

Stretching Exercises for Horses: Are They Effective?

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ABSTRACT

This article aims to present research in both animals and humans that support the use of stretching exercises in horses as a means of increasing range of motion, improving body flexibility and posture, and preventing injury by strengthening the supportive tissues. Too often veterinarians may overlook the importance of stretch exercises. This could partially be due to a lack of familiarity of what type of exercises to recommend, how to perform them, or where to obtain the desired information. Studies demonstrate the beneficial effects of stretching, warm-up, and temperature on the mechanical properties of muscle, potentially reducing the risk of strain injury to muscles. Evidence demonstrates that various approaches to conditioning that include warm-up and stretching along with other techniques such as strength training and proprioceptive training enhance performance and prevent certain types of injury. In addition, stretching of specific muscles and articulations for specific activities might enhance the effectiveness of these other pre-exercise activities, which is consistent with a multifactorial model for injury prevention. Stretches are either dynamic (having motion) or static (having no motion). Dynamic stretching involves moving parts of the body and gradually increasing reach, speed of movement, or both. It is controlled movement or swings that gently take the limb to the limits of range of motion. Static stretching consists of stretching a muscle (or group of muscles) to its farthest point and then maintaining or holding that position. Passive or relaxed and isometric stretching are both types of static stretches. Passive or relaxed is where a position is maintained by holding it with some other part of your body, or with the assistance of a partner or some other apparatus. This type of stretching is the most common type used with stretching exercises in horses as we control the motion and positioning desired. Slow, relaxed stretching is useful in relieving spasms in muscles that are healing after an injury. Relaxed stretching is also good for “cooling down” after a workout and helps reduce postworkout muscle fatigue and soreness. A case

study and an example of a stretch exercise program and what to look for in a “how to” guide is also presented.

Keywords: Stretching; Flexibility; Exercises; Muscle fatigue; Range of motion (ROM)

INTRODUCTION

Stretching is a common practice before participation in human sports and competitive activities. Athletic directors, physical therapists, coaches, and trainers recommend exercise programs that include stretching in an effort to improve flexibility, relieve pain, prevent injury, and enhance performance. Flexibility (lack of tightness) is an intrinsic property of the body tissue that determines the absolute ROM in a joint or series of joints that is attainable in a momentary effort with the help of a partner or piece of equipment. It is specific to the type of action performed at the joint.¹

Static flexibility of a joint is measured by tools such as a goniometer, and is reported as degrees of ROM, commonly of flexion or extension.² The improvement of short-term flexibility that results from stretching has been documented.³⁻⁷ Dynamic flexibility is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through it a full ROM in the joints. This is seen when a can-can dancer swings her leg around from the hip and then twirls the knee. Active flexibility is the ability to assume and maintain extended positions using only the tension of the agonists and synergists while the antagonists are being stretched. An example here is the splits. Passive flexibility is the ability to assume extended positions and then maintain them using only your weight, the support of your limbs, or some other apparatus.¹ With horses this would be your support aiding the stretch of a leg.

Stretching exercises are designed for athletes to target specific body regions or tissue related to sporting activities based on the joints and muscles most commonly affected. Availability of this information has led veterinarians, therapists, horse owners, trainers, and riders to use stretching exercises with similar reported benefits for their horses.

Some benefits include regaining proper balance (right to left and front to rear proportions), flexibility, and body awareness, proprioception, or limb placement.⁷ Proprioception can improve with exercises and stretching specifically designed to stimulate the central nervous system's primary input fields such as the mental status and sensory

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input from the surroundings along with the body's relationship in space to that environment. In addition, stretching of specific muscles and joints for specific activities might enhance the effectiveness of other pre-exercise activities (eg, in horses these could be lounging, bringing the head around while in the saddle, walking, and loping as a warm-up), which is an approach consistent with a multifactorial model for injury prevention.⁸

Evidence demonstrates that stretching increases flexibility and might improve performance or decrease the risk of injury.^{3,6,9} Compared to control study groups those that performed stretching exercises had an increase in ROM and stretch tolerance after 4 weeks of stretching, with no change in muscle stiffness, work absorption, or delayed on-set muscle soreness. After eccentric exercise, they also had greater ROM and stretch tolerance.¹⁰

The purpose of this manuscript is to discuss the following issues.

1. Review of literature and proposed mechanism of action to assess whether stretching can actually improve ROM and prevent injury.
2. What evidence exists that stretching can relieve pain?
3. When are stretching exercises appropriate?
4. What types of stretching exercises are appropriate for horses?
5. Provide an example of a stretching exercise protocol.

REVIEW OF MECHANISMS OF ACTION

Stretching increases the joint ROM through increases in the compliance and decreases in the viscoelasticity of resting muscle.^{5,6,11-14} Compliance is the willingness of tissue to lengthen with very little force and is the reciprocal of stiffness. Compliance is most necessary during the active phase of muscle contraction as that is when most injuries occur.^{11,12,13,15,16}

Viscoelasticity refers to the presence of both elasticity and viscous behavior. An elastic substance will exhibit a change in length for a given force, and will return to its original length immediately on release. The effect is not time dependent. A viscous substance exhibits flow and movement that is time-dependent. With a viscous substance the length continues to increase slowly with a constantly applied force. Stretch relaxation occurs when the length is held constant but the measured force on the tissue slowly decreases and when the force is removed the object returns to its original length.^{6,11,12,17}

The beneficial adaptation to stretching has been most frequently credited to stretch reflex mechanisms and viscoelastic properties of the muscle. Viscoelasticity as visualized by experiments, including computed tomography and magnetic resonance imaging, have shown that injuries occur at the muscle-tendon junction and that repetitive

stretching reduces the load on the muscle-tendon unit at any given length. A large component of the changes seen in muscle due to stretching is a result of inherent muscle-tendon viscoelasticity.¹³

Stretching affects not only muscle but tendons and connective tissue as well. The immediate effects of a single stretching session produce a decrease in viscoelasticity and an increase in stretch tolerance. Stretching over a longer period of time primarily affects stretch tolerance and regular stretching may induce muscle hypertrophy.^{9,12,17}

Rabbit and quail research has shown that normal muscles stretched for 24 hours per day for several days will actually increase in cross-sectional area, even though they are not contracting.^{9,17,18} This is known as stretch-induced hypertrophy. Other rat studies have looked at both continuous and intermittent stretching as factors that could theoretically reduce the risk of injury.¹⁹ Muscles stretched continuously for 24 hours per day over varying intervals exhibited stretch-induced hypertrophy. A mouse study where shorter times of only 2 min/d of stretching were applied to the long digital extensor muscle after an induced injury lacked the previous results.¹²

Based on these studies it appears that the possibility that some hypertrophy will occur in healthy muscle if a longer period of stretching is applied. In humans, stretching alone on a regular schedule over weeks, even on days when not exercising, has shown to improve tests of maximal voluntary contraction, jumping height, and, in some, running speed.²⁰

Muscle strain occurs when muscle is elongated passively beyond its anatomical limits or activated during stretch.^{13,15,16} This is eccentric contraction. Eccentric contraction of the muscle contributes to injury by generating high muscle forces during lengthening, exceeding the forces produced by the passive connective tissue elements. Eccentric contraction occurs when the force generated is insufficient to overcome the external load on the muscle and the muscle fibers lengthen as they attempt to contract. An example of eccentric contraction is weight lifting on a bench press with fatigued or overloaded muscles and the weight is slowly lowered during maximal effort or muscle contraction.

Muscle strain, as documented in a series of rabbit hind limb studies, is characterized by a disruption of the muscle tendon unit and is due to eccentric contraction. Eccentric contractions generate high forces but activate few motor units.¹³ The extent of muscular injuries in these studies was closely related to the stretch rate. An injury could occur if the stimulated muscle was stretched to failure even once.¹⁵ The findings suggest that eccentric contractions cause profound changes in the muscular parenchyma and that they may be the result of mechanical trauma caused by the high tension generated in a relatively few active fibers during eccentric contractions. Sometimes this can occur within the physiologic range.¹⁵

The more energy muscle can absorb, the more resistant the muscle is to injury. Analysis assessing the mechanical function of two ankle extensors in wild turkeys showed that the changing demands for whole body work during steady speed running are met, at least in part, by an ability of single muscles to shift mechanical function from net energy production to net energy absorption.²¹

Both the passive and contractile elements of muscle contribute to the muscle's ability to absorb energy. These passive elements, which are not dependent on activation, include connective tissue and the fibers themselves. The contractile element of the muscle also participates because activation of the muscle increases the ability to absorb energy. The increase in energy absorbed due to contraction has been found to be around 100%. Any setting that diminishes the ability of the muscle to contract also diminishes the ability of the muscle to absorb energy and leaves the muscle more susceptible to injury.¹³

Fatigue and muscle weakness are other important contributing factors leading to muscle strain injuries. Rabbit muscle was assessed for the effect of fatigue on function. Significantly less energy was absorbed in the experimentally designed fatigue condition, with the greatest loss occurring in the most fatigued muscle.^{13,15} Muscles absorb energy while controlling and regulating limb movement.²²

Fatigued muscle is less able to absorb energy prior to reaching the amount of stretch that initiates injury.²² The passive component of a muscle, consisting of the connective tissue elements within the muscle, can absorb half the amount of energy of the contractile component until the point of failure.¹⁴ Proper conditioning to reduce fatigue is a part of a rationale for the prevention of muscle strain injury. Fortunately, many of the intrinsic factors that help to prevent muscle injury, such as strength, endurance, and flexibility are also essential to the muscle's maximum performance.

Flexibility is an intrinsic property of tissues that determines the ROM at a joint or group of joints. Flexibility is a key to virtually all physical movement, be it dynamic, active, or passive. Stretching muscles is recognized by the American College of Sports Medicine as the easiest and safest way to maintain and/or increase flexibility. There are many internal factors that influence flexibility including those listed below:

- The type of joint (some are inherently unflexible)
- The internal resistance within a joint
- Bony structures that limit movement
- The elasticity of muscle tissue (scarred tissue from a previous injury is not very elastic)
- The elasticity of tendons and ligaments (ligaments have minimal stretch and tendons should not stretch at all)
- The elasticity of skin
- The ability of a muscle to relax and contract to achieve the greatest range of movement

- The temperature of a joint and associated tissues (joints and muscles offer better flexibility at body temperatures that are 1 °C–2 °C higher than normal)
- Level of hydration¹

Flexibility is dependent on the viscoelasticity of muscle, ligaments, and other connective tissue crossing the joints. It is also influenced by two spinal reflexes, which are initiated by the muscle spindle and the Golgi tendon organ. The muscle spindle is a stretch receptor composed of thin muscle fibers some of which are designed to respond to rate of length change, while others respond to static absolute length change. When muscle stretch activates the spindle reflex, the fibers contract, shortening the muscle. The Golgi tendon organ is collagenous fibers and muscle fibers located at the muscle tendon interface. Upon contraction a force is applied to the Golgi tendon organ, which sends to the spinal cord a message that results in inhibition of the agonist muscle and contraction of the antagonist. Thus, the Golgi tendon reflex enhances the ability of a muscle to stretch, while the spindle reflex attempts to prevent muscle elongation. The goal of a stretching exercise should be to enhance the Golgi tendon reflex and inhibit the spindle reflex.⁶

An imbalance in flexibility might predispose to injury.³ Increased muscle flexibility after stretching has been attributed to a number of theorized mechanisms. Viscoelastic properties of muscles allow for the muscle to gradually relax and increase in length as a force is applied over a constant period. In human patients this is seen as increased ROM of the joints associated with stretched muscles and connective tissue.^{6,15} Recent studies indicate that improvements primarily may be the result of muscle relaxation secondary to tensile stress applied to the muscle during passive stretching.⁴

Animal studies support the impact of active stretching toward increasing muscle length through relaxation via reciprocal innervation.²³ Active stretching is purported to increase the extensibility of the hypertonic muscles while concomitantly improving the use of antagonistic muscles. Although the neurologic mechanisms of muscle relaxation in active and passive stretching are thought to be different based on animal models, tensile stress is common to both types of stretching and is probably the primary factor for increasing muscle flexibility.⁴

Additional benefits of stretching and joint mobilization are the effect it has on pain. Muscle pain is reduced with stretching via an increase in pain thresholds.^{5,24} The reduced pain or hypoalgesia is partially due to the effects of central nervous system at the spinal cord or cerebral level. Muscles are electrically silent during normal stretch until nearing end ROM.^{5,25}

The stretch tolerance is the key for relieving pain associated with muscle stiffness. Increased stretch tolerance

means that the same force produces less pain and may occur through an increase of muscle strength or an analgesic effect. After several weeks, stretch-induced hypertrophy may increase tissue strength and stretch tolerance as a result.¹⁴

Evidence of a possible analgesic effect is recent. Stretching seems to increase the pain threshold during a muscle stretch—acting like an analgesic. Studies on human subjects incurred stretching to muscles until they felt pain then the stretch stopped. Upon stretching again, the expected increased ROM before pain was felt was found to be associated with both an increased length and force across the muscle. Had the increased ROM been limited to viscoelastic changes alone, the muscle length would have increased but the force applied would have been less or unchanged. The only explanation for an increase in force before pain is felt is that stretching acts like an analgesic.¹²

STRETCHING METHODS

Important steps to preventing muscle strain injuries include warming the muscles and joints prior to exercise, stretching (pre-exercise, postexercise, time outside of exercise) and improved flexibility.^{11,13,22,26,27}

Warming up tissue before stretching has consistently shown to produce improved benefits for increased ROM and flexibility.^{3,5,19} Heating augments the increase in ROM achieved by stretching by increasing the extensibility of collagen within the tendon and joint capsule. Heat also facilitates the response of the major spinal reflexes to stretch by decreasing the sensitivity of muscle spindle reflexes and increasing the firing rate of Golgi tendon organs.¹³ Warming the muscles can be achieved by application of warm compresses, deep massage, or light walking or activity to stimulate circulation and increase the muscle temperature.

Viscoelasticity is temperature-dependent and warm-up causing increased viscoelasticity is therefore thought to be protective against muscle strains.¹⁰ Rabbit hind limb muscle held isometrically and tetanically stimulated for 10–15 seconds elevated the muscle temperature by 1 °C. The muscle then exhibited greater stretch length before failure and with higher force production.³

Warm-up increases blood flow to muscles, speed of nerve impulses, oxygen and energy substrate delivery to working muscles while removing waste products, and allows for improved oxygen release from hemoglobin and myoglobin. Warm-up decreases both the activation energy required for cellular reactions and muscle viscosity. These changes prepare the body for vigorous exercise by accelerating metabolism in muscle fibers and decreasing intramuscular resistance, thus increasing mechanical efficiency and ROM as well as the speed and force of muscle contraction.³ Animal studies suggest that warm-up increases muscle and

connective tissue elasticity, which reduces the likelihood of muscle strain.^{6,28}

When should stretching be done for the greatest gain? Much of the research surrounding this topic has focused on injury prevention. A 2007 *Sports Med publication* provided evidence that a warm-up and stretching routine performed within 15 minutes immediately before the activity showed the greatest benefit in preventing muscular injury.²⁹ Other references dating prior to 2007 contained variable results but leaned toward clinical significance supporting the benefits of pre-exercise stretching.^{6,12}

Studies focusing on stretching after or outside periods of exercise suggest a clinically relevant decrease risk of injury. Positive studies involving military recruits and another with firefighters supported that regular stretching prevents injury. Further, the costs due to lost time from work were also less in the groups that stretched.¹²

Both dynamic and static stretching routines are beneficial for pre-exercise and outside of the activity schedule. Relaxed or passive-type stretching is very good for cooling down after a workout and helps reduce postworkout muscle fatigue and soreness.³⁰ Static stretching of fatigued muscles performed immediately after exercising that caused the fatigue, helps not only to increase flexibility but also enhances the promotion of muscular development, and will actually help decrease lactic acid and postexercise soreness. Muscles that are not stretched after strenuous exercise retain a reduced ROM secondary to the shortening that occurs during the repetition of intense muscle activity and build up of lactic acid and other waste products. Static stretching of the recently active and “pumped-up” muscles helps to loosen and reset them back to full ROM and reduce tightness.¹

Strenuous exercise can often cause damage to the muscle’s connective tissue. The tissue heals in a few days, but it is believed that the tissue heals at a shorter length, decreasing muscular development as well as flexibility. Further, weak muscular connective tissue is more likely to become damaged due to overstretching, or sudden powerful muscular contractions. To prevent the tissues from healing at a reduced length, physiologists recommend static stretching after a workout.¹

Static and isometric stretching may be done by a horse on its own, but the horse cannot be directed to do them on command with repetition; thus, these stretches are not applicable for a stretching exercise program in horses. Passive techniques require a skill level on the part of the administrator. A knowingness, or “feel” for the stretch tolerance of the patient’s body region involved in a stretching exercise is important to avoid causing injury to the muscles or connective tissue.

In considering the desired type of stretch exercises to implement with a horse the veterinarian needs to determine whether the goal is to prevent injury, to achieve an

immediate tissue response, or to gain a long-term effect. Other considerations would include if the patient is post-operative or postinjury, then the goal might be to regain tissue function or reduce scarring and adhesions.

Evidence from animal models suggests that adverse physiological adaptations can be prevented following operations by doing prolonged daily stretches.³¹ Injured muscles that healed with scar tissue may require longer stretches or more repetitions to obtain the same benefits as healthy muscles.¹⁴ Experimental animal models have proved that there is statistically significant reduction in tension for a given stretching length and an increase in length for a given tensile force between the first four stretches. Immediate effects are acquired during the first four repetitions within 60 minutes after a stretch and increased frequency of stretching exercises leads to faster rehabilitation without compromising the overall result.^{14,32}

Several studies have examined the exact time per stretch that produces the greatest response.^{3,5,11,31} Static stretches were held ranging from 10–60 seconds. Studies where static stretches with variable time lengths were used on animals and humans showed that optimal time for improved ROM is 10–30-second stretches, starting with the shorter time and working to the upper limit as tissue response permits.^{3,14,31} Increased frequency of static stretching exercise leads to faster rehabilitation and accelerates the benefits of other therapeutic measures, allowing a faster return to function, without compromising the overall result.^{6,14}

Based on all the references cited above, we can surmise that adequate pre-exercise stretching, warm-up, and post-exercise ground stretches in horses could prevent muscle and joint injury in them as well.

CLINICAL APPLICATIONS

A regular stretching routine for prevention of injuries is important for all performance horses but is especially important for stalled horses. These horses do not have the opportunity to graze, flex, and extend joints through their ROM, or engage muscle groups throughout the day outside of their training program. If a program is not based on cross training, many muscle groups may rarely be engaged, if at all. The in-saddle training “warm-up” does not compensate for good regular ground exercises.

Safety for the horse and the individual doing the stretches needs to be considered. An individual with “good horse sense” knows the etiquette needed around a horse. Those concerns should always be present and adhered to even when working with the best of horses. Body positioning, protecting your back, bending at the hips as opposed to arching your back, using your legs for support as opposed to lifting with your shoulders and back, skills learned in weight lifting and personal exercise programs will all serve you well in establishing safety

guidelines to implement during stretching movements with a horse.

Anyone can learn to be effective and safe at stretching a horse. The best administrator would be the owner, handler, or trainer as they could potentially be with the horse daily and can maintain a consistent program. Improved flexibility is achieved when stretching becomes a regular part of the horse athlete’s routine. No matter who is delivering the stretching, success does require a few key points for the administrator:

- Be comfortable around the horse
- Find an exercise program that is recommended by a veterinarian or professional therapist who has used the stretches on horses, understands rehabilitation, and is comfortable in helping to guide you if the need arises
- Understand the goal or purpose and how to effectively deliver the exercises
- Take the time to do it correctly (no short cuts)
- Always start conservatively then gradually increase the length of stretch, the angle or height of the stretch, and the number of repetitions as the body zones respond appropriately
- Pay attention to the behavior or response(s) the horse gives with each stretch
- Keep notes on the changes you see
- Periodically re-evaluate movement and balance from a distance
- A “good” stretch will be comfortable and effective if you are following the above steps. A “bad” stretch will be met with resistance or failure to make any positive gains in flexibility, ROM, or performance.

When implementing a stretch program it is best to work through increasing gradients of difficulty starting with a basic or beginning style set of expectations, gradually working up to an advanced level as the horse accomplishes each step and is ready to proceed. The point of stretching, for example, is not to see how far you can extend or flex the leg but to pull the tissues out to length and put just a little healthy tension on them. Consistency and frequency on the part of the administrator are also important. The execution of stretch exercises need to follow a precise plan if consistent results are expected.

Assessment of the weaknesses and strengths of the horses’ posture, clinical history, previous injuries, gait analysis, current overall condition, and optimal goals will help determine the type of stretch exercise and body region that needs attention. Posture is the relationship of the body in regard to gravitational forces. A horse with perfect conformation can exhibit poor posture because of an accident or injury and the subsequent alterations to muscle and body contour such as lordosis, kyphosis, weight shifting, atrophy, fibrosis, and scars.

Stretch exercises for horses are designed to improve function of joints and tissue including the extremities, neck, abdomen, and the back. When doing exercises, especially starting with an unfamiliar horse, it is crucial to select a quiet location, have a good frame of mind, and maintain a calm horse. Anything that triggers the sympathetic nervous system (fear, anxiety, stress) will cause tensing of the large muscle groups (a “prepare for escape” response), which is counterproductive to relaxation. Execution of the stretches will be easier if the horse is relaxed. An exercise program should include several points:

1. The purpose or goal of the treatment
2. Focus on the primary area or muscles affected
3. List indicators that the stretching is effective and when to discontinue treatment
4. Clear descriptions of the step-by-step process for each stretch
5. Quality photos showing the stretching sequence including body positioning for the human as well as the horse
6. Recommended repetitions, duration of stretching session, frequency and time line for delivery

The effects of a successful program can sometimes be seen as early as 1 week. Other times it may take 2 to 4 weeks before definitive changes are measurable. Positive results are the end product of following what has previously been mentioned and listed earlier. Here is a case history of a horse that could benefit from a stretching exercise program.

CASE HISTORY

A 7-year-old 3-day Eventing Warmblood with a 2-month history of changes in willingness to take a right lead and flex to the left, loss of tone in gluteal muscles, tenderness over lumbar region, slight kyphosis, base narrow stance, shifts weight off right rear. PEX: No soft-tissue trauma, joint flexion tests normal, chiropractic adjustments to correct; restricted dorsoventral motion in right pelvis, low lumbar spinous process left rotation, mid lumbar dorsoventral restriction, upper lumbar left rotation, mid cervical vertebral body to left and atlas rotated dorsally on the right.

An example of a stretching exercise program for the lumbar spine, pelvis and pelvic limbs of this horse would include the following exercises taken from *Fitness in Motion*³³: (* Stretching exercises to be highlighted)

1. Butt, Belly, Back
2. Basic Rear Leg Series*
3. Pelvic Rock*
4. Tail Traction

Purpose

Reduce pain and tenderness, increase flexibility, improve ROM.

Primary Area(s) and Muscles Affected

These would be listed more specifically under each individual exercise (number 2 and 3) but to condense and save space I have included the entire groupings as one. See the photos with description below for details.) Semimembranosus, semitendinosus, adductor muscle group, gluteal muscle group, biceps femoris, gastrocnemius, tensor fascia latae, rectus abdominus, iliopsoas, and thoracolumbar fascia.

Primary Indicators That Activity Is Effective

Reduced pain and tenderness, increased flexibility and ROM of the affected joint(s), and a balanced stance.

Primary Indicators to Discontinue Activity

Unwillingness to do the stretch exercises, pain and tenderness persists, no improvement to ROM or body posture after a reasonable amount of time based on the original condition. (This may be 2 weeks for one situation but 4–6 weeks for another.)

List of Activities

“Rear Leg Stretch Series”; Forward Pull, Quadriceps Extension, and Rear Leg Crossover. Pelvic Rock.

Specific Goals

These would be listed out for individual exercises. An example of this would include how far to lift the leg and in what precise directions, a measurement of how big to make a circle, how long to hold the position, etc.

Frequency

Time to perform each activity: 3–5 minutes. Number of times per day: 1 time. Number of days per week: 3–7.

Example photos of proper techniques used for stretching exercises complete the mental image so that the person doing the stretches would be able to vision herself doing the exercise and then start doing them on her own horse.³³

I. REAR LEG STRETCH SERIES

- A. Image 1 (Figure 1): Forward Pull–Hind limb protraction exercise. The gluteal muscles and tensor fascia latae work to pull the rear limb forward and flex the hip. The hamstring muscles will be extended and stretched during this exercise. It will also engage the lumbar region to extend.
- B. Image 2 (Figure 2): Quadriceps Extension–Hind limb retraction exercise. Extension of the hip is controlled by the semitendinosus, semimembranosus, and biceps femoris. The quadriceps group will extend and be stretched during this exercise. The lumbar region will need to flex.



Figure 1. Forward Pull-Hind limb protraction exercise. The gluteal muscles and tensor fascia latae work to pull the rear limb forward and flex the hip. The hamstring muscles will also be extended and stretched during this exercise. It will also engage the lumbar region to extend.



Figure 2. Quadriceps Extension-Hind limb retraction exercise. Extension of the hip is controlled by the semitendinosus, semimembranosus, and biceps femoris. The quadriceps group will extend and be stretched during this exercise. The lumbar region will need to flex.

C. Image 3 (Figure 3): Rear Leg Crossover—Adductors move the leg medially as the leg crosses over the midline of the body. Gluteal muscles and tensor fascia latae will stretch to allow the completion of the exercise. Lumbar region will rotate to the side of the leg that is being stretched.

PELVIC ROCK

This stretching exercise retracts the entire leg in a somewhat flexed position with a gentle protraction/retraction rocking motion that encourages ventral (anterior) movement of the pelvis on the same side. It is used to facilitate ventral motion of the pelvis after a posterior fixated pelvic adjustment.

A. Image 4 (Figure 4): Position of horse and administrator, note placement of forward (superior) hand on the stifle.

B. Image 5 (Figure 5): Position of caudal (inferior) hand on the hock.

The placement of your leg in front of the hock enables you to use your entire body efficiently to create the stretch. Once your leg and hands are in position your leg is then motioned left to right 15–20 times as you watch for the ilium to dip.

SUMMARY

Muscles and connective tissue respond to overuse by shrinking and tightening. Its response to underuse is much the same. Stiffness can result in injury, lead to inactivity, and eventually speed up the aging process of the musculoskeletal system. To remain supple the connective tissue and muscles need regular stretching. Stretching helps resist the gradual shortening and tightening of tissue

that otherwise sets in from both overuse and underuse, reducing the discomfort and slowing the progressive loss of capacity that accompany the tightening.

Too often veterinarians may overlook the importance of stretch exercises. This could partially be due to a lack of familiarity of what type of exercises to recommend, how to do them, or where to get the desired information. As more veterinary colleges are beginning to add physical rehabilitation programs, future veterinarians will have some knowledge of its importance and how to implement stretch exercises for their patients. For further information or clinical expertise, I recommend contacting a rehabilitation or sports medicine–focused practice, animal chiropractic trained (minimum of 200 hours of coursework) and certified doctors, physical therapists, or veterinarians specializing in physiotherapy and rehabilitation.

Studies cited in this manuscript demonstrate the beneficial effects of warm-up, temperature, and stretching on the mechanical properties of muscle, potentially reducing the risk of strain injury to the muscle. Research supports that various approaches to conditioning that include warm-up and stretching along with other techniques such as strength training and proprioceptive training both enhance performance and prevent certain types of injury.^{3,6,34} This suggests that conditioning and proprioceptive training could play an important role in injury prevention for horses as well.

A summary of the benefits of stretching:

- Reduces the risk of injury
- Reduces muscular tension
- Maintains the normal functional length of all muscles
- Eases joint stress
- Increases joint ROM
- Corrects muscle imbalances



Figure 3. Rear Leg Crossover. Adductors move the leg medially as the leg crosses over the midline of the body. Gluteal muscles and tensor fascia latae will stretch to allow the completion of the exercise. Lumbar region will rotate to the side of the leg that is being stretched.

- Improves movement patterns
- Improves overall functional ability and freedom of movement
- Enhances posture
- Develops better body awareness
- Decreases delayed onset muscle soreness
- Promotes circulation
- Allows one to feel and perform better
- Helps improve balance and stability³⁵

There is an ever-growing interest in performance horse maintenance and injury prevention exhibited by the new books that are being published on the subject.^{33,36,37} As with any manual skill, it is best to receive some hands-on education and guidance in addition to reading. Some people will be more adept than others at perfecting the application and delivery but the first step is to just begin because it is never too late to start stretching your horses.

DEFINITIONS

Concentric exercise – A type of muscle contraction in which the muscles shorten while generating force

Dynamic flexibility – Movement of a joint that depends on the strength of antagonist muscles to move the limb and on the freedom of the limb to move

Eccentric exercise – A voluntary muscle activity in which there is an overall lengthening of the muscle in response to external resistance

Flexibility – The absolute ROM in a joint or series of joints and muscles that is attainable in a momentary effort



Figure 4. Position of horse and administrator. Note the placement of the forward (superior) hand on the stifle.



Figure 5. Position of horse and administrator. Note the position of the caudal (inferior) hand on the hock.

influenced by muscles, tendons, ligaments, bones and bony structures, and primarily the muscle–tendon unit

Isometric stretching – A type of static stretching that involves the exertion of effort against a resistance that strengthens and tones the muscle without changing the length of the muscle fibers

Kinetic – Presence or absence of motion or movement

Muscle compliance – The amount of force produced by a muscle in response to lengthening of that muscle. The inverse of elasticity, it is the intrinsic quality of a muscle that resists stretch.

Muscle fatigue – The inability to exert force with one's muscle to the degree that would be expected. Also known as muscle weakness. It can be the result of vigorous exercise

but may be caused by barriers to or interference with the different stages of muscle contraction.

Posture – The carriage of the body as a whole, the attitude of the body or the position of the limbs

Protraction – Lengthening or extending a joint or limb forward

Retraction – Lengthening or extending a joint or limb to its most rearward position

ROM – Measurement of the achievable distance between the flexed and the extended position of a particular joint or muscle group

Static flexibility – The ability of a joint to move through a passive ROM

Stiffness – The capacity of a tissue to resist stretching or elongation

Stretching – Exercise designed to extend the limbs and muscles to their full extent

Stretch reflex – A reflex contraction of a muscle in response to stretching of an attached tendon of the muscle

Stretch tolerance – The capacity of muscle to allow or tolerate a greater lengthening of tissue resulting in increased flexibility and is thought to be the result of decreased sensitivity to pain

Tensile stress – The resistance of muscle to force

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