

THE USE OF MANUAL THERAPY IN CANINE DISCIPLINE – AGILITY

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Key words: canine sports, animal physiotherapy, manual therapy, rehabilitation.

Abstract

Agility competition is a discipline of canine sports in which dogs complete the obstacle course in specific order racing against the clock. The aim of this study was to estimate the impact of applied manual therapy techniques on the movement parameters of dogs. The movement of the dogs was characterised on the basis of 5 parameters, i.e.: walk, trot, gallop, flexibility and mobility and was assessed with the use of quality point scale. The study covered the assessment of movement parameters of 36 dogs, in canine discipline – agility, during two sporting seasons. The animals were assessed in categories: Small, Medium, Large. Assessment of parameters was carried out before the beginning of sporting dog competition and again after the end of three-month season of competitions. In the following year there were animal physiotherapy manual treatments implemented. Treatments included passive and active exercises, so called mobilizations, massages, thermal therapy, vibration training and sensomotoric exercises. In Small, Medium and Large category the highest average point values were attributed to walk feature, whereas the lowest values were attributed to trot. Dogs whose height at the withers was up to 35 cm were characterized by proper traction of movement in gait, correct dynamics of take-off while jumping and were given high marks for completing slalom obstacle. The lowest average value for flexibility feature was recorded for dogs in Large category.

Manual therapy techniques applied systematically reinforce dog's anatomical structures of skeletal system, reduce muscle tension and increase the intensity of metabolism.

ZASTOSOWANIE TERAPII MANUALNYCH W DYSCYPLINIE KYNologicZNEJ – AGILITY

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Słowa kluczowe: sporty kynologiczne, fizjoterapia zwierząt, terapie manualne, rehabilitacja.

Abstrakt

Agility stanowi dyscyplinę psich sportów, w których psy pokonują tor przeszkód w ściśle określonym czasie.

Celem pracy było oszacowanie wpływu stosowanych technik terapii manualnej na parametry ruchu psów. Ruch psów charakteryzowano na podstawie 5 parametrów, tj. stępu, kłusu, galopu, elastyczności i mobilności, oraz oceniono za pomocą jakościowej skali punktowej. Badanie obejmowało ocenę parametrów ruchu 36 psów biorących udział w agility w ciągu dwóch sezonów sportowych. Zwierzęta oceniano w kategoriach: Small, Medium, Large. Ocenę parametrów przeprowadzono przed rozpoczęciem trzymiesięcznego sezonu zawodów i po jego zakończeniu. W następnym roku wprowadzono zabiegi manualnego leczenia fizjoterapeutycznego. Obejmowały ćwiczenia bierne i czynne, zwane mobilizacjami, masaże, terapie termiczne, ćwiczenia wibracyjne i ćwiczenia sensomotoryczne. W kategorii Small, Medium i Large najwyższe średnie wartości punktu przypisano do funkcji chód, podczas gdy najniższe wartości przypisywano do kłusu. Psy, których wysokość w kłębie wynosiła do 35 cm, charakteryzowały się właściwą trakcją ruchu chodu, poprawną dynamiką startu podczas skoków i zostały wysoko ocenione do ukończenia przeszkody na slalomie. Najniższą średnią wartość funkcji elastyczności zarejestrowano dla psów z kategorii Large.

Zastosowanie w rehabilitacji technik manualnych systematycznie wzmacnia strukturę anatomiczną układu kostnego psa, zmniejsza napięcie mięśniowe i zwiększa intensywność metabolizmu.

Introduction

The use of manual therapy is aimed at reaching and maintaining such a level of dog's physical condition so as to enable the dog to take part in sport competitions without the risk of injury. Manual and kinetic therapeutic techniques applied in animal (veterinary) physiotherapy include the following: active and passive mobilization of muscles and tendons, therapeutic massage, including stretching, lymphatic drainage and thermal therapy – direct (contact) thermal impact.

Precise defining of kinesiotherapy programme and incorporating manual therapy into regular training is the element which positively affects the well-being of working animals as well as brings down the costs of

injury treatment. The achievement of the proper fitness state for sport activities by the animal requires preparing its body for cycles of unilateral physiological load. The aim of animal physiotherapy treatment is minimizing the neuromuscular dysfunctions, and, in turn, preventing the pathological lesions within the dog's locomotor apparatus. This effect is obtained through active movement of soft tissues, relaxation of antagonist muscles, post-isometric relaxation of muscles (LANDRUM et al. 2008, PFAU et al. 2011, SINISCALCHI et al. 2014). The underlying purpose of active mobilization (kinesiotherapy) is the stimulation of blood circulation, and, consequently, stimulation of metabolism, the increase of temperature in the active area, preparing the motor structures for dynamic reactions.

Agility competition is a discipline of canine sports in which dogs complete the obstacle course in specific order racing against the clock. The obstacles are of various types, which requires the dog to engage all structures of locomotor apparatus (BALTZER et al. 2012, PASTORE et al. 2011, CULLEN et al. 2017). Injuries or a lowered sport performance means lack of participation in competitions and generates costs involved in treatment, rehabilitation and recovery allowing the dog's return to training schedule.

The aim of this study was to estimate the impact of applied manual therapy techniques on the movement parameters of working dogs in canine discipline – agility.

Material and Methods

The study covered 36 sporting dogs taking part in competitions of international range, in the canine discipline – agility in the sporting season of 2013 and again, in 2014. According to the rules of agility competition the study group was divided into 3 categories, 12 dogs in each one (Agility Regulations: Federation Cynologique Internationale, 2013).

1. Small category – dogs of under 35 cm at the withers represented in the study by:

- 7 Cavalier King Charles Spaniel dogs,
- 5 Fox terrier dogs.

2. Medium category – dogs from 35 cm to 43 cm at the withers, the following dogs were assessed:

- 10 Border Collie dogs,
- 2 Shetland Sheepdogs.

3. Large category – dogs of over 43 cm at the withers, which comprised of:

- 9 Belgian Sheepdogs,
- 3 Beauceron dogs.

The sporting season lasted 3 months and each of the dogs being evaluated within its duration took part in 10 agility competitions.

The movement of the dogs was characterised on the basis of 5 parameters, i.e.: walk, trot, gallop, flexibility and mobility and was assessed with the use of own quality 6 points scale described in Table 1.

Table 1
Quality scale (in points) of assessed movement parameters of dogs used in own investigations

Feature	Description	Points	Characteristics of gait parameters
Walk	gait the slowest four-point gait, cycle: 1. Right shoulder limb. 2. Left pelvic limb. 3. Left shoulder limb. 4. Right pelvic limb.	1	noticeable lameness, dog stumbles or does not load one of the limbs, possible occurrence of spasticity
		2	movement with noticeable disrupted alignment of limbs while stepping forward, insufficient load on one of the limbs, gait with so called toe support
		3	proper movement, but without visible dynamics, frequent stumbling, all limbs properly loaded
		4	dynamic movement, limbs properly loaded, occasional stumbling
		5	proper movement, dynamic, without stumbling, limbs loaded properly, proper step forward of comparable length for each limb
		6	proper, dynamic movement, noticeable involvement, equal length of step forward for all limbs
Trot	two-point gait, symmetrical with visible rhythm, diagonal limbs move at the same time cycle: 1. Right shoulder limb and left pelvic limb are on the ground, left shoulder limb and right pelvic limb are in the air. 2. Left shoulder limb and right pelvic limb remain on the ground, while right foreleg and left hindleg are in the air	1	noticeable lameness, dog stumbles or does not load one of the limbs, possible occurrence of spasticity
		2	movement with noticeable disrupted alignment of limbs while stepping forward, insufficient load on one of the limbs, gait with so called toe support
		3	proper movement, but without visible dynamics, frequent stumbling, all limbs properly loaded
		4	dynamic movement, limbs properly loaded, occasional stumbling
		5	proper movement, dynamic, without stumbling, limbs loaded properly, proper step forward of comparable length for each limb
		6	proper, dynamic movement, noticeable involvement, equal length of step forward for all limbs

Gallop	<p>non-symmetrical three-point gait, so called 'leap' gait. cycle:</p> <ol style="list-style-type: none"> 1. Left shoulder limb and right pelvic limb 2. Right shoulder limb and left pelvic limb. 3. Flight stage; the moment when all limbs are not touching the ground. 	1	noticeable lameness, dog stumbles or does not load one of the limbs, possible occurrence of spasticity
		2	movement with noticeable disrupted alignment of limbs while stepping forward, insufficient load on one of the limbs, gait with so called toe support
		3	proper movement, but without visible dynamics, frequent stumbling, all limbs properly loaded
		4	dynamic movement, limbs properly loaded, occasional stumbling
		5	proper movement, dynamic, without stumbling, limbs loaded properly, proper step forward of comparable length for each limb
		6	proper, dynamic movement, noticeable involvement, equal length of step forward for all limbs
Flexibility	<p>feature defined as the dog's ability to smoothly change directions, so called manoeuvrability, alternately assuming S-shaped position, especially while going through slalom obstacles</p>	1	noticeable lameness; dog is moving overbent, with so called 'cat back' , lack of level for back line from the withers to sacral bones, animal does not complete slalom in any gait
		2	back line with slight but noticeable protrusions, stiff gait at any pace, elements of slalom rarely completed
		3	proper back line, dog misses single poles while going through a slalom, shortened step forward, no dynamics in taking turns
		4	proper back line, dog completes slalom without missing poles, proper step forward, lack of dynamics
		5	proper back line, proper step forward, proper dynamics of movement
		6	proper back line, proper step forward, proper dynamics of movement, increased range of movement in limb joints, visible while going through slalom and assuming S-shaped position – double bend

Mobility	feature defined as the ability to jump; assessment covers the cycle of: 1. Take-off stage. 2. Bascule (characteristic curve of dog's body during the flight over obstacle) 3. Landing. 4. Rebound.	1	dog refuses to go through a vertical
		2	dog goes through a vertical with a fault – knocks the bar, take-off is clearly incorrect, lack of bascule, landing with a stumble, lack of rebound
		3	dog goes through a vertical; take-off with a fault – no distance kept in front of the obstacle, bascule visibly with too much neck work, stumbling at landing, rebound with support
		4	dog goes through a vertical, visible effort at take-off, flat bascule, occasional stumbling occurs at landing
		5	dog correctly completes a vertical, dynamic take-off, proper bascule, landing without stumbling, rebound stage with minor faults
		6	dog correctly completes a vertical, all stages of movement are performed clearly and flawlessly

The same dogs were assessed twice at the start, creating control group KS (start) and the end of sporting season, creating KF group (finish).

In the second year of research the assessed dogs were included into a supportive manual therapy treatment carried out before training (Table 2) and after training (Table 3). Within 6 months the exercises consisting of mobilization, increase of muscle strength, improvement in coordination and proprioception were done.

Table 2

Author's supportive programme introduced before dog's training

Sequence of treatments	Treatment	Description	Duration/number of repetitions
1	thermal therapy	improvement of blood circulation, diminished pain, swelling and limb muscle contractions, reduced inflammation	5 minutes
2	mobilizing massage with elements of stretching	reduction of muscle tension in pathological area, removal of adhesions	10 minutes + 5 minutes
3	sensomotoric exercises	sensomotoric disc – increase of muscle strength and blood circulation in limbs affected by injury; improved functioning of proprioception organs and flexibility of limb muscles	10 repetitions

4	active mobilization I flexibility	slalom – improving the sense of balance; increasing movement coordination and rebuilding limb muscle strength after injury	5 repetitions
5	active mobilization II balance	ball – increase of muscle strength in limbs affected by injury, improvement of animal's static and dynamic balance balance beam – improvement of external stimuli perception in limbs; improvement of dog's proprioceptive organ	3 minutes 2 minutes
Total time of supportive programme before training 25–30 minutes			

Table 3

Author's supportive programme introduced after dog's training

Sequence of treatments	Treatment	Description	Duration/number of repetitions
1	vibro	body regeneration, relieving tendons and ligaments, simultaneous stimulation of many muscle groups, improvement of blood circulation	5 minutes
2	sensomotoric exercises	increase of muscle strength and blood circulation in limbs affected by injury; improved functioning of proprioception organs and flexibility of limb muscles	10 repetitions
3	active mobilization I flexibility	slalom – improving the sense of balance; increasing movement coordination and rebuilding limb muscle strength after injury	3 repetitions
4	passive exercises	stretching – eliminating symptoms of contractures, lessening tension around joint structure, increasing mobility of joints and muscles, increasing flexibility of ligaments	5 minutes
5	lymphatic drainage	elimination of pain and swelling of limbs	5–7 minutes
Total duration of treatment carried out after training – approx. 20–25 minutes			

Treatment was introduced 3 months before the start of sporting season. The parameters of dogs' movement were assessed twice according to own programs: at the start of the sporting season, creating TS group, and the end of sporting season, creating TF group.

Statistical characteristics of the assessed movement parameters was made within the scope of research groups (KS, KF, TS, TF), for the entire research population and for Small, Medium, Large categories. Statistical differences between research groups for average values of features: walk, trot, gallop, flexibility and mobility were demonstrated with the use of Mann Whitney test. The calculations were made with the use of statistics package Statistica 12 Pl.

Results

The study covered the assessment of movement parameters of 36 dogs, in canine discipline – agility, during two sporting seasons. The animals were assessed in 3 categories: Small, Medium, Large and as the entire population.

During the first sporting season the point values were given to the following features: walk, trot, gallop, flexibility, mobility according to the assumed quality scale (Table 1). Assessment of parameters was carried out before the beginning of sporting dog competition (group of dogs defined as KS) and again after the end of three-month season of competitions (group of dogs defined as KF).

In the following year for the same dogs there were animal physiotherapy manual treatments implemented before training/participating in competition (Table 2) and after finished training/end of competitions (Table 3). Treatments included passive and active exercises, so called mobilizations, massages (with lymphatic drainage and stretching), thermal therapy, vibration training (vibro) and sensomotoric exercises. During the second sporting season dogs were also assessed twice – a quarter after the commencement of supportive treatment and simultaneously three months before participation in competitions (group of dogs referred to as TS) and after the end of sporting season (group of dogs referred to as TF).

In Small, Medium and Large category the highest average point values in all groups (KS-TF) were attributed to walk feature, whereas the lowest values were attributed to trot (Table 4–6).

Dogs whose height at the withers was up to 35 cm (Small category) were characterized by proper traction of movement in gait, correct dynamics of take-off while jumping and were given high marks for completing

slalom obstacle. During slalom dogs change directions, alternately assuming S-shaped position. Maintaining proper back line, expressiveness of movement and length of step forward were described and assessed as the parameter of flexibility. For this feature in Small and Medium categories, in TS, TF and KS groups, average point values were between 5.1 and 5.5. For KF group the average point value for flexibility parameter was 4.4, in Small category and 4.2 for Medium category (Table 4, Table 5).

Table 4

Average point values of particular movement parameters of assessed dogs in Small category

Feature	Small			
	KS	KF	TS	TF
Walk	5.6	4.8	5.5	5.5
Trot	5.2	4.1	4.8	4.9
Gallop	5.0	4.5	4.8	4.8
Flexibility	5.5	4.4	5.1	5.1
Mobility	5.8	4.1	5.0	5.0

Significance: KS – control group before the start of the competition; KF – control group after the finish of the competition; TS – group which received manual therapy programme before the start; TF – group which received manual therapy programme after the end of sporting season

Table 5

Average point values of particular movement parameters of assessed dogs in Medium category

Feature	Medium			
	KS	KF	TS	TF
Walk	5.8	4.6	5.2	5.4
Trot	5.5	4.4	5.0	5.0
Gallop	5.2	4.7	4.9	5.2
Flexibility	5.5	4.2	5.1	5.4
Mobility	5.4	4.2	4.8	5.2

Significance: KS – control group before the start of the competition; KF – control group after the finish of the competition; TS – group which received manual therapy programme before the start; TF – group which received manual therapy programme after the end of sporting season

The lowest average value for flexibility feature was recorded for dogs in Large category in KF group: 3.9 points (Table 6). The location of centre of gravity in relation to the ground of large dogs (above 43 cm at the withers) makes it difficult for the animal to take dynamic turns without loss of gait pace or balance.

Table 6

Average point values of particular movement parameters of assessed dogs in Large category

Feature	Large			
	KS	KF	TS	TF
Walk	5.5	4.3	5.0	4.8
Trot	5.0	3.8	4.7	4.5
Gallop	5.0	4.2	4.9	4.9
Flexibility	5.2	3.9	5.0	5.0
Mobility	5.7	4.0	5.5	4.9

Significance: KS – control group before the start of the competition; KF – control group after the finish of the competition; TS – group which received manual therapy programme before the start; TF – group which received manual therapy programme after the end of sporting season

The average values of movement parameters assessment in control group after the end of sporting season (KF) were lower in comparison with control group assessed before the participation in competition (KS) and with both groups with implemented programme of manual therapy treatment (Table 4–6).

In the researched population the highest values of average scores were attributed for such movement parameters as: walk and flexibility whereas the lowest for trot feature. Comparable values for assessed parameters were observed in groups TS and TF involved in manual therapy programmes. The amplitude of average values of features for the dogs assessed before the beginning and after the end of sporting season in the group not involved in physiotherapy treatments was statistically significant (Figure 1 – Table 7).

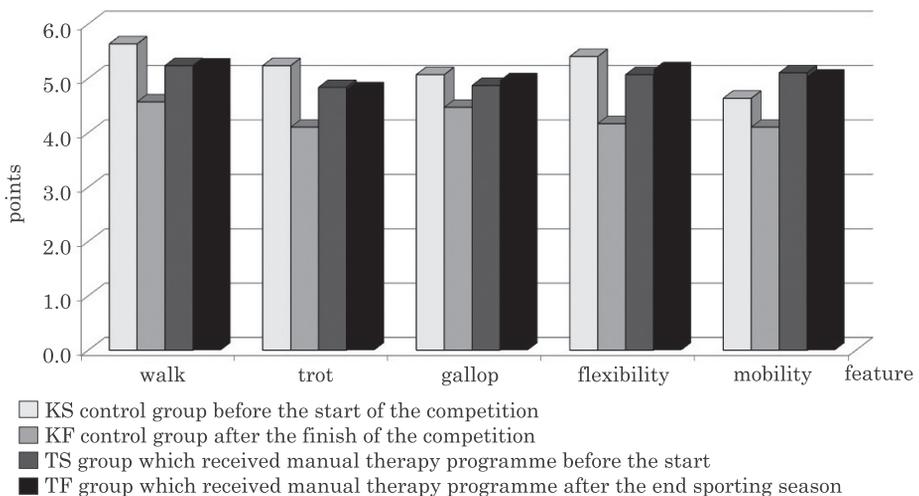


Fig.1. Average point values of assessed movement parameters in research groups for the entire population

Table 7
Statistical differences between research groups for the assessed movement parameters

Feature	Statistical differences
Walk	KS – TF ** KF – TS, TF *
Trot	KS – KF ** KF – TS, TF **
Gallop	KS – KF * KS, KF – TS, TF **
Flexibility	KS – KF ** KF – TS, TF *
Mobility	KS – KF ** KS – TS ** KS – TF * KF – TS, TF **

*statistical difference significant for $p \leq 0.05$, **statistical difference significant for $p \leq 0.01$
Significance: KS – control group before the start of the competition; KF – control group after the finish of the competition; TS – group which received manual therapy programme before the start; TF – group which received manual therapy programme after the end of sporting season

Between KS and KF group highly significant statistical differences were observed (at $p \leq 0.01$) between average values of scores for walk, trot, flexibility and mobility whereas significant statistical differences (at $p \leq 0.05$) were noted for gallop feature. Highly significant statistical differences for features such as trot, gallop and mobility were noticed between KF and TS, TF (Table 7).

For KS and KF groups, both in categories and in population, there was a fall within the range of average point values for all features. The result is a consequence of body fatigue and the limited period of tissue regeneration during sporting season.

In groups covered by supportive programme with manual therapy treatment no differences between average values for assessed features were observed. Despite the strain on anatomical structures of locomotor apparatus due to intensive work performed by the dogs during sporting season the animals did not display changes related to fatigue or injury in their manner of movement.

Discussion

Preparing the dog for participation in sport competition is time-consuming and requires financial resources. Building proper fitness state for

sport activities and participation in sport rivalry on international level is preceded by training of endurance, coordination and manoeuvrability (MCMILLIAN et al. 2006, SAUNDERS et al. 2005, BIRCH et al. 2015, CULLEN et al. 2017).

The quality of movement of the dog – agility contestant – is directly defined by efficiency (ergonomics) of particular gait, dynamic jumps and manoeuvrability (flexibility) (DYSON et al. 2000, GULDA et al. 2013).

Walk as the alternating four-point gait enables the dog to balance its bodyweight on all limbs without the necessity of long-term straining of any of them because of displacement of the centre of gravity.

Trot, as the two-point gait causes abrupt shifting of centre of gravity with simultaneous involvement of alternate limbs. Another gait, faster in terms of pace, is gallop, during which the dog additionally mobilizes motoric structures (muscles) to dynamic bouncing and shifting weight to front body parts (GOLDNER et al. 2015). Load is received by resilient structures like cartilages and bursae (GREGERSEN and CARRIER 2004, MCMILLIAN et al. 2006).

Assessment of gait is a description of characteristic traction of movement and tolerance of loads. It is related to a particular dog breed. According to MILLIS et al. (2007) dogs of small breeds move in a dynamic manner, are manoeuvrable and flexible (ARHANT et al. 2010, MILLIS et al. 2004). In the course of conducted research dogs assessed in Small category (up to 35 cm) obtained the highest scores in features walk and ‘flexibility’ and the lowest scores in trot (Table 4). Breeds with short limbs have increased step frequency, while having a shortened step forward. It diminishes their trot effectiveness.

In research the mobilization exercises were introduced in the supportive programme before training (Table 2), incorporating elements of stretching as well as active exercises. These preventive exercises were aimed at the improvement of static and dynamic balance of animals, coordination and flexibility of movement as well as increasing muscle strength while relieving points of tension (DEMIERRE et al. 2005, GAYNOR 2007, GULDA et al. 2013).

According to many authors mobilization of muscles covers PROM exercises, so called passive exercises within the scope of movement – exercises are based on increased mobility within joints through traction movements taking into account the length and flexibility of soft tissues (BIRCH and LEŚNIAK 2013, CARR 2014).

Active mobilization of animal muscles is a general name denoting a number of exercises activating structures of locomotor system. Movement of limbs is dynamic with the participation of animal’s muscles. Dur-

ing mobilization the dog makes a move, contracts and relaxes skeletal muscles (BIEWENER and DALEY 2007, COATES 2013, DOYLE 2004).

As opposed to active mobilization, passive exercises are done without the participation of dog's muscle contractions (WOJCIECHOWSKI et al. 2004). Training is conducted with the use of external forces with dog's passive attitude.

Among supportive exercises conducted after training (Table 2) there were: active mobilization, represented by flexibility practice with slalom obstacle and passive exercises where stretching techniques were used to reduce increased tension of tendons and muscles.

Lower average point values in group involved in supportive programme before the participation in the competition as compared to the research group in which manual therapy was not carried out results from so called physiological rebound. Dog's body as a response to stimulation of anatomical structures (sensomotoric exercises) and their directional load (unilateral active and passive mobilization) needs time for regeneration processes and physiological mobilization.

Positive impact on ligament and tendon flexibility and the elimination of muscle spasticity reduces the frequency of mechanical injuries occurrence during training and competition, e.g.: ligament rupture, sprains or dislocations (DEMIERRE et al. 2005, MCGOWAN et al. 2007). The application of therapeutic massage (muscle mobilization techniques, stretching) and thermal therapy before the start of training improves micro-circulation, warms up muscles and prepares the body for intensive effort. Passive exercises of anatomical structures and lymphatic drainage implemented after training or directly after strenuous exercises diminish congestive oedema.

Summing up, the introduction of manual techniques of animal physiotherapy for dogs taking part in canine sports serves a supportive and preventive role. Treatments applied systematically before and after training reinforce dog's anatomical structures of skeletal system, reduce muscle tension and increase the intensity of metabolism.

In the authors' opinion, working dogs participating in canine discipline agility require the application of treatment making use of various manual therapeutic techniques in order to stabilize the physical condition and capability of the participating dog. In dogs involved in supportive programme all parameters of the quality of movement were assessed at a comparable level, at the beginning and at the end of sporting season. In that group there was no indication of negative impact of intensive work, fatigue, injuries or lowered physiological capability. This phenomenon is a consequence of dynamics of metabolic changes. In dogs of small breeds

the rate of regeneration of biological structures is much faster than in large or giant breeds.

Taking into account the principles of animal welfare, it should be noted that larger dogs have greater joint overload associated with their body weight during agility training. The animal must perform more work on the mobilization to jump, which entails a cascade of physiological processes such as increased oxygen demand, intense heart and skeletal muscles, etc. At the landing the animal mobilizes responsible for coordination of neurological structures, muscles, with the base, ligaments and tendons stabilizing the animal in motion (BIRCH et al. 2015).

All applicable international, national and/or institutional guidelines for the care and use of animals were followed.

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