2	9.5	8.8	7.9	9.5
Right	Bounty	8.8	9.1	2.9	7.6	9.1	3.1
Right	Perle	7.1	6.9	8	5.4	7.2	8.7
Right	Minnie	8.5	8	9.5	6.7	8.3	7.3
Right	Shiva	9	7.9	9.9	1.9	6	6.6
Right	Donna	7.5	7.8	9.4	5	8	8.6
Right	Tanne	8.9	8.2	6.3	8.2	8.4	6.4
Right	Romeo	5.3	7.9	7.4	4	7.4	7.6
Right	Lika	3.9	8.2	8	2.3	7.3	6.6
Right	Barthez	5.6	6	7.2	4.5	5.5	4.5
Right	Andy	7.1	8.5	7.5	4	7.9	5.1
Right	Koffi	5.3	6.4	8.1	0.1	5.6	7.6
Right	Schnuden	5.1	9.1	8.1	0.8	8.6	3.4
Right	Yuki	8.3	8.6	7.4	5.7	8.6	7.9
Right	Piqué	9.2	8.5	4.4	8.9	8.6	5.7
Right	Brutus	8.5	8.4	5.8	7.3	8.2	3.4

Mean L	7.4292	8.1917	6.2708	4.8958	7.4792	5.7542
Mean R	7.775	8.0458	7.4417	6.1083	7.7917	7.1542
SD L	1.6504	0.5508	2.0681	2.6838	1.3743	2.2969
SD R	1.616	0.8562	2.4265	2.7362	1.0685	2.0709

Appendix G: M. Quadriceps vastus lateralis E-, S- & T-scores for all dogs at all water levels and speeds – Calculated means and standard deviations for right and left values are given at the bottom

		Pre-baseline 30 m/min			Pre-baseline 50 m/min			Hock 30 m/min			Hock 50 m/min		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	8.4	8.7	6.5	7.2	8.2	5.8	8.8	7.9	3.9	6.9	7.5	5.4
Left	Kiki	7.5	8	7.8	4.3	7.7	5.9	5.8	6.7	7	2.8	6.4	5.7
Left	Nala	7.7	7.7	7.3	7.1	7.6	5.5	8.7	8.3	7.4	7.6	7.6	7.9
Left	Berta	9.7	8.5	9.5	9.7	9.3	9.9	9.8	8.9	8.9	8.8	8.6	9.4
Left	Luna	6.3	6.8	8	5.1	6.5	7.9	7	7.9	7.6	5.6	6.8	8
Left	Zimba	9.8	8.7	5.9	9.4	8.8	7.8	9.6	8.6	9.3	9.4	8.7	9.7
Left	Kofi	8	7.4	6.5	7.4	8.6	7.6	8.7	8.1	8.9	7.6	8	7.9
Left	Saga	8.2	8.6	7.2	7	8.2	7	7.9	8.7	6.7	4.4	8.5	6.9
Left	Goonie	5.7	6.4	7.3	4.9	7.1	7.9	5.7	6.3	7.2	3.7	6.1	4.2
Left	Bounty	7.6	9.2	5.3	3.8	9	6.9	8.8	9	8.5	3.6	8.8	7.7
Left	Perle	7.1	5.9	6.2	5.8	5	6.6	7	7.7	6.8	3.4	7.5	4.8
Left	Minnie	9.5	8.5	8.9	7.7	7.8	9	8.2	7.3	9.7	7.2	7.9	9.4
Left	Shiva	6.8	8.1	8	5	7.7	7.9	8.6	8	7.6	6.9	7.4	9
Left	Donna	6.7	6.3	6.1	4.1	6.4	7.2	5.8	8.1	7.1	3.5	7.9	7.4
Left	Tanne	7	6.3	5.3	5.4	7.1	5.4	5.1	8.5	5.9	4.8	7.9	6
Left	Romeo	4.4	7.6	7.3	3.1	6.2	5.1	1.4	7.2	6.1	1.7	5.7	5.1
Left	Lika	6.2	8.6	7.4	4	7.4	8	8.3	8.7	9.1	4.8	7.5	8.2
Left	Barthez	3.2	7.3	5.4	3.2	4.2	5	4	7.1	5	2.8	4.4	4.6
Left	Andy	3.8	6.4	6.7	1.9	5.3	5.8	3.9	7.8	5.9	4.3	5	5.5
Left	Koffi	7.2	7.1	5.7	6	7.7	7.7	8.1	7.1	7.1	4.5	7	8.8
Left	Schnuden	9.2	8.8	9.5	9.4	8.5	8.6	9.8	8.9	8.3	6.6	8.4	8
Left	Yuki	7.8	8.4	7.8	7	8.7	8.4	8.7	8.3	8.5	5.8	8.2	7.6
Left	Piqué	7.7	8.6	7.5	7.3	8.4	7.4	8.4	8.8	7.7	8	8.2	7.1
Left	Brutus	9.8	8.7	10	8.6	8.7	6.9	8.1	7.6	7.3	8.9	8.6	8.9
Right	Nelly	8.9	8.9	6.3	6.9	8.8	5.3	9.7	8.9	8	8.4	8.9	8.3
Right	Kiki	7.9	7.7	9.1	7.5	7.3	9.1	7.4	7.4	9.1	5.5	7.4	8.6
Right	Nala	8.3	8.6	7.7	7	7.6	6.8	8.4	7.2	8.9	7.9	6.7	8.3
Right	Berta	8.9	9.1	8.1	6.1	7.3	7.1	8.6	8.8	7.2	5.1	7.6	0.7
Right	Luna	5.9	7.7	7.8	6.2	7.2	7.3	7.7	6.7	7.6	6.6	7.1	6.2
Right	Zimba	7.7	8.7	7	6.3	8.5	7.6	9.6	8.6	9.2	6.7	8.2	8.4
Right	Kofi	5.5	7.9	8.5	2.1	7.2	8.2	7	7.2	8.5	4.4	7	8.6
Right	Saga	8.6	8.3	6.3	6.9	8.1	7.7	9.2	8.8	7.3	6.2	8.5	6.6
Right	Goonie	6.8	7.6	6.6	2.7	5.1	5.7	5.1	7.3	5.7	2.8	5.8	4.9
Right	Bounty	8	9.2	9.6	8	9.3	6.3	8.6	7.4	9.9	5.3	8.4	6.6
Right	Perle	6.4	7.4	7.6	0.4	3.1	4.7	5	7	8.4	1.9	7.1	6
Right	Minnie	9	8.6	8.2	8.1	8.6	6.2	9	8.3	8.6	6.3	8.3	6
Right	Shiva	8.2	8.5	8.6	5.9	8.5	7.9	8.9	8.5	7.1	8.4	7.8	8.3
Right	Donna	7.8	7.8	7.2	5.8	7.5	6.3	8.8	8.9	9.7	4.8	3.3	8.1
Right	Tanne	7	7	6.3	5.6	7.2	5.8	7.8	8.1	8.4	3.8	6.7	3.6
Right	Romeo	6.1	6.5	7.6	4.1	6.4	6.3	2.8	7.2	7.9	2.7	6.2	7.5
Right	Lika	6.1	8.5	7.2	4.8	8	7	7.8	7.7	7.1	5	4.6	8.2
Right	Barthez	3.6	7.1	4.3	1.8	5.2	4.3	7.2	5.9	7.3	3.2	5.7	5.2
Right	Andy	6	7.1	6.9	4.1	6.5	6.8	6.5	6.6	8.5	4.6	6.6	6.6
Right	Koffi	7.6	7.9	5.5	6	8.3	5.5	8.2	8.1	6.9	5	8	0.6
Right	Schnuden	8.2	8.3	6.3	6.3	8.3	6.5	8.4	8.3	8.7	4.4	8.1	6.2
Right	Yuki	8	7.8	9	6.6	8.3	7.7	8.8	8.4	9.9	7.7	7	8.2
Right	Piqué	6.2	8.5	3.7	5.7	8.3	4.3	6.2	8.4	5.9	8.9	8.3	5
Right	Brutus	9.2	8.5	6.8	8.7	8.6	7.5	8.7	8.7	8.3	8.4	8.4	8.8

Mean L	7.3042	7.775	7.2125	6.0167	7.5042	7.1333	7.3417	7.9792	7.3958	5.5667	7.4417	7.2167
Mean R	7.3292	8.05	7.175	5.5667	7.4667	6.5792	7.725	7.85	8.0875	5.5833	7.1542	6.4792
SD L	1.7804	0.9944	1.3401	2.1526	1.3268	1.2907	2.1246	0.7425	1.4008	2.1835	1.1799	1.6704
SD R	1.3763	0.7059	1.4207	2.0926	1.4061	1.2279	1.6398	0.8408	1.1319	1.9967	1.3348	2.2921

	Dog	Tibial Plateau 30 m/min			Tibial Plateau 50 m/min			Mid Femur 30 m/min			Mid Femur 50 m/min		
		E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	7.8	8.3	7.4	5	8.1	7.9	8.6	8.9	9	7.3	8.6	8.9
Left	Kiki	6	6.5	7.7	3.2	5.9	7.4	6.9	8	6.5	3.1	7.5	8
Left	Nala	8.3	8.5	8.4	8	8	7.6	8.4	8.6	8.3	6.6	8.4	8.4
Left	Berta	8.9	8.9	9.5	9.7	9.3	9.4	9.2	9.1	9.9	9.5	9.2	9.6
Left	Luna	6.9	7.8	8.7	5.7	7.8	8.1	/	/	/	/	/	/
Left	Zimba	9.7	8.7	9.5	9.8	9	4.7	8.2	6.9	5.9	5.9	5.7	1.4
Left	Kofi	8.2	8	8.3	8.2	8.3	8.1	7.8	8.5	7.1	5.6	5.4	4.2
Left	Saga	8.9	8.7	7.9	5.4	8.1	8.1	9.2	8.9	6.5	3.8	8.3	7.3
Left	Goonie	5.8	7.5	9	2.5	6.6	5.7	6.9	8	7.2	2.8	6.7	5.8
Left	Bounty	6.5	7.8	9.1	2.8	7.2	6.6	6.2	8.5	7.5	3.5	7.2	2
Left	Perle	7.1	8.3	7.3	2.9	7.3	5.8	6.1	8.3	6.3	1.4	6.9	6.6
Left	Minnie	7.5	7.9	9.5	6.5	7.4	9.3	7.5	7.7	9.6	6.2	7.8	9.3
Left	Shiva	8.7	7.5	7.9	7.5	7.7	7.8	8.7	8.6	7.3	5.3	8.4	6.2
Left	Donna	6.3	8.4	8.2	2.5	5.5	7.3	3.4	7	8.2	1	5.8	6.4
Left	Tanne	6.8	8.3	6.9	5.3	7.8	6.5	4.4	8.5	6.7	0.9	7.7	2.8
Left	Romeo	2.8	6.8	6.3	1	6.7	6.8	1.6	7.9	5.4	0.9	6.8	5.6
Left	Lika	8.7	6.8	9.7	5.3	7	9	8.5	8.2	9.6	8.3	8.3	8.9
Left	Barthez	5.3	7.2	6.2	1.7	6.2	5.6	6.2	7.7	4.3	3.2	7.6	6.5
Left	Andy	4.7	4.7	7.8	3.5	5.5	7	4.9	6.8	7.6	2.2	5.2	6
Left	Koffi	7.4	7.4	8.7	2	7.3	7.9	8.2	8.1	9.1	5	6.8	8.1
Left	Schmuden	9.6	8.7	4.3	8.3	8.7	9.3	9.1	8.7	8.3	6.4	8.5	6.5
Left	Yuki	8.7	8.5	9	7.3	8.6	8.3	4.2	8.4	7.8	3.6	8.2	7.8
Left	Piqué	8.5	8.8	5.7	8.3	8.3	5.8	8.9	8.4	6.9	8.4	8.7	6.2
Left	Brutus	9.5	8.7	9.5	9.7	8.8	8.9	9.9	9	6.8	8.4	8.5	7.7
Right	Nelly	9.7	9.1	8.4	9.5	8.8	7	9.7	9.1	7.6	9.7	9	8.6
Right	Kiki	9.2	7	7	4.4	5.1	8.7	7.4	3.9	6.9	4.4	6.9	7.8
Right	Nala	8.9	8.6	8.5	6.6	7.8	8	8.5	8.7	7.6	6.8	7.2	7.6
Right	Berta	9.8	5.2	9	9.5	8.8	1.7	8.3	8.3	6.4	3.3	8.7	2.7
Right	Luna	7.4	8.3	8.1	7	7.7	7.4	/	/	/	/	/	/
Right	Zimba	8.2	8.6	8.4	5.3	8.2	8.8	9.8	8.9	6.3	6.9	8.6	7.5
Right	Kofi	8.7	7.4	8.2	7.9	7	6.9	6.3	8	9.3	6.8	8.3	8
Right	Saga	8.1	8.4	7.3	6.6	8.7	9	7.2	8.1	5.6	2.1	6.2	3.7
Right	Goonie	4.7	6.1	6.7	2.3	3.6	6.1	4.7	6.7	7.3	1.4	4.9	4
Right	Bounty	8.8	7	9.9	6.3	8	7.9	8.3	8.8	9.6	3.4	7.9	7.3
Right	Perle	7	7.3	7.8	0.7	5.2	6.4	3.3	7.1	8.2	0.5	3.3	6.7
Right	Minnie	9.9	9	9.4	7.7	8.8	7.2	7	5.6	7.8	7.3	8.1	7.9
Right	Shiva	9.2	8.7	9.1	6.2	8.3	8.6	8.1	8.5	8.4	6.7	8.6	7.9
Right	Donna	9.2	8.8	9.4	2	5.2	6.5	5.4	8.3	5.3	2.6	7.6	6.1
Right	Tanne	7	6	6.8	4.1	7.4	4	4.2	8.1	5.9	1.4	7	4.1
Right	Romeo	4.1	7.1	8.5	2.7	6.5	7.8	6.1	7.6	7.6	1.8	6.5	7.2
Right	Lika	8.9	6.9	8	6.7	8.3	6	8.9	8.7	6.6	6.8	8.6	6.3
Right	Barthez	6	7.4	5.6	1.1	5.5	3.3	7.2	8.1	5.1	2.5	7.9	4.8
Right	Andy	6.2	6.9	7.6	4.5	6.8	5	6.1	8.3	5.2	3.1	6.5	6
Right	Koffi	8.1	8.3	7	3.9	7	3.7	8.6	8.4	6	4.5	7.9	4.5
Right	Schmuden	8.8	8.7	6.8	4.3	8.4	6.2	8.5	8.7	8.2	3.7	8.3	7
Right	Yuki	7.5	8.5	7.2	6.9	7.5	7.4	5.7	8.6	8.6	5.9	8.1	7.8
Right	Piqué	6.6	8.3	4.2	8.2	8.3	6.3	8.3	8.7	8.1	7.9	8.7	9.2
Right	Brutus	9.7	8.7	7.8	8.9	8.4	10	9.7	7.7	10	8.5	7.4	8
	Mean L	7.4417	7.8625	8.0208	5.5042	7.5458	7.4542	7.087	8.2043	7.4696	4.7522	7.487	6.5304
	Mean R	7.9875	7.7625	7.7792	5.5542	7.3042	6.6625	7.2739	7.9522	7.287	4.6957	7.487	6.5522
	SD L	1.7067	0.9668	1.3781	2.7967	1.071	1.3098	2.1596	0.6442	1.4089	2.6382	1.1474	2.217
	SD R	1.5922	1.0684	1.2782	2.5667	1.4378	1.9891	1.7973	1.1862	1.4223	2.621	1.3492	1.7671

		Post-baseline 30 m/min			Post-baseline 50 m/min		
	Dog	E	S	T	E	S	T
Left	Nelly	8.7	8.4	8.6	7.6	7.6	6.5
Left	Kiki	7.8	8.2	9.4	3.9	7.2	9.1
Left	Nala	8.9	8.2	9	8	8.2	7.1
Left	Berta	9.8	9	8.9	9.9	9.4	9.4
Left	Luna	7.5	7.6	6.2	5.8	7.7	7.5
Left	Zimba	9.1	8.4	8.2	8.5	8.3	8
Left	Kofi	8.1	6.6	5.2	7.1	7.4	6.1
Left	Saga	6.7	7.6	8.5	6.8	8.1	6
Left	Goonie	6.1	6.6	8	5.1	6.5	8.4
Left	Bounty	9.8	9.4	8.9	8.4	9	6.9
Left	Perle	7.5	7.8	7.2	6.5	6.6	6.2
Left	Minnie	9.1	8.3	9.9	6.7	8.2	9.4
Left	Shiva	8.8	8.4	9	7.1	8	6.9
Left	Donna	7.1	8.3	9	3.9	6.6	7.9
Left	Tanne	7.4	8.2	3.1	6.1	8.1	3.9
Left	Romeo	2.6	8	6.3	2.3	6.9	5.2
Left	Lika	8.7	7.8	8.4	5.7	5.6	9
Left	Barthez	0.4	7.1	7.6	3.4	6.2	7.3
Left	Andy	7.6	7.5	6.3	4.9	7	6.8
Left	Koffi	6.8	6.4	3.9	5.5	6	6.8
Left	Schnuden	9.2	8.6	7.3	8.3	8.7	10
Left	Yuki	7.7	8.8	8.3	6.3	8.6	8
Left	Piqué	8.1	8.6	7.1	8.3	8.6	7.7
Left	Brutus	8.2	8.3	5.8	7.7	8.4	7.2
Right	Nelly	9.8	9	9.9	8.4	8.8	9.5
Right	Kiki	7.9	6.8	8.1	9.6	8.9	8.5
Right	Nala	8.5	7.6	8.7	6.9	7.7	7.6
Right	Berta	9.8	9.2	8.9	6.1	6.7	5.9
Right	Luna	8.3	8.5	7.9	7.6	7.8	7.7
Right	Zimba	7.3	8.2	8.1	4.4	7.6	8.2
Right	Kofi	7.1	6.3	6.8	4.6	6.9	6.1
Right	Saga	8.4	7.7	8.3	6.2	8.1	7.7
Right	Goonie	5.9	7	6.7	3.9	7.6	6.2
Right	Bounty	8.8	9.3	5.8	9.7	9.1	8.6
Right	Perle	7.4	6.9	7.2	1.6	5.4	6.2
Right	Minnie	9.8	8.5	7.9	9	8.9	4.8
Right	Shiva	8.7	8.5	8	7.4	8.1	7.7
Right	Donna	9.7	8.8	2.7	5.9	6.4	6.7
Right	Tanne	7.8	7.7	7.6	5	8	6.1
Right	Romeo	6.8	6.9	8.2	4.1	6.2	8
Right	Lika	7.9	8.6	7.1	5.5	8	6.7
Right	Barthez	5.5	7.2	6.6	3.2	5.9	5.3
Right	Andy	8.5	7.3	7.1	4.6	6.9	8.7
Right	Koffi	6.9	7.8	5.2	3.9	8	6.8
Right	Schnuden	7.9	6.9	5.2	3.7	6.6	6.5
Right	Yuki	7.3	8.5	8.6	5.8	8	7.7
Right	Piqué	5.9	8.4	4.2	7.3	8.4	5.7
Right	Brutus	9.5	8.8	10	7.8	8.5	9.1

Mean L	7.5708	8.0042	7.5042	6.4083	7.6208	7.3875
Mean R	7.975	7.9333	7.2833	5.925	7.6042	7.1667
SD L	2.1267	0.7555	1.7422	1.8512	1.0151	1.4238
SD R	1.2626	0.8681	1.7153	2.1293	1.0136	1.2589

Appendix H: Differences of various combinations of speed and water levels in M. Biceps femoris – Given at the bottom is the results of whether or not the differences were normally distributed, the statistical test used for analysis (t-test if normally distributed and if not, Wilcoxon signed rank test = WSR), the p-value and the mean.

		Diff 30 pre vs 30 post			Diff 50 pre vs 50 post			Diff 30 pre vs 50 pre			Diff 30 post vs 50 post		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	-0.6	-0.1	1.4	0.2	0.1	-1.3	1.6	0.1	2.2	2.4	0.3	-0.5
Left	Kiki	-0.1	-2.9	1.1	-3.6	-1	0.5	4.5	-1.3	0.6	1	0.6	0
Left	Nala	-1	-0.4	-0.6	0.7	-0.1	0.2	-0.4	-0.2	-0.2	1.3	0.1	0.6
Left	Luna	-3.4	-2.3	-0.2	-3.8	-3.8	-0.2	1.4	1.7	-0.5	1	0.2	-0.5
Left	Manny	-0.4	0.5	-1.1	-1	-0.1	-0.1	0.7	0.6	0.3	0.1	0	1.3
Left	Zimba	2	1.6	2	2.7	1.3	-0.6	2.7	0.3	4	3.4	0	1.4
Left	Kofi	-3.4	-1.3	-2	0.8	-2.4	0.6	0.5	1.4	-1.3	4.7	0.3	1.3
Left	Saga	2	0.9	0.7	0.3	0.4	0.3	1.6	0.3	0.2	-0.1	-0.2	-0.2
Left	Goonie	0.3	0	0.9	0.7	-0.3	0.9	0.8	0.3	1.3	1.2	0	1.3
Left	Bounty	0.5	0.4	4.9	3.5	4	-2.2	4.6	0.3	3.6	7.6	3.9	-3.5
Left	Perle	-0.8	0.3	-1.7	-1.3	-0.5	-1.3	3.2	1	-1	2.7	0.2	-0.6
Left	Minnie	0	0.1	-1.9	-0.4	1.2	0.3	3.6	0.4	-3.1	3.2	1.5	-0.9
Left	Shiva	0.3	-0.1	0.1	7.8	5.6	3.4	0.1	-0.2	-2.1	7.6	5.5	1.2
Left	Donna	-1.2	-1	-1.6	1	0.5	-1	2.9	0.8	1.8	5.1	2.3	2.4
Left	Tanne	-0.6	0.4	2.4	0	-2.1	-0.1	0.7	2.8	2.9	1.3	0.3	0.4
Left	Romeo	-0.2	-0.2	-4.1	0	-0.2	1.3	1.7	0.2	-2.5	1.9	0.2	2.9
Left	Lika	-1.1	0.4	-0.6	-0.7	0.1	-0.9	1.6	0.7	0.8	2	0.4	0.5
Left	Barthez	-1.9	-0.8	-0.1	-1.2	-3.3	0.7	1.8	4	2.2	2.5	1.5	3
Left	Andy	-0.3	-0.5	4.7	0.7	-0.5	0	0.9	0.4	1.4	1.9	0.4	-3.3
Left	Koffi	0.2	0	2.9	0	-2.4	1.8	3.3	3.2	0.2	3.1	0.8	-0.9
Left	Schnuden	-0.9	0.6	0.4	1.6	-0.2	1.5	1.7	0.3	2.1	4.2	-0.5	3.2
Left	Yuki	1.2	0.4	0.4	1.3	-0.2	1.5	2.5	0.7	-1.9	2.6	0.1	-0.8
Left	Piqué	-0.7	-0.3	-2.4	-1.2	-0.5	-3.6	0.4	0.4	1.3	-0.1	0.2	0.1
Left	Brutus	-1.1	0.8	-5.7	-2.2	-0.6	-0.4	1.3	0.4	-1.3	0.2	-1	4
Right	Nelly	-0.1	0.2	-0.6	-1.9	-0.5	-0.9	2.5	-0.2	0.3	0.7	-0.9	0
Right	Kiki	-0.8	-0.1	-2.1	-1.7	-0.5	-1.4	1.9	0.9	-0.3	1	0.5	0.4
Right	Nala	0.9	0.6	-1.6	0.7	0.5	-0.4	0.9	0.1	-1	0.7	0	0.2
Right	Luna	0	-0.2	1.8	0.2	0.1	0.4	0.9	0.3	-1.5	1.1	0.6	-2.9
Right	Manny	-1	0.1	4.2	-1.5	-0.8	-6.5	1	0.5	1.9	0.5	-0.4	-8.8
Right	Zimba	0.3	1.1	0.2	0.4	3	0.1	0	0.3	-0.3	0.1	2.2	-0.4
Right	Kofi	-0.5	-0.1	-3.3	-1.8	-0.1	-1.6	1.8	0.1	-0.4	0.5	0.1	1.3
Right	Saga	-0.8	0.3	0.3	-2.1	-1.9	-0.4	1.3	1.1	0.4	0	-1.1	-0.3
Right	Goonie	-1	-0.6	-0.5	-1.2	0.5	-0.6	-0.1	-0.8	0.1	-0.3	0.3	0
Right	Bounty	0.7	0.1	6.7	-1	0.1	1.4	2.9	0	5.1	1.2	0	-0.2
Right	Perle	1	0.7	0.1	0.3	0.4	-0.2	2.4	0	-0.4	1.7	-0.3	-0.7
Right	Minnie	-3.2	-0.8	-1.9	-1.9	-1.3	-1.8	0.5	0.2	2.1	1.8	-0.3	2.2
Right	Shiva	-0.1	0.5	-1.5	4.2	2.4	2.5	2.8	0	-0.7	7.1	1.9	3.3
Right	Donna	-0.8	-0.6	-0.9	-1.4	-1.5	-1.5	3.1	0.7	1.4	2.5	-0.2	0.8
Right	Tanne	-1.6	0	-0.6	-1.8	-0.8	-0.6	0.9	0.6	-0.1	0.7	-0.2	-0.1
Right	Romeo	0.8	-0.3	-3.8	-0.4	-0.1	-2.3	2.5	0.3	-1.7	1.3	0.5	-0.2
Right	Lika	-0.6	0	0.7	-1.3	0.1	-0.4	2.3	0.8	2.5	1.6	0.9	1.4
Right	Barthez	-2.7	0.9	-0.3	-2.4	-0.5	0.6	0.8	1.9	1.8	1.1	0.5	2.7
Right	Andy	-1.3	-0.7	0.3	-0.7	-0.4	-0.8	2.5	0.3	3.5	3.1	0.6	2.4
Right	Koffi	-0.4	-0.2	-1.1	4.5	2.3	-0.4	0.3	-1.7	-0.2	5.2	0.8	0.5
Right	Schnuden	1	0.1	-4	1.8	0.3	-2.1	3.5	0.3	2.8	4.3	0.5	4.7
Right	Yuki	-2.5	0	1.1	0.6	-0.3	0.5	-0.5	0.3	0.1	2.6	0	-0.5
Right	Piqué	-0.7	-0.2	-1.4	-0.8	-0.9	-0.7	0.4	0.6	-2	0.3	-0.1	-1.3
Right	Brutus	0.6	0.3	-4.4	1.1	0.1	-1	0.7	0.4	-1	1.2	0.2	2.4
	Mean	-0.5	-0.05	-0.265	-0.046	-0.1	-0.35	1.645833	0.5333	0.4875	2.1	0.4833	0.4021
	Norm?	Yes	No	Yes	No	No	No	Yes	No	Yes	No	No	No
	Test	t-test	WSR	t-test	WSR	WSR	WSR	t-test	WSR	t-test	WSR	WSR	WSR
	P-value	0.0067	0.8563	0.458	0.2614	0.1453	0.1198	4.75E-12	1E-05	0.0704	5E-09	0.0025	0.0675

	Dog	Diff 30 hock vs 50 hock			Diff 30 TP vs 50 TP			Diff 30 MF vs 50 MF			Diff 30 pre vs 30 hock		
		E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	3.2	0.4	0	1.3	0.2	0.4	2.8	0.3	-1.2	0.2	-0.1	-0.6
Left	Kiki	0.6	-0.8	0.9	4.4	1.1	2.4	4.9	1.4	-0.4	2.1	-2	1
Left	Nala	1.7	0.2	-0.1	0.6	0.3	2.4	1.1	0.2	-0.8	-2.7	-0.4	-1
Left	Luna	2.4	0.8	3.1	2.5	2.8	2.2				-1.6	0.2	-1
Left	Manny	2	0.1	-0.4	1.8	0.1	-0.8	2.1	-0.2	-0.3	-0.1	0.3	-0.9
Left	Zimba	2.8	0.2	1.1	2.6	1	1.1	3.4	2	-2.3	0.7	0	-3.8
Left	Kofi	1.5	-1.3	-0.8	2.6	0.7	-1.6	3.2	1	2.8	-3	0	-3.5
Left	Saga	1.5	-0.3	0	5.6	1	1	4	2.5	2.3	1	0.7	0.1
Left	Goonie	-0.4	-2.6	2.5	5.1	1.4	0.8	5.6	1	6.8	2.4	2.7	-1.2
Left	Bounty	3.9	-0.3	1.2	2.1	-0.4	3.6	4	1.3	6.5	2.4	1.1	1.1
Left	Perle	4.5	1	1.1	4.3	0.3	-0.1	4.9	1.8	3.8	-2	-0.5	-2.1
Left	Minnie	0.4	-0.1	0	1.4	-0.6	0.2	1.8	0.5	0.9	0	0.2	-3.4
Left	Shiva	1	0.1	1.5	-0.1	0	2.6	2	0.1	1.6	-0.6	-0.6	-1.9
Left	Donna	3.3	2.9	2.4	2	4.4	0.7	1.3	3.7	1.2	0.2	-0.4	0.5
Left	Tanne	2.3	2.8	-1.7	3.1	2	1.7	2.3	2.4	0	-1	0.1	2
Left	Romeo	1	-0.5	1.6	1.9	1.1	-0.4	5.1	1.6	2.2	1.3	0.7	-5.7
Left	Lika	1.7	0.5	3.2	3.2	1.2	2.1	3.4	0.8	2.6	-1.8	1.2	-1.1
Left	Barthez	2.4	2.9	2.4	3.7	1.7	-0.1	4	1.6	-0.5	-1.1	-0.9	-1.2
Left	Andy	2.4	0.4	0.4	1.4	0.7	-2.2	1.4	1.1	-0.7	-1.3	-0.3	2.8
Left	Koffi	3	2.3	0.5	4.2	1.1	2.2	5	2.2	1	0.9	0.5	-0.6
Left	Schnuden	2.8	0	2.7	3.2	0.1	2.8	5.9	0	5.8	1	0.1	-0.3
Left	Yuki	4.2	0.5	2.7	0.3	1.2	1.5	1.5	0.2	1.6	-0.7	0	-1.2
Left	Piqué	0.3	0.2	0.1	1.4	0.2	0.2	1.1	0.2	-0.2	0.5	-0.1	0
Left	Brutus	-1.1	-0.9	-1.9	0.3	0.2	0.4	2.1	0.7	2.5	1.5	0.8	-2.3
Right	Nelly	1.4	0.1	0.6	1.9	0	0.5	1.1	0	0.1	0.9	-0.1	-0.5
Right	Kiki	2.2	0.6	0.9	0.6	-0.3	1.6	2.9	1.5	1.1	1.3	0.7	-0.4
Right	Nala	1.5	0.3	-0.6	0.8	-0.1	-0.3	0.1	-0.1	-5.3	-0.4	-0.4	-1.9
Right	Luna	1.8	0.9	3.1	2.6	1.1	0.9				0.2	-0.3	-1.4
Right	Manny	0.8	-0.1	0.7	2	0.3	1.4	0.1	0.1	0.4	0.8	0.2	-1.4
Right	Zimba	0.8	-0.2	0.1	2.4	2.4	-0.1	2.5	-1.3	1.4	2.1	1.4	0
Right	Kofi	1	0	1.7	0.3	-0.1	-1.9	1.2	-0.4	-2.5	-1	-0.2	-3.2
Right	Saga	2.8	0.7	0.6	1.6	1.5	0.4	2.9	0.6	0.3	-1.4	-0.8	-0.3
Right	Goonie	-0.4	-0.6	-0.2	-0.6	-0.2	0.3	4.6	0.8	2.5	1	0.7	-0.1
Right	Bounty	2.5	0.1	0.4	4.4	0.2	3.6	4.6	1.2	1.4	0.6	0	1.2
Right	Perle	3.9	0.8	1.4	3.4	1.9	1.5	3.1	0.4	1.2	0.8	-0.4	-1.3
Right	Minnie	0.5	-1	1.2	4.9	3.4	-0.2	0	-0.6	2.9	0.4	1.3	-0.1
Right	Shiva	3.2	0	4	2.3	-0.4	1	1	0.7	0.2	-0.6	0	-0.5
Right	Donna	4.2	0.4	0.3	3.9	0.3	0.8	3.3	0.3	3.1	-0.5	0.3	-0.3
Right	Tanne	4.1	0.5	3	2.6	0.9	0.9	3.7	1.3	2	-1.6	-0.5	-1.5
Right	Romeo	1.8	-0.1	2.4	1.1	0	-1	2.1	-0.3	0.6	1.2	0.5	-3.8
Right	Lika	2.1	0.4	2.4	3.2	2.3	4.2	3.6	0.4	4.5	-0.6	1.6	1.3
Right	Barthez	2.3	1.5	0.7	3.3	-0.6	1.9	0.7	1.4	2.6	-2.5	0	2.2
Right	Andy	1.7	0.4	0.8	1.8	0.3	2.6	2.9	0	-1.9	1.7	0.2	3.6
Right	Koffi	2.6	-0.1	0.6	1.6	1	1.2	4.1	2.1	1.2	-0.7	-1.1	-0.2
Right	Schnuden	3	0.8	3.6	2.6	0.9	3.5	1.6	-0.4	-0.9	-0.1	0	-1.4
Right	Yuki	3.4	0.3	-1.2	3.7	0.9	-0.5	1.3	0.6	0.8	-3.7	-0.3	0.3
Right	Piqué	0.9	-0.1	-0.3	1.6	0.1	0.6	1.7	-0.3	-2.7	-0.2	-0.1	-3.8
Right	Brutus	-1.1	-0.3	3.7	2.1	-0.1	-2	3.8	2.2	3.5	2.5	0.6	-2.8
	Mean	1.9667	0.2875	1.0917	2.3542	0.7813	0.9167	2.7348	0.7957	1.1239	-0.031	0.1375	-0.846
	Norm?	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes
	Test	t-test	WSR	t-test	t-test	WSR	t-test	t-test	t-test	t-test	t-test	WSR	t-test
	P-value	4E-13	0.0329	3E-06	4E-15	6E-06	1E-04	1E-15	2E-06	0.0023	0.8837	0.2909	0.0023

		Diff 30 pre vs 30 TP			Diff 30 pre vs 30 MF			Diff 50 pre vs 50 hock			Diff 50 pre vs 50 TP		
	Dog	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**
Left	Nelly	-0.1	-0.3	-0.8	0	-0.1	3.3	1.8	0.2	-2.8	-0.4	-0.2	-2.6
Left	Kiki	0.3	-3	2	1.9	-2.4	3.9	-1.8	-1.5	1.3	0.2	-0.6	3.8
Left	Nala	-1.5	-0.5	-1.1	0.9	0	2.5	-0.6	0	-0.9	-0.5	0	1.5
Left	Luna	-0.7	-0.4	-0.9				-0.6	-0.7	2.6	0.4	0.7	1.8
Left	Manny	-0.6	0	-0.9	0.4	0.4	1.2	1.2	-0.2	-1.6	0.5	-0.5	-2
Left	Zimba	-0.1	0	-2.4	2.7	0.6	4.3	0.8	-0.1	-6.7	-0.2	0.7	-5.3
Left	Kofi	-3.3	-1.9	-3.8	-1.6	-1.6	-2.3	-2	-2.7	-3	-1.2	-2.6	-4.1
Left	Saga	0.8	0.6	0.2	2.5	1.2	0.2	0.9	0.1	-0.1	4.8	1.3	1
Left	Goonie	-0.4	-0.9	-1.2	2	0.6	0.2	1.2	-0.2	0	3.9	0.2	-1.7
Left	Bounty	3.6	1.2	0.4	4.1	0.5	2.9	1.7	0.5	-1.3	1.1	0.5	0.4
Left	Perle	-1.5	0.5	-2.3	1.7	0.8	-2.1	-0.7	-0.5	0	-0.4	-0.2	-1.4
Left	Minnie	-0.3	0.7	-3.1	2.5	0.9	-2.1	-3.2	-0.3	-0.3	-2.5	-0.3	0.2
Left	Shiva	-0.7	-0.4	-4.7	0.2	-0.2	-1.8	0.3	-0.3	1.7	-0.9	-0.2	0
Left	Donna	2.8	-0.4	-0.6	3.6	0.4	0.2	0.6	1.7	1.1	1.9	3.2	-1.7
Left	Tanne	-1.7	-0.2	0.8	2	0.3	0.6	0.6	0.1	-2.6	0.7	-1	-0.4
Left	Romeo	0.8	0.4	-5	0.9	0.7	-6.2	0.6	0	-1.6	1	1.3	-2.9
Left	Lika	-2.9	-0.1	-1.4	-3.1	-0.1	-1.3	-1.7	1	1.3	-1.3	0.4	-0.1
Left	Barthez	-1.6	-0.3	0.2	-2	0.1	1.9	-0.5	-2	-1	0.3	-2.6	-2.1
Left	Andy	-0.5	-0.4	2.5	2.4	-0.1	2.4	0.2	-0.3	1.8	0	-0.1	-1.1
Left	Koffi	-1.6	-0.2	-1.3	-1.9	-0.2	-0.2	0.6	-0.4	-0.3	-0.7	-2.3	0.7
Left	Schnuden	0.8	0	-1.1	0.4	0.5	0.1	2.1	-0.2	0.3	2.3	-0.2	-0.4
Left	Yuki	1.3	0.1	-1.1	5.1	1.2	-1.2	1	-0.2	3.4	-0.9	0.6	2.3
Left	Piqué	-0.5	-0.4	-1.8	-0.3	-0.2	-0.7	0.4	-0.3	-1.2	0.5	-0.6	-2.9
Left	Brutus	-1.1	-0.6	-6.8	-1.1	-0.5	-2	-0.9	-0.5	-2.9	-2.1	-0.8	-5.1
Right	Nelly	0.1	-0.5	-1.1	0	-0.6	-0.4	-0.2	0.2	-0.2	-0.5	-0.3	-0.9
Right	Kiki	0.3	0.6	-1.3	3.1	0.8	0	1.6	0.4	0.8	-1	-0.6	0.6
Right	Nala	-0.3	0	-1.2	-0.8	-0.2	5.6	0.2	-0.2	-1.5	-0.4	-0.2	-0.5
Right	Luna	0.5	-0.1	-3				1.1	0.3	3.2	2.2	0.7	-0.6
Right	Manny	-1.1	-0.5	-4.7	-1	-0.2	-2.2	0.6	-0.4	-2.6	-0.1	-0.7	-5.2
Right	Zimba	0.6	0.4	0	1.7	3.6	-0.1	2.9	0.9	0.4	3	2.5	0.2
Right	Kofi	-1.6	-0.1	0.8	-1.6	0.3	-0.2	-1.8	-0.3	-1.1	-3.1	-0.3	-0.7
Right	Saga	-1.4	-1	-0.2	-0.6	0.7	0	0.1	-1.2	-0.1	-1.1	-0.6	-0.2
Right	Goonie	0.7	0.5	-0.5	0.3	-0.3	0.3	0.7	0.9	-0.4	0.2	1.1	-0.3
Right	Bounty	0.5	0	0.4	2.3	0.3	6.4	0.2	0.1	-3.5	2	0.2	-1.1
Right	Perle	1.6	0.3	-1.2	0.7	-0.4	-1.6	2.3	0.4	0.5	2.6	2.2	0.7
Right	Minnie	-3.3	-1.5	1.1	0.2	0.1	-0.9	0.4	0.1	-1	1.1	1.7	-1.2
Right	Shiva	0.2	1.1	-1.4	1.7	0.3	-0.9	-0.2	0	4.2	-0.3	0.7	0.3
Right	Donna	0.2	0.3	0	1.5	-0.1	0.4	0.6	0	-1.4	1	-0.1	-0.6
Right	Tanne	0.4	-0.5	-0.2	2	-0.4	-1.4	1.6	-0.6	1.6	2.1	-0.2	0.8
Right	Romeo	1.8	0.7	-1.9	0.7	0.5	-4.2	0.5	0.1	0.3	0.4	0.4	-1.2
Right	Lika	-3.2	-0.4	0.5	-2.4	1.1	0.4	-0.8	1.2	1.2	-2.3	1.1	2.2
Right	Barthez	-3.5	1.4	-0.5	-2	-0.3	-0.7	-1	-0.4	1.1	-1	-1.1	-0.4
Right	Andy	0.7	0.5	2.2	1	1.1	5	0.9	0.3	0.9	0	0.5	1.3
Right	Koffi	0.6	-0.8	-1.2	-0.4	-1.7	-0.1	1.6	0.5	0.6	1.9	1.9	0.2
Right	Schnuden	0.5	0	-2.5	2.6	0.8	-0.6	-0.6	0.5	-0.6	-0.4	0.6	-1.8
Right	Yuki	-3.4	-0.2	0.3	1.9	0.7	2.4	0.2	-0.3	-1	0.8	0.4	-0.3
Right	Piqué	-0.2	-0.4	-5.4	-0.4	-0.1	-2	0.3	-0.8	-2.1	1	-0.9	-2.8
Right	Brutus	0.1	0.5	-4.9	0	0	-2.3	0.7	-0.1	1.9	1.5	0	-5.9
	Mean	-0.373	-0.129	-1.252	0.7348	0.1913	0.1457	0.2896	-0.108	-0.242	0.3354	0.1188	-0.823
	Norm?	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes
	Test	t-test	WSR	WSR	t-test	WSR	WSR	t-test	WSR	t-test	t-test	t-test	t-test
	P-value	0.1014	0.4456	7E-05	0.0086	0.0388	0.9163	0.1002	0.3157	0.4016	0.1516	0.4769	0.0073

		Diff 50 pre vs 50 MF			Diff 30 hock vs 30 TP			Diff 30 hock vs 30 MF			Diff 50 hock vs 50 TP		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	1.2	0.1	-0.1	-0.3	-0.2	-0.2	-0.2	0	3.9	-2.2	-0.4	0.2
Left	Kiki	2.3	0.3	2.9	-1.8	-1	1	-0.2	-0.4	2.9	2	0.9	2.5
Left	Nala	2.4	0.4	1.9	1.2	-0.1	-0.1	3.6	0.4	3.5	0.1	0	2.4
Left	Luna				0.9	-0.6	0.1				1	1.4	-0.8
Left	Manny	1.8	-0.4	0.6	-0.5	-0.3	0	0.5	0.1	2.1	-0.7	-0.3	-0.4
Left	Zimba	3.4	2.3	-2	-0.8	0	1.4	2	0.6	8.1	-1	0.8	1.4
Left	Kofi	1.1	-2	1.8	-0.3	-1.9	-0.3	1.4	-1.6	1.2	0.8	0.1	-1.1
Left	Saga	4.9	3.4	2.3	-0.2	-0.1	0.1	1.5	0.5	0.1	3.9	1.2	1.1
Left	Goonie	6.8	1.3	5.7	-2.8	-3.6	0	-0.4	-2.1	1.4	2.7	0.4	-1.7
Left	Bounty	3.5	1.5	5.8	1.2	0.1	-0.7	1.7	-0.6	1.8	-0.6	0	1.7
Left	Perle	3.4	1.6	2.7	0.5	1	-0.2	3.7	1.3	0	0.3	0.3	-1.4
Left	Minnie	0.7	1	1.9	-0.3	0.5	0.3	2.5	0.7	1.3	0.7	0	0.5
Left	Shiva	2.1	0.1	1.9	-0.1	0.2	-2.8	0.8	0.4	0.1	-1.2	0.1	-1.7
Left	Donna	2	3.3	-0.4	2.6	0	-1.1	3.4	0.8	-0.3	1.3	1.5	-2.8
Left	Tanne	3.6	-0.1	-2.3	-0.7	-0.3	-1.2	3	0.2	-1.4	0.1	-1.1	2.2
Left	Romeo	4.3	2.1	-1.5	-0.5	-0.3	0.7	-0.4	0	-0.5	0.4	1.3	-1.3
Left	Lika	-1.3	0	0.5	-1.1	-1.3	-0.3	-1.3	-1.3	-0.2	0.4	-0.6	-1.4
Left	Barthez	0.2	-2.3	-0.8	-0.5	0.6	1.4	-0.9	1	3.1	0.8	-0.6	-1.1
Left	Andy	2.9	0.6	0.3	0.8	-0.1	-0.3	3.7	0.2	-0.4	-0.2	0.2	-2.9
Left	Koffi	-0.2	-1.2	0.6	-2.5	-0.7	-0.7	-2.8	-0.7	0.4	-1.3	-1.9	1
Left	Schnuden	4.6	0.2	3.8	-0.2	-0.1	-0.8	-0.6	0.4	0.4	0.2	0	-0.7
Left	Yuki	4.1	0.7	2.3	2	0.1	0.1	5.8	1.2	0	-1.9	0.8	-1.1
Left	Piqué	0.4	-0.4	-2.2	-1	-0.3	-1.8	-0.8	-0.1	-0.7	0.1	-0.3	-1.7
Left	Brutus	-0.3	-0.2	1.8	-2.6	-1.4	-4.5	-2.6	-1.3	0.3	-1.2	-0.3	-2.2
Right	Nelly	-1.4	-0.4	-0.6	-0.8	-0.4	-0.6	-0.9	-0.5	0.1	-0.3	-0.5	-0.7
Right	Kiki	4.1	1.4	1.4	-1	-0.1	-0.9	1.8	0.1	0.4	-2.6	-1	-0.2
Right	Nala	-1.6	-0.4	1.3	0.1	0.4	0.7	-0.4	0.2	7.5	-0.6	0	1
Right	Luna				0.3	0.2	-1.6				1.1	0.4	-3.8
Right	Manny	-1.9	-0.6	-3.7	-1.9	-0.7	-3.3	-1.8	-0.4	-0.8	-0.7	-0.3	-2.6
Right	Zimba	4.2	2	1.6	-1.5	-1	0	-0.4	2.2	-0.1	0.1	1.6	-0.2
Right	Kofi	-2.2	-0.2	-2.3	-0.6	0.1	4	-0.6	0.5	3	-1.3	0	0.4
Right	Saga	1	0.2	-0.1	0	-0.2	0.1	0.8	1.5	0.3	-1.2	0.6	-0.1
Right	Goonie	5	1.3	2.7	-0.3	-0.2	-0.4	-0.7	-1	0.4	-0.5	0.2	0.1
Right	Bounty	4	1.5	2.7	-0.1	0	-0.8	1.7	0.3	5.2	1.8	0.1	2.4
Right	Perle	1.4	0	0	0.8	0.7	0.1	-0.1	0	-0.3	0.3	1.8	0.2
Right	Minnie	-0.3	-0.7	-0.1	-3.7	-2.8	1.2	-0.2	-1.2	-0.8	0.7	1.6	-0.2
Right	Shiva	-0.1	1	0	0.8	1.1	-0.9	2.3	0.3	-0.4	-0.1	0.7	-3.9
Right	Donna	1.7	-0.5	2.1	0.7	0	0.3	2	-0.4	0.7	0.4	-0.1	0.8
Right	Tanne	4.8	0.3	0.7	2	0	1.3	3.6	0.1	0.1	0.5	0.4	-0.8
Right	Romeo	0.3	-0.1	-1.9	0.6	0.2	1.9	-0.5	0	-0.4	-0.1	0.3	-1.5
Right	Lika	-1.1	0.7	2.4	-2.6	-2	-0.8	-1.8	-0.5	-0.9	-1.5	-0.1	1
Right	Barthez	-2.1	-0.8	0.1	-1	1.4	-2.7	0.5	-0.3	-2.9	0	-0.7	-1.5
Right	Andy	1.4	0.8	-0.4	-1	0.3	-1.4	-0.7	0.9	1.4	-0.9	0.2	0.4
Right	Koffi	3.4	2.1	1.3	1.3	0.3	-1	0.3	-0.6	0.1	0.3	1.4	-0.4
Right	Schnuden	0.7	0.1	-4.3	0.6	0	-1.1	2.7	0.8	0.8	0.2	0.1	-1.2
Right	Yuki	3.7	1	3.1	0.3	0.1	0	5.6	1	2.1	0.6	0.7	0.7
Right	Piqué	0.9	-1	-2.7	0	-0.3	-1.6	-0.2	0	1.8	0.7	-0.1	-0.7
Right	Brutus	3.1	1.8	2.2	-2.4	-0.1	-2.1	-2.5	-0.6	0.5	0.8	0.1	-7.8
	Mean	1.8022	0.4739	0.7174	-0.342	-0.267	-0.406	0.737	0.0457	0.9761	0.0458	0.2271	-0.581
	Norm?	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	No
	Test	t-test	t-test	t-test	t-test	WSR	t-test	t-test	t-test	WSR	t-test	t-test	WSR
	P-value	2E-06	0.0107	0.0312	0.081	0.1	0.0503	0.019	0.7144	0.0039	0.7922	0.0444	0.0433

		Diff 50 hock vs 50 MF			Diff 30 TP vs 30 MF			Diff 50 TP vs 50 MF		
	Dog	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**
Left	Nelly	-0.6	-0.1	2.7	0.1	0.2	4.1	1.6	0.3	2.5
Left	Kiki	4.1	1.8	1.6	1.6	0.6	1.9	2.1	0.9	-0.9
Left	Nala	3	0.4	2.8	2.4	0.5	3.6	2.9	0.4	0.4
Left	Luna									
Left	Manny	0.6	-0.2	2.2	1	0.4	2.1	1.3	0.1	2.6
Left	Zimba	2.6	2.4	4.7	2.8	0.6	6.7	3.6	1.6	3.3
Left	Kofi	3.1	0.7	4.8	1.7	0.3	1.5	2.3	0.6	5.9
Left	Saga	4	3.3	2.4	1.7	0.6	0	0.1	2.1	1.3
Left	Goonie	5.6	1.5	5.7	2.4	1.5	1.4	2.9	1.1	7.4
Left	Bounty	1.8	1	7.1	0.5	-0.7	2.5	2.4	1	5.4
Left	Perle	4.1	2.1	2.7	3.2	0.3	0.2	3.8	1.8	4.1
Left	Minnie	3.9	1.3	2.2	2.8	0.2	1	3.2	1.3	1.7
Left	Shiva	1.8	0.4	0.2	0.9	0.2	2.9	3	0.3	1.9
Left	Donna	1.4	1.6	-1.5	0.8	0.8	0.8	0.1	0.1	1.3
Left	Tanne	3	-0.2	0.3	3.7	0.5	-0.2	2.9	0.9	-1.9
Left	Romeo	3.7	2.1	0.1	0.1	0.3	-1.2	3.3	0.8	1.4
Left	Lika	0.4	-1	-0.8	-0.2	0	0.1	0	-0.4	0.6
Left	Barthez	0.7	-0.3	0.2	-0.4	0.4	1.7	-0.1	0.3	1.3
Left	Andy	2.7	0.9	-1.5	2.9	0.3	-0.1	2.9	0.7	1.4
Left	Koffi	-0.8	-0.8	0.9	-0.3	0	1.1	0.5	1.1	-0.1
Left	Schnuden	2.5	0.4	3.5	-0.4	0.5	1.2	2.3	0.4	4.2
Left	Yuki	3.1	0.9	-1.1	3.8	1.1	-0.1	5	0.1	0
Left	Piqué	0	-0.1	-1	0.2	0.2	1.1	-0.1	0.2	0.7
Left	Brutus	0.6	0.3	4.7	0	0.1	4.8	1.8	0.6	6.9
Right	Nelly	-1.2	-0.6	-0.4	-0.1	-0.1	0.7	-0.9	-0.1	0.3
Right	Kiki	2.5	1	0.6	2.8	0.2	1.3	5.1	2	0.8
Right	Nala	-1.8	-0.2	2.8	-0.5	-0.2	6.8	-1.2	-0.2	1.8
Right	Luna									
Right	Manny	-2.5	-0.2	-1.1	0.1	0.3	2.5	-1.8	0.1	1.5
Right	Zimba	1.3	1.1	1.2	1.1	3.2	-0.1	1.2	-0.5	1.4
Right	Kofi	-0.4	0.1	-1.2	0	0.4	-1	0.9	0.1	-1.6
Right	Saga	0.9	1.4	0	0.8	1.7	0.2	2.1	0.8	0.1
Right	Goonie	4.3	0.4	3.1	-0.4	-0.8	0.8	4.8	0.2	3
Right	Bounty	3.8	1.4	6.2	1.8	0.3	6	2	1.3	3.8
Right	Perle	-0.9	-0.4	-0.5	-0.9	-0.7	-0.4	-1.2	-2.2	-0.7
Right	Minnie	-0.7	-0.8	0.9	3.5	1.6	-2	-1.4	-2.4	1.1
Right	Shiva	0.1	1	-4.2	1.5	-0.8	0.5	0.2	0.3	-0.3
Right	Donna	1.1	-0.5	3.5	1.3	-0.4	0.4	0.7	-0.4	2.7
Right	Tanne	3.2	0.9	-0.9	1.6	0.1	-1.2	2.7	0.5	-0.1
Right	Romeo	-0.2	-0.2	-2.2	-1.1	-0.2	-2.3	-0.1	-0.5	-0.7
Right	Lika	-0.3	-0.5	1.2	0.8	1.5	-0.1	1.2	-0.4	0.2
Right	Barthez	-1.1	-0.4	-1	1.5	-1.7	-0.2	-1.1	0.3	0.5
Right	Andy	0.5	0.5	-1.3	0.3	0.6	2.8	1.4	0.3	-1.7
Right	Koffi	1.8	1.6	0.7	-1	-0.9	1.1	1.5	0.2	1.1
Right	Schnuden	1.3	-0.4	-3.7	2.1	0.8	1.9	1.1	-0.5	-2.5
Right	Yuki	3.5	1.3	4.1	5.3	0.9	2.1	2.9	0.6	3.4
Right	Piqué	0.6	-0.2	-0.6	-0.2	0.3	3.4	-0.1	-0.1	0.1
Right	Brutus	2.4	1.9	0.3	-0.1	-0.5	2.6	1.6	1.8	8.1
	Mean	1.5109	0.5783	1.0957	1.1196	0.3152	1.3674	1.5087	0.3804	1.6022
	Norm?	Yes	Yes	Yes	No	No	No	Yes	No	No
	Test	t-test	t-test	t-test	WSR	WSR	WSR	t-test	WSR	WSR
	P-value	3E-06	0.0002	0.0052	5E-05	0.0078	6E-05	4E-07	0.0012	6E-05

Appendix I: Differences of various combinations of speed and water levels in M. Quadriceps vastus lateralis – Given at the bottom is the results of whether or not the differences were normally distributed, the statistical test used for analysis (t-test if normally distributed and if not, Wilcoxon signed rank test = WSR), the p-value and the mean.

		Diff 30 pre vs 30 post			Diff 50 pre vs 50 post			Diff 30 pre vs 50 pre			Diff 30 post vs 50 post		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	-0.3	0.3	-2.1	-0.4	0.6	-0.7	1.2	0.5	0.7	1.1	0.8	2.1
Left	Kiki	-0.3	-0.2	-1.6	0.4	0.5	-3.2	3.2	0.3	1.9	3.9	1	0.3
Left	Nala	-1.2	-0.5	-1.7	-0.9	-0.6	-1.6	0.6	0.1	1.8	0.9	0	1.9
Left	Berta	-0.1	-0.5	0.6	-0.2	-0.1	0.5	0	-0.8	-0.4	-0.1	-0.4	-0.5
Left	Luna	-1.2	-0.8	1.8	-0.7	-1.2	0.4	1.2	0.3	0.1	1.7	-0.1	-1.3
Left	Zimba	0.7	0.3	-2.3	0.9	0.5	-0.2	0.4	-0.1	-1.9	0.6	0.1	0.2
Left	Kofi	-0.1	0.8	1.3	0.3	1.2	1.5	0.6	-1.2	-1.1	1	-0.8	-0.9
Left	Saga	1.5	1	-1.3	0.2	0.1	1	1.2	0.4	0.2	-0.1	-0.5	2.5
Left	Goonie	-0.4	-0.2	-0.7	-0.2	0.6	-0.5	0.8	-0.7	-0.6	1	0.1	-0.4
Left	Bounty	-2.2	-0.2	-3.6	-4.6	0	0	3.8	0.2	-1.6	1.4	0.4	2
Left	Perle	-0.4	-1.9	-1	-0.7	-1.6	0.4	1.3	0.9	-0.4	1	1.2	1
Left	Minnie	0.4	0.2	-1	1	-0.4	-0.4	1.8	0.7	-0.1	2.4	0.1	0.5
Left	Shiva	-2	-0.3	-1	-2.1	-0.3	1	1.8	0.4	0.1	1.7	0.4	2.1
Left	Donna	-0.4	-2	-2.9	0.2	-0.2	-0.7	2.6	-0.1	-1.1	3.2	1.7	1.1
Left	Tanne	-0.4	-1.9	2.2	-0.7	-1	1.5	1.6	-0.8	-0.1	1.3	0.1	-0.8
Left	Romeo	1.8	-0.4	1	0.8	-0.7	-0.1	1.3	1.4	2.2	0.3	1.1	1.1
Left	Lika	-2.5	0.8	-1	-1.7	1.8	-1	2.2	1.2	-0.6	3	2.2	-0.6
Left	Barthez	2.8	0.2	-2.2	-0.2	-2	-2.3	0	3.1	0.4	-3	0.9	0.3
Left	Andy	-3.8	-1.1	0.4	-3	-1.7	-1	1.9	1.1	0.9	2.7	0.5	-0.5
Left	Koffi	0.4	0.7	1.8	0.5	1.7	0.9	1.2	-0.6	-2	1.3	0.4	-2.9
Left	Schnuden	0	0.2	2.2	1.1	-0.2	-1.4	-0.2	0.3	0.9	0.9	-0.1	-2.7
Left	Yuki	0.1	-0.4	-0.5	0.7	0.1	0.4	0.8	-0.3	-0.6	1.4	0.2	0.3
Left	Piqué	-0.4	0	0.4	-1	-0.2	-0.3	0.4	0.2	0.1	-0.2	0	-0.6
Left	Brutus	1.6	0.4	4.2	0.9	0.3	-0.3	1.2	0	3.1	0.5	-0.1	-1.4
Right	Nelly	-0.9	-0.1	-3.6	-1.5	0	-4.2	2	0.1	1	1.4	0.2	0.4
Right	Kiki	0	0.9	1	-2.1	-1.6	0.6	0.4	0.4	0	-1.7	-2.1	-0.4
Right	Nala	-0.2	1	-1	0.1	-0.1	-0.8	1.3	1	0.9	1.6	-0.1	1.1
Right	Berta	-0.9	-0.1	-0.8	0	0.6	1.2	2.8	1.8	1	3.7	2.5	3
Right	Luna	-2.4	-0.8	-0.1	-1.4	-0.6	-0.4	-0.3	0.5	0.5	0.7	0.7	0.2
Right	Zimba	0.4	0.5	-1.1	1.9	0.9	-0.6	1.4	0.2	-0.6	2.9	0.6	-0.1
Right	Kofi	-1.6	1.6	1.7	-2.5	0.3	2.1	3.4	0.7	0.3	2.5	-0.6	0.7
Right	Saga	0.2	0.6	-2	0.7	0	0	1.7	0.2	-1.4	2.2	-0.4	0.6
Right	Goonie	0.9	0.6	-0.1	-1.2	-2.5	-0.5	4.1	2.5	0.9	2	-0.6	0.5
Right	Bounty	-0.8	-0.1	3.8	-1.7	0.2	-2.3	0	-0.1	3.3	-0.9	0.2	-2.8
Right	Perle	-1	0.5	0.4	-1.2	-2.3	-1.5	6	4.3	2.9	5.8	1.5	1
Right	Minnie	-0.8	0.1	0.3	-0.9	-0.3	1.4	0.9	0	2	0.8	-0.4	3.1
Right	Shiva	-0.5	0	0.6	-1.5	0.4	0.2	2.3	0	0.7	1.3	0.4	0.3
Right	Donna	-1.9	-1	4.5	-0.1	1.1	-0.4	2	0.3	0.9	3.8	2.4	-4
Right	Tanne	-0.8	-0.7	-1.3	0.6	-0.8	-0.3	1.4	-0.2	0.5	2.8	-0.3	1.5
Right	Romeo	-0.7	-0.4	-0.6	0	0.2	-1.7	2	0.1	1.3	2.7	0.7	0.2
Right	Lika	-1.8	-0.1	0.1	-0.7	0	0.3	1.3	0.5	0.2	2.4	0.6	0.4
Right	Barthez	-1.9	-0.1	-2.3	-1.4	-0.7	-1	1.8	1.9	0	2.3	1.3	1.3
Right	Andy	-2.5	-0.2	-0.2	-0.5	-0.4	-1.9	1.9	0.6	0.1	3.9	0.4	-1.6
Right	Koffi	0.7	0.1	0.3	2.1	0.3	-1.3	1.6	-0.4	0	3	-0.2	-1.6
Right	Schnuden	0.3	1.4	1.1	2.6	1.7	0	1.9	0	-0.2	4.2	0.3	-1.3
Right	Yuki	0.7	-0.7	0.4	0.8	0.3	0	1.4	-0.5	1.3	1.5	0.5	0.9
Right	Piqué	0.3	0.1	-0.5	-1.6	-0.1	-1.4	0.5	0.2	-0.6	-1.4	0	-1.5
Right	Brutus	-0.3	-0.3	-3.2	0.9	0.1	-1.6	0.5	-0.1	-0.7	1.7	0.3	0.9
	Mean	-0.456	-0.056	-0.2	-0.375	-0.127	-0.421	1.525	0.4271	0.3375	1.60625	0.3563	0.1167
	Norm?	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	No	Yes
	Test	t-test	t-test	t-test	t-test	t-test	t-test	WSR	WSR	t-test	t-test	WSR	t-test
	P-value	0.014	0.614	0.458	0.061	0.361	0.023	6E-09	0.005	0.057	1E-08	0.003	0.598

		Diff 30 hock vs 50 hock			Diff 30 TP vs 50 TP			Diff 30 MF vs 50 MF			Diff 30 pre vs 30 hock		
	Dog	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**
Left	Nelly	1.9	0.4	-1.5	2.8	0.2	-0.5	1.3	0.3	0.1	-0.4	0.8	2.6
Left	Kiki	3	0.3	1.3	2.8	0.6	0.3	3.8	0.5	-1.5	1.7	1.3	0.8
Left	Nala	1.1	0.7	-0.5	0.3	0.5	0.8	1.8	0.2	-0.1	-1	-0.6	-0.1
Left	Berta	1	0.3	-0.5	-0.8	-0.4	0.1	-0.3	-0.1	0.3	-0.1	-0.4	0.6
Left	Luna	1.4	1.1	-0.4	1.2	0	0.6				-0.7	-1.1	0.4
Left	Zimba	0.2	-0.1	-0.4	-0.1	-0.3	4.8	2.3	1.2	4.5	0.2	0.1	-3.4
Left	Kofi	1.1	0.1	1	0	-0.3	0.2	2.2	3.1	2.9	-0.7	-0.7	-2.4
Left	Saga	3.5	0.2	-0.2	3.5	0.6	-0.2	5.4	0.6	-0.8	0.3	-0.1	0.5
Left	Goonie	2	0.2	3	3.3	0.9	3.3	4.1	1.3	1.4	0	0.1	0.1
Left	Bounty	5.2	0.2	0.8	3.7	0.6	2.5	2.7	1.3	5.5	-1.2	0.2	-3.2
Left	Perle	3.6	0.2	2	4.2	1	1.5	4.7	1.4	-0.3	0.1	-1.8	-0.6
Left	Minnie	1	-0.6	0.3	1	0.5	0.2	1.3	-0.1	0.3	1.3	1.2	-0.8
Left	Shiva	1.7	0.6	-1.4	1.2	-0.2	0.1	3.4	0.2	1.1	-1.8	0.1	0.4
Left	Donna	2.3	0.2	-0.3	3.8	2.9	0.9	2.4	1.2	1.8	0.9	-1.8	-1
Left	Tanne	0.3	0.6	-0.1	1.5	0.5	0.4	3.5	0.8	3.9	1.9	-2.2	-0.6
Left	Romeo	-0.3	1.5	1	1.8	0.1	-0.5	0.7	1.1	-0.2	3	0.4	1.2
Left	Lika	3.5	1.2	0.9	3.4	-0.2	0.7	0.2	-0.1	0.7	-2.1	-0.1	-1.7
Left	Barthez	1.2	2.7	0.4	3.6	1	0.6	3	0.1	-2.2	-0.8	0.2	0.4
Left	Andy	-0.4	2.8	0.4	1.2	-0.8	0.8	2.7	1.6	1.6	-0.1	-1.4	0.8
Left	Koffi	3.6	0.1	-1.7	5.4	0.1	0.8	3.2	1.3	1	-0.9	0	-1.4
Left	Schnuder	3.2	0.5	0.3	1.3	0	-5	2.7	0.2	1.8	-0.6	-0.1	1.2
Left	Yuki	2.9	0.1	0.9	1.4	-0.1	0.7	0.6	0.2	0	-0.9	0.1	-0.7
Left	Piqué	0.4	0.6	0.6	0.2	0.5	-0.1	0.5	-0.3	0.7	-0.7	-0.2	-0.2
Left	Brutus	-0.8	-1	-1.6	-0.2	-0.1	0.6	1.5	0.5	-0.9	1.7	1.1	2.7
Right	Nelly	1.3	0	-0.3	0.2	0.3	1.4	0	0.1	-1	-0.8	0	-1.7
Right	Kiki	1.9	0	0.5	4.8	1.9	-1.7	3	-3	-0.9	0.5	0.3	0
Right	Nala	0.5	0.5	0.6	2.3	0.8	0.5	1.7	1.5	0	-0.1	1.4	-1.2
Right	Berta	3.5	1.2	6.5	0.3	-3.6	7.3	5	-0.4	3.7	0.3	0.3	0.9
Right	Luna	1.1	-0.4	1.4	0.4	0.6	0.7				-1.8	1	0.2
Right	Zimba	2.9	0.4	0.8	2.9	0.4	-0.4	2.9	0.3	-1.2	-1.9	0.1	-2.2
Right	Kofi	2.6	0.2	-0.1	0.8	0.4	1.3	-0.5	-0.3	1.3	-1.5	0.7	0
Right	Saga	3	0.3	0.7	1.5	-0.3	-1.7	5.1	1.9	1.9	-0.6	-0.5	-1
Right	Goonie	2.3	1.5	0.8	2.4	2.5	0.6	3.3	1.8	3.3	1.7	0.3	0.9
Right	Bounty	3.3	-1	3.3	2.5	-1	2	4.9	0.9	2.3	-0.6	1.8	-0.3
Right	Perle	3.1	-0.1	2.4	6.3	2.1	1.4	2.8	3.8	1.5	1.4	0.4	-0.8
Right	Minnie	2.7	0	2.6	2.2	0.2	2.2	-0.3	-2.5	-0.1	0	0.3	-0.4
Right	Shiva	0.5	0.7	-1.2	3	0.4	0.5	1.4	-0.1	0.5	-0.7	0	1.5
Right	Donna	4	5.6	1.6	7.2	3.6	2.9	2.8	0.7	-0.8	-1	-1.1	-2.5
Right	Tanne	4	1.4	4.8	2.9	-1.4	2.8	2.8	1.1	1.8	-0.8	-1.1	-2.1
Right	Romeo	0.1	1	0.4	1.4	0.6	0.7	4.3	1.1	0.4	3.3	-0.7	-0.3
Right	Lika	2.8	3.1	-1.1	2.2	-1.4	2	2.1	0.1	0.3	-1.7	0.8	0.1
Right	Barthez	4	0.2	2.1	4.9	1.9	2.3	4.7	0.2	0.3	-3.6	1.2	-3
Right	Andy	1.9	0	1.9	1.7	0.1	2.6	3	1.8	-0.8	-0.5	0.5	-1.6
Right	Koffi	3.2	0.1	6.3	4.2	1.3	3.3	4.1	0.5	1.5	-0.6	-0.2	-1.4
Right	Schnuder	4	0.2	2.5	4.5	0.3	0.6	4.8	0.4	1.2	-0.2	0	-2.4
Right	Yuki	1.1	1.4	1.7	0.6	1	-0.2	-0.2	0.5	0.8	-0.8	-0.6	-0.9
Right	Piqué	-2.7	0.1	0.9	-1.6	0	-2.1	0.4	0	-1.1	0	0.1	-2.2
Right	Brutus	0.3	0.3	-0.5	0.8	0.3	-2.2	1.2	0.3	2	0.5	-0.2	-1.5
	Mean	1.9583	0.61667	0.8938	2.1854	0.3875	0.8417	2.4565	0.5913	0.837	-0.217	-0.002	-0.548
	Norm?	Yes	No	No	Yes	No	No	Yes	No	Yes	No	Yes	Yes
	Test	t-test	WSR	WSR	t-test	WSR	WSR	t-test	WSR	t-test	WSR	t-test	t-test
	P-value	3E-11	0.00001	0.001	2E-10	0.004	0.0003	4E-13	0.00003	0.0012	0.094	0.987	0.0097

		Diff 30 pre vs 30 TP			Diff 30 pre vs 30 MF			Diff 50 pre vs 50 hock			Diff 50 pre vs 50 TP		
	Dog	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**	**E**	**S**	**T**
Left	Nelly	0.6	0.4	-0.9	-0.2	-0.2	-2.5	0.3	0.7	0.4	2.2	0.1	-2.1
Left	Kiki	1.5	1.5	0.1	0.6	0	1.3	1.5	1.3	0.2	1.1	1.8	-1.5
Left	Nala	-0.6	-0.8	-1.1	-0.7	-0.9	-1	-0.5	0	-2.4	-0.9	-0.4	-2.1
Left	Berta	0.8	-0.4	0	0.5	-0.6	-0.4	0.9	0.7	0.5	0	0	0.5
Left	Luna	-0.6	-1	-0.7				-0.5	-0.3	-0.1	-0.6	-1.3	-0.2
Left	Zimba	0.1	0	-3.6	1.6	1.8	0	0	0.1	-1.9	-0.4	-0.2	3.1
Left	Kofi	-0.2	-0.6	-1.8	0.2	-1.1	-0.6	-0.2	0.6	-0.3	-0.8	0.3	-0.5
Left	Saga	-0.7	-0.1	-0.7	-1	-0.3	0.7	2.6	-0.3	0.1	1.6	0.1	-1.1
Left	Goonie	-0.1	-1.1	-1.7	-1.2	-1.6	0.1	1.2	1	3.7	2.4	0.5	2.2
Left	Bounty	1.1	1.4	-3.8	1.4	0.7	-2.2	0.2	0.2	-0.8	1	1.8	0.3
Left	Perle	0	-2.4	-1.1	1	-2.4	-0.1	2.4	-2.5	1.8	2.9	-2.3	0.8
Left	Minnie	2	0.6	-0.6	2	0.8	-0.7	0.5	-0.1	-0.4	1.2	0.4	-0.3
Left	Shiva	-1.9	0.6	0.1	-1.9	-0.5	0.7	-1.9	0.3	-1.1	-2.5	0	0.1
Left	Donna	0.4	-2.1	-2.1	3.3	-0.7	-2.1	0.6	-1.5	-0.2	1.6	0.9	-0.1
Left	Tanne	0.2	-2	-1.6	2.6	-2.2	-1.4	0.6	-0.8	-0.6	0.1	-0.7	-1.1
Left	Romeo	1.6	0.8	1	2.8	-0.3	1.9	1.4	0.5	0	2.1	-0.5	-1.7
Left	Lika	-2.5	1.8	-2.3	-2.3	0.4	-2.2	-0.8	-0.1	-0.2	-1.3	0.4	-1
Left	Barthez	-2.1	0.1	-0.8	-3	-0.4	1.1	0.4	-0.2	0.4	1.5	-2	-0.6
Left	Andy	-0.9	1.7	-1.1	-1.1	-0.4	-0.9	-2.4	0.3	0.3	-1.6	-0.2	-1.2
Left	Koffi	-0.2	-0.3	-3	-1	-1	-3.4	1.5	0.7	-1.1	4	0.4	-0.2
Left	Schnuder	-0.4	0.1	5.2	0.1	0.1	1.2	2.8	0.1	0.6	1.1	-0.2	-0.7
Left	Yuki	-0.9	-0.1	-1.2	3.6	0	0	1.2	0.5	0.8	-0.3	0.1	0.1
Left	Piqué	-0.8	-0.2	1.8	-1.2	0.2	0.6	-0.7	0.2	0.3	-1	0.1	1.6
Left	Brutus	0.3	0	0.5	-0.1	-0.3	3.2	-0.3	0.1	-2	-1.1	-0.1	-2
Right	Nelly	-0.8	-0.2	-2.1	-0.8	-0.2	-1.3	-1.5	-0.1	-3	-2.6	0	-1.7
Right	Kiki	-1.3	0.7	2.1	0.5	3.8	2.2	2	-0.1	0.5	3.1	2.2	0.4
Right	Nala	-0.6	0	-0.8	-0.2	-0.1	0.1	-0.9	0.9	-1.5	0.4	-0.2	-1.2
Right	Berta	-0.9	3.9	-0.9	0.6	0.8	1.7	1	-0.3	6.4	-3.4	-1.5	5.4
Right	Luna	-1.5	-0.6	-0.3				-0.4	0.1	1.1	-0.8	-0.5	-0.1
Right	Zimba	-0.5	0.1	-1.4	-2.1	-0.2	0.7	-0.4	0.3	-0.8	1	0.3	-1.2
Right	Kofi	-3.2	0.5	0.3	-0.8	-0.1	-0.8	-2.3	0.2	-0.4	-5.8	0.2	1.3
Right	Saga	0.5	-0.1	-1	1.4	0.2	0.7	0.7	-0.4	1.1	0.3	-0.6	-1.3
Right	Goonie	2.1	1.5	-0.1	2.1	0.9	-0.7	-0.1	-0.7	0.8	0.4	1.5	-0.4
Right	Bounty	-0.8	2.2	-0.3	-0.3	0.4	0	2.7	0.9	-0.3	1.7	1.3	-1.6
Right	Perle	-0.6	0.1	-0.2	3.1	0.3	-0.6	-1.5	-4	-1.3	-0.3	-2.1	-1.7
Right	Minnie	-0.9	-0.4	-1.2	2	3	0.4	1.8	0.3	0.2	0.4	-0.2	-1
Right	Shiva	-1	-0.2	-0.5	0.1	0	0.2	-2.5	0.7	-0.4	-0.3	0.2	-0.7
Right	Donna	-1.4	-1	-2.2	2.4	-0.5	1.9	1	4.2	-1.8	3.8	2.3	-0.2
Right	Tanne	0	1	-0.5	2.8	-1.1	0.4	1.8	0.5	2.2	1.5	-0.2	1.8
Right	Romeo	2	-0.6	-0.9	0	-1.1	0	1.4	0.2	-1.2	1.4	-0.1	-1.5
Right	Lika	-2.8	1.6	-0.8	-2.8	-0.2	0.6	-0.2	3.4	-1.2	-1.9	-0.3	1
Right	Barthez	-2.4	-0.3	-1.3	-3.6	-1	-0.8	-1.4	-0.5	-0.9	0.7	-0.3	1
Right	Andy	-0.2	0.2	-0.7	-0.1	-1.2	1.7	-0.5	-0.1	0.2	-0.4	-0.3	1.8
Right	Koffi	-0.5	-0.4	-1.5	-1	-0.5	-0.5	1	0.3	4.9	2.1	1.3	1.8
Right	Schnuder	-0.6	-0.4	-0.5	-0.3	-0.4	-1.9	1.9	0.2	0.3	2	-0.1	0.3
Right	Yuki	0.5	-0.7	1.8	2.3	-0.8	0.4	-1.1	1.3	-0.5	-0.3	0.8	0.3
Right	Piqué	-0.4	0.2	-0.5	-2.1	-0.2	-4.4	-3.2	0	-0.7	-2.5	0	-2
Right	Brutus	-0.5	-0.2	-1	-0.5	0.8	-3.2	0.3	0.2	-1.3	-0.2	0.2	-2.5
	Mean	-0.398	0.1	-0.7063	0.1891	-0.137	-0.215	0.2167	0.1875	0.0083	0.2625	0.0604	-0.202
	Norm?	Yes	No	No	Yes	No	Yes	Yes	No	No	Yes	No	No
	Test	t-test	WSR	WSR	t-test	WSR	t-test	t-test	WSR	WSR	t-test	WSR	WSR
	P-value	0.025	0.933	0.0001	0.476	0.073	0.35	0.305	0.037	0.3047	0.341	0.847	0.1329

		Diff 50 pre vs 50 MF			Diff 30 hock vs 30 TP			Diff 30 hock vs 30 MF			Diff 50 hock vs 50 TP		
	Dog	E	S	T	E	S	T	E	S	T	E	S	T
Left	Nelly	-0.1	-0.4	-3.1	1	-0.4	-3.5	0.2	-1	-5.1	1.9	-0.6	-2.5
Left	Kiki	1.2	0.2	-2.1	-0.2	0.2	-0.7	-1.1	-1.3	0.5	-0.4	0.5	-1.7
Left	Nala	0.5	-0.8	-2.9	0.4	-0.2	-1	0.3	-0.3	-0.9	-0.4	-0.4	0.3
Left	Berta	0.2	0.1	0.3	0.9	0	-0.6	0.6	-0.2	-1	-0.9	-0.7	0
Left	Luna				0.1	0.1	-1.1				-0.1	-1	-0.1
Left	Zimba	3.5	3.1	6.4	-0.1	-0.1	-0.2	1.4	1.7	3.4	-0.4	-0.3	5
Left	Kofi	1.8	3.2	3.4	0.5	0.1	0.6	0.9	-0.4	1.8	-0.6	-0.3	-0.2
Left	Saga	3.2	-0.1	-0.3	-1	0	-1.2	-1.3	-0.2	0.2	-1	0.4	-1.2
Left	Goonie	2.1	0.4	2.1	-0.1	-1.2	-1.8	-1.2	-1.7	0	1.2	-0.5	-1.5
Left	Bounty	0.3	1.8	4.9	2.3	1.2	-0.6	2.6	0.5	1	0.8	1.6	1.1
Left	Perle	4.4	-1.9	0	-0.1	-0.6	-0.5	0.9	-0.6	0.5	0.5	0.2	-1
Left	Minnie	1.5	0	-0.3	0.7	-0.6	0.2	0.7	-0.4	0.1	0.7	0.5	0.1
Left	Shiva	-0.3	-0.7	1.7	-0.1	0.5	-0.3	-0.1	-0.6	0.3	-0.6	-0.3	1.2
Left	Donna	3.1	0.6	0.8	-0.5	-0.3	-1.1	2.4	1.1	-1.1	1	2.4	0.1
Left	Tanne	4.5	-0.6	2.6	-1.7	0.2	-1	0.7	0	-0.8	-0.5	0.1	-0.5
Left	Romeo	2.2	-0.6	-0.5	-1.4	0.4	-0.2	-0.2	-0.7	0.7	0.7	-1	-1.7
Left	Lika	-4.3	-0.9	-0.9	-0.4	1.9	-0.6	-0.2	0.5	-0.5	-0.5	0.5	-0.8
Left	Barthez	0	-3.4	-1.5	-1.3	-0.1	-1.2	-2.2	-0.6	0.7	1.1	-1.8	-1
Left	Andy	-0.3	0.1	-0.2	-0.8	3.1	-1.9	-1	1	-1.7	0.8	-0.5	-1.5
Left	Koffi	1	0.9	-0.4	0.7	-0.3	-1.6	-0.1	-1	-2	2.5	-0.3	0.9
Left	Schnuder	3	0	2.1	0.2	0.2	4	0.7	0.2	0	-1.7	-0.3	-1.3
Left	Yuki	3.4	0.5	0.6	0	-0.2	-0.5	4.5	-0.1	0.7	-1.5	-0.4	-0.7
Left	Piqué	-1.1	-0.3	1.2	-0.1	0	2	-0.5	0.4	0.8	-0.3	-0.1	1.3
Left	Brutus	0.2	0.2	-0.8	-1.4	-1.1	-2.2	-1.8	-1.4	0.5	-0.8	-0.2	0
Right	Nelly	-2.8	-0.2	-3.3	0	-0.2	-0.4	0	-0.2	0.4	-1.1	0.1	1.3
Right	Kiki	3.1	0.4	1.3	-1.8	0.4	2.1	0	3.5	2.2	1.1	2.3	-0.1
Right	Nala	0.2	0.4	-0.8	-0.5	-1.4	0.4	-0.1	-1.5	1.3	1.3	-1.1	0.3
Right	Berta	2.8	-1.4	4.4	-1.2	3.6	-1.8	0.3	0.5	0.8	-4.4	-1.2	-1
Right	Luna				0.3	-1.6	-0.5				-0.4	-0.6	-1.2
Right	Zimba	-0.6	-0.1	0.1	1.4	0	0.8	-0.2	-0.3	2.9	1.4	0	-0.4
Right	Kofi	-4.7	-1.1	0.2	-1.7	-0.2	0.3	0.7	-0.8	-0.8	-3.5	0	1.7
Right	Saga	4.8	1.9	4	1.1	0.4	0	2	0.7	1.7	-0.4	-0.2	-2.4
Right	Goonie	1.3	0.2	1.7	0.4	1.2	-1	0.4	0.6	-1.6	0.5	2.2	-1.2
Right	Bounty	4.6	1.4	-1	-0.2	0.4	0	0.3	-1.4	0.3	-1	0.4	-1.3
Right	Perle	-0.1	-0.2	-2	-2	-0.3	0.6	1.7	-0.1	0.2	1.2	1.9	-0.4
Right	Minnie	0.8	0.5	-1.7	-0.9	-0.7	-0.8	2	2.7	0.8	-1.4	-0.5	-1.2
Right	Shiva	-0.8	-0.1	0	-0.3	-0.2	-2	0.8	0	-1.3	2.2	-0.5	-0.3
Right	Donna	3.2	-0.1	0.2	-0.4	0.1	0.3	3.4	0.6	4.4	2.8	-1.9	1.6
Right	Tanne	4.2	0.2	1.7	0.8	2.1	1.6	3.6	0	2.5	-0.3	-0.7	-0.4
Right	Romeo	2.3	-0.1	-0.9	-1.3	0.1	-0.6	-3.3	-0.4	0.3	0	-0.3	-0.3
Right	Lika	-2	-0.6	0.7	-1.1	0.8	-0.9	-1.1	-1	0.5	-1.7	-3.7	2.2
Right	Barthez	-0.7	-2.7	-0.5	1.2	-1.5	1.7	0	-2.2	2.2	2.1	0.2	1.9
Right	Andy	1	0	0.8	0.3	-0.3	0.9	0.4	-1.7	3.3	0.1	-0.2	1.6
Right	Koffi	1.5	0.4	1	0.1	-0.2	-0.1	-0.4	-0.3	0.9	1.1	1	-3.1
Right	Schnuder	2.6	0	-0.5	-0.4	-0.4	1.9	-0.1	-0.4	0.5	0.1	-0.3	0
Right	Yuki	0.7	0.2	-0.1	1.3	-0.1	2.7	3.1	-0.2	1.3	0.8	-0.5	0.8
Right	Piqué	-2.2	-0.4	-4.9	-0.4	0.1	1.7	-2.1	-0.3	-2.2	0.7	0	-1.3
Right	Brutus	0.2	1.2	-0.5	-1	0	0.5	-1	1	-1.7	-0.5	0	-1.2
	Mean	1.0739	0.0261	0.2826	-0.181	0.1021	-0.158	0.3609	-0.137	0.3696	0.0458	-0.127	-0.21
	Norm?	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	No
	Test	t-test	WSR	t-test	t-test	WSR	t-test	t-test	WSR	t-test	t-test	WSR	WSR
	P-value	0.0021	0.8659	0.3804	0.1906	0.8848	0.4363	0.125	0.1686	0.1408	0.8201	0.0998	0.1687

		Diff 50 hock vs 50 MF			Diff 30 TP vs 30 MF			Diff 50 TP vs 50 MF		
	Dog	E	S	T	E	S	T	E	S	T
Left	Nelly	-0.4	-1.1	-3.5	-0.8	-0.6	-1.6	-2.3	-0.5	-1
Left	Kiki	-0.3	-1.1	-2.3	-0.9	-1.5	1.2	0.1	-1.6	-0.6
Left	Nala	1	-0.8	-0.5	-0.1	-0.1	0.1	1.4	-0.4	-0.8
Left	Berta	-0.7	-0.6	-0.2	-0.3	-0.2	-0.4	0.2	0.1	-0.2
Left	Luna									
Left	Zimba	3.5	3	8.3	1.5	1.8	3.6	3.9	3.3	3.3
Left	Kofi	2	2.6	3.7	0.4	-0.5	1.2	2.6	2.9	3.9
Left	Saga	0.6	0.2	-0.4	-0.3	-0.2	1.4	1.6	-0.2	0.8
Left	Goonie	0.9	-0.6	-1.6	-1.1	-0.5	1.8	-0.3	-0.1	-0.1
Left	Bounty	0.1	1.6	5.7	0.3	-0.7	1.6	-0.7	0	4.6
Left	Perle	2	0.6	-1.8	1	0	1	1.5	0.4	-0.8
Left	Minnie	1	0.1	0.1	0	0.2	-0.1	0.3	-0.4	0
Left	Shiva	1.6	-1	2.8	0	-1.1	0.6	2.2	-0.7	1.6
Left	Donna	2.5	2.1	1	2.9	1.4	0	1.5	-0.3	0.9
Left	Tanne	3.9	0.2	3.2	2.4	-0.2	0.2	4.4	0.1	3.7
Left	Romeo	0.8	-1.1	-0.5	1.2	-1.1	0.9	0.1	-0.1	1.2
Left	Lika	-3.5	-0.8	-0.7	0.2	-1.4	0.1	-3	-1.3	0.1
Left	Barthez	-0.4	-3.2	-1.9	-0.9	-0.5	1.9	-1.5	-1.4	-0.9
Left	Andy	2.1	-0.2	-0.5	-0.2	-2.1	0.2	1.3	0.3	1
Left	Koffi	-0.5	0.2	0.7	-0.8	-0.7	-0.4	-3	0.5	-0.2
Left	Schnuder	0.2	-0.1	1.5	0.5	0	-4	1.9	0.2	2.8
Left	Yuki	2.2	0	-0.2	4.5	0.1	1.2	3.7	0.4	0.5
Left	Piqué	-0.4	-0.5	0.9	-0.4	0.4	-1.2	-0.1	-0.4	-0.4
Left	Brutus	0.5	0.1	1.2	-0.4	-0.3	2.7	1.3	0.3	1.2
Right	Nelly	-1.3	-0.1	-0.3	0	0	0.8	-0.2	-0.2	-1.6
Right	Kiki	1.1	0.5	0.8	1.8	3.1	0.1	0	-1.8	0.9
Right	Nala	1.1	-0.5	0.7	0.4	-0.1	0.9	-0.2	0.6	0.4
Right	Berta	1.8	-1.1	-2	1.5	-3.1	2.6	6.2	0.1	-1
Right	Luna									
Right	Zimba	-0.2	-0.4	0.9	-1.6	-0.3	2.1	-1.6	-0.4	1.3
Right	Kofi	-2.4	-1.3	0.6	2.4	-0.6	-1.1	1.1	-1.3	-1.1
Right	Saga	4.1	2.3	2.9	0.9	0.3	1.7	4.5	2.5	5.3
Right	Goonie	1.4	0.9	0.9	0	-0.6	-0.6	0.9	-1.3	2.1
Right	Bounty	1.9	0.5	-0.7	0.5	-1.8	0.3	2.9	0.1	0.6
Right	Perle	1.4	3.8	-0.7	3.7	0.2	-0.4	0.2	1.9	-0.3
Right	Minnie	-1	0.2	-1.9	2.9	3.4	1.6	0.4	0.7	-0.7
Right	Shiva	1.7	-0.8	0.4	1.1	0.2	0.7	-0.5	-0.3	0.7
Right	Donna	2.2	-4.3	2	3.8	0.5	4.1	-0.6	-2.4	0.4
Right	Tanne	2.4	-0.3	-0.5	2.8	-2.1	0.9	2.7	0.4	-0.1
Right	Romeo	0.9	-0.3	0.3	-2	-0.5	0.9	0.9	0	0.6
Right	Lika	-1.8	-4	1.9	0	-1.8	1.4	-0.1	-0.3	-0.3
Right	Barthez	0.7	-2.2	0.4	-1.2	-0.7	0.5	-1.4	-2.4	-1.5
Right	Andy	1.5	0.1	0.6	0.1	-1.4	2.4	1.4	0.3	-1
Right	Koffi	0.5	0.1	-3.9	-0.5	-0.1	1	-0.6	-0.9	-0.8
Right	Schnuder	0.7	-0.2	-0.8	0.3	0	-1.4	0.6	0.1	-0.8
Right	Yuki	1.8	-1.1	0.4	1.8	-0.1	-1.4	1	-0.6	-0.4
Right	Piqué	1	-0.4	-4.2	-1.7	-0.4	-3.9	0.3	-0.4	-2.9
Right	Brutus	-0.1	1	0.8	0	1	-2.2	0.4	1	2
	Mean	0.8283	-0.174	0.2957	0.5587	-0.276	0.5	0.7696	-0.076	0.487
	Norm?	Yes	No	No	No	No	Yes	Yes	No	No
	Test	t-test	WSR	WSR	WSR	WSR	t-test	t-test	WSR	WSR
	P-value	0.001	0.1903	0.4002	0.0452	0.014	0.0426	0.0084	0.3846	0.1942