



"We have worked with Debranne Pattillo since the early 90s, first as in a veterinarian/equine therapist relationship and later on, as part of her worldwide education program, *Equinology, Inc.*

Over the years, we truly witnessed the intrinsic character of a leader and true pioneer.

We observed Debranne's keen obsession for science-backed knowledge, scouting the world to collaborate with the best qualified equine professionals. She worked incessantly to bring expertise, excellency and recognition into the educational programs that she developed one by one over the years.

Who would have been more qualified to write this anatomy and muscle therapy book than Debranne? Precise, fully documented and researched, this work will become a reference tool for every horseman or equine professional.

It had been an honor and a pleasure to collaborate all these years with such a gifted individual. We now applaud her tenacity and persistence for achieving such a masterpiece.

Kerry would have been so proud of her achievements. He always knew that whatever she would put her heart into would be outstandingly executed. Bravo!"

*Christine and Kerry Ridgway, DVM*

"Many books have been published that profess to teach you "how to understand your horse." This one may actually answer the question for the first time. Many books, and courses, and videos have also been produced with the idea of introducing people to doing massage and bodywork for their horses, but few, if any, take the time to give you enough information to pick the issues of a specific horse from the haystack of possibilities. This text covers far more than anatomy – it actually teaches you to see each unique horse from conformation through performance, injury, and compensation so that you can have an idea of which bodywork moves to apply and where to use them. The detailed discussion and image of each muscle, its location, function, and potential causes for dysfunction help to completely demystify issues affecting equine wellness and performance. The bodywork techniques that Debranne has developed and teaches have proven their effectiveness in the hands of many of her students with many horses of all breeds and disciplines.

Debranne has the mind of a researcher and an anatomist – this passion, combined with her years of experience and expertise in the field – makes the information she presents exceptionally accurate and insightful. Because of its hands-on practicality and its in-depth look into the anatomy of the horse, this text operates on a much deeper level than much of the literature available on similar topics. Many books address anatomy, and many books discuss bodywork, but few combine both of these essentials at this level of expertise. Another unique element of this work is that it presents a synthesis of experience and knowledge from top practitioners in the field of equine wellness, making it a comprehensive resource, collecting the thinking and best practices of some of the best minds on the subject. Those of us who have followed Debranne's work for years are anxiously awaiting the publication of this comprehensive discussion of the horse."

*Sarah Miles, EEBW III*

"Congratulations Debranne, on writing THE book on equine anatomy and bodywork. At seven hundred pages, this book is thorough, clearly written and beautifully illustrated – and is bound to become an essential resource for equine wellness professionals, trainers and riders. This book shows the same standard of excellence we have seen in the Equinology courses and Painted Horse demonstrations we have hosted over the years and we have no doubt that it is going to become a best seller. Finally, we are proud to have the handsome Clint Eastwood featured on the cover – you truly are an artist besides being a gifted teacher and equine anatomist."

*Manolo and Kate Mendez, Equestrian La Mancha, Australia*

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## Tissue level of organization

Due to the complexity of the equine body, it is not possible for every cell to perform every single function that is required. Instead, some cells become specialized to carry out specific functions. Together, all these differentiated cells are able to fulfill the needs of the body. Due to their specialization, the cells – though they have the same basic organelles – appear different, taking on different sizes and shapes with modifications according to their function. A collection of cells with the same function is known as a **tissue**.

## Types of tissues

The body consists of four main types of tissues – **epithelial tissue**, **connective tissue**, **muscle tissue**, and **neural tissue**.

### Epithelial tissue

Epithelial tissues are those that cover surfaces exposed to the surrounding environment, line internal passages and chambers and form glands. They form the outermost layer of skin and line the respiratory, reproductive, digestive and urinary tracts (Figure 3). They also line the inner walls of the blood vessels.

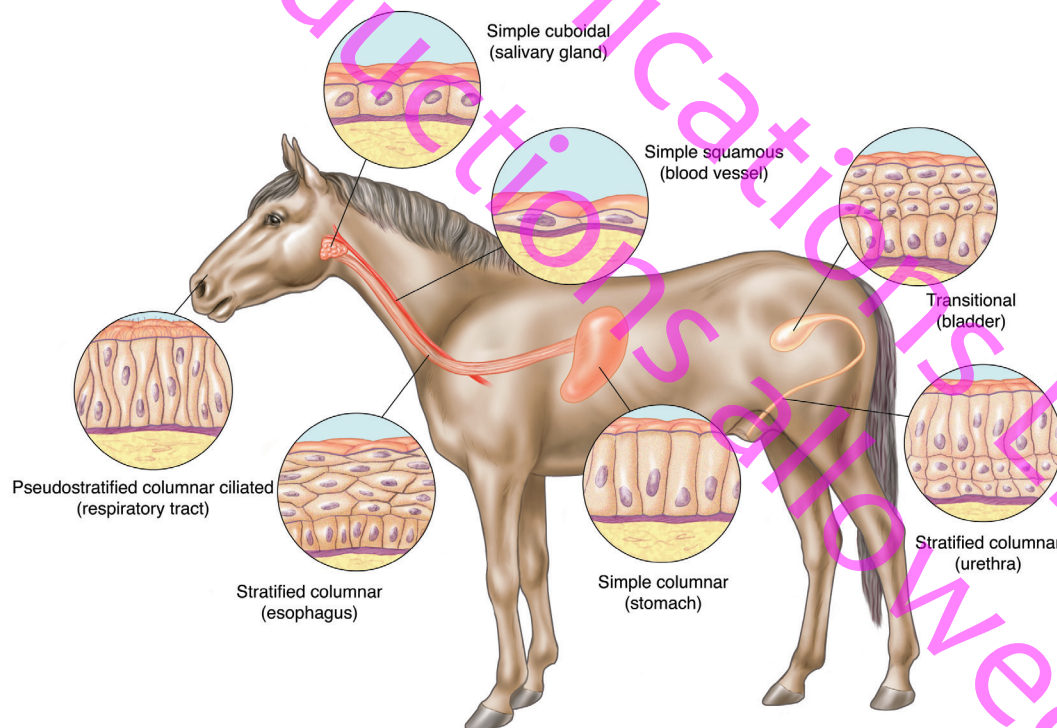
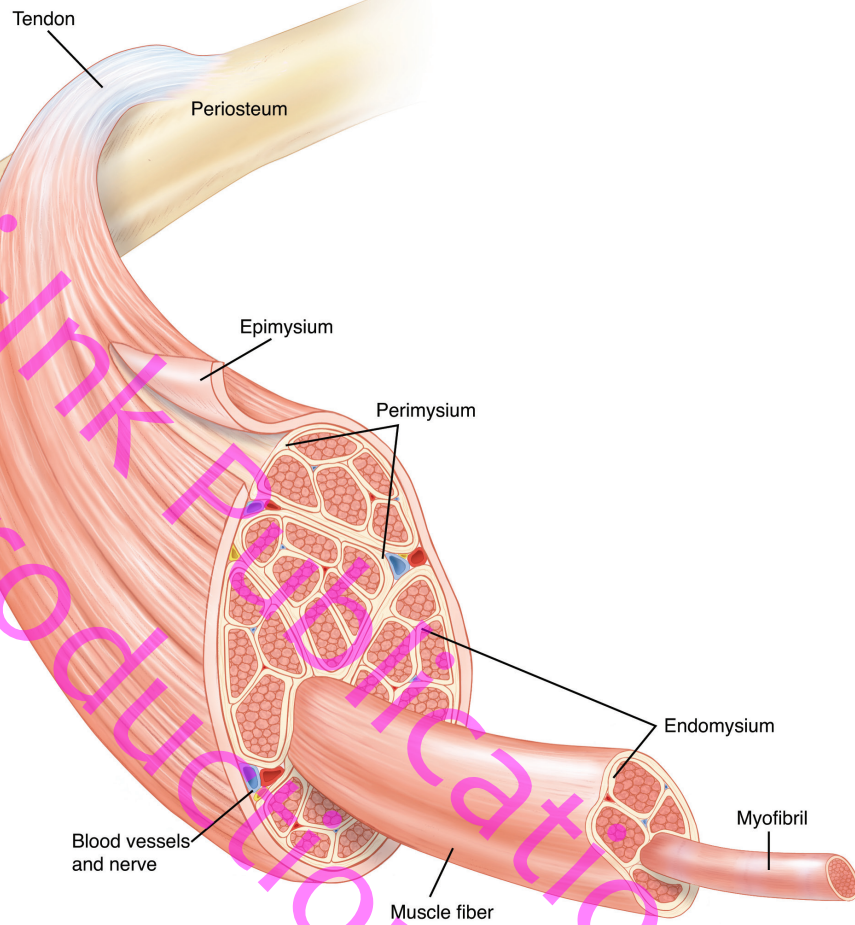
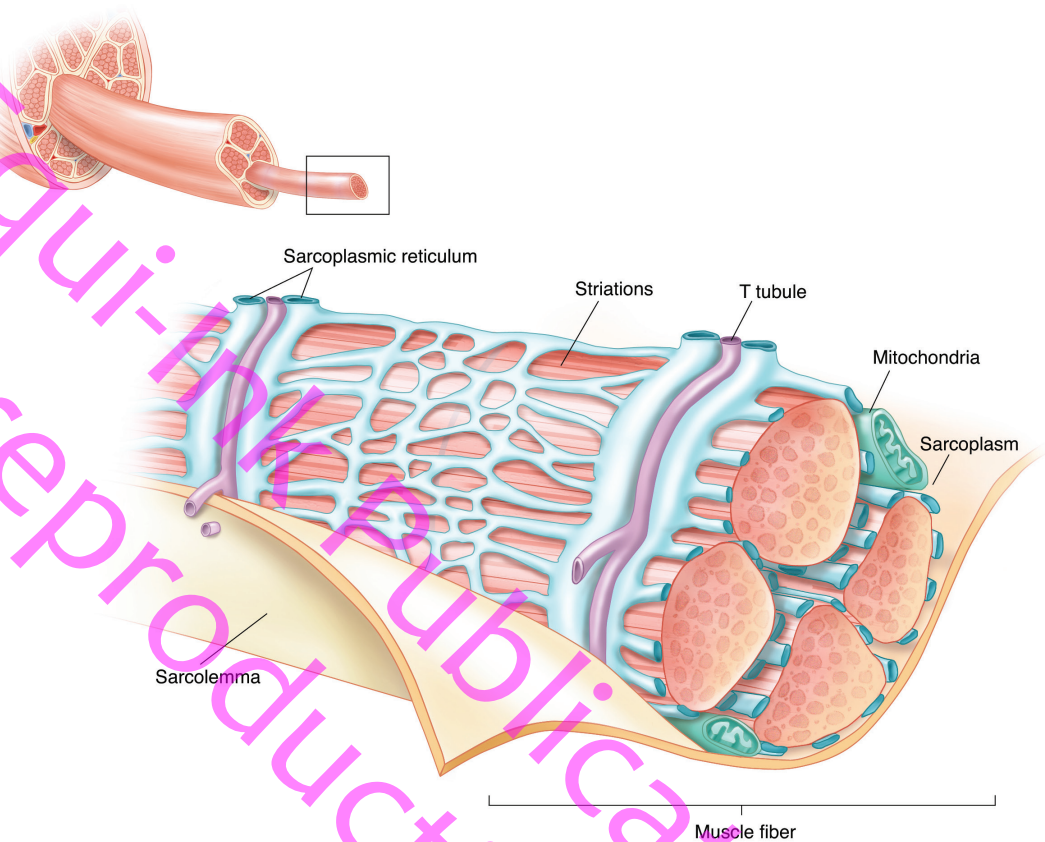


Figure 3: Epithelial tissue



*Figure 8: Structure of skeletal muscle*



*Figure 9: Structure of a single muscle fiber*

Under the microscope, each fiber appears striated (or striped) with dark and light bands (Figure 10, following page). The bands are due to the special arrangement of muscle proteins inside the cell. A unique feature of skeletal muscle fibers is the presence of cylindrical structures called **myofibrils** within the cell. These myofibrils are made up of a collection of specialized proteins called **myofilaments**. It is the activity of the myofilaments that produce contraction and relaxation of the muscle. How do the myofilaments do this?





## Endurance

*Photo by Shutterstock*

- Hyperextension of the distal limb
- Fatigue
- Trotting uphill when fatigued
- Low heel, long toe (LHLT)



## Eventing

*Photo by Dr. Carrie Schlachter*

- Impact of landing after jumping
- Pushing off with the hind end for jumping (take off)
- Varied terrain
- Fatigue
- Quick turns
- Hyperextension of the distal limb



## Polo and Polo Cross

*Photo by Melissa Main*

- Inverted posture
- Torque from mallet swing
- Sharp pivots on hind end
- Increased joint flexion
- Impulsion and fast starts
- Fast stops
- Hyperextension of the distal limb
- Low heel, long toe (LHLT)
- Standing in stirrups



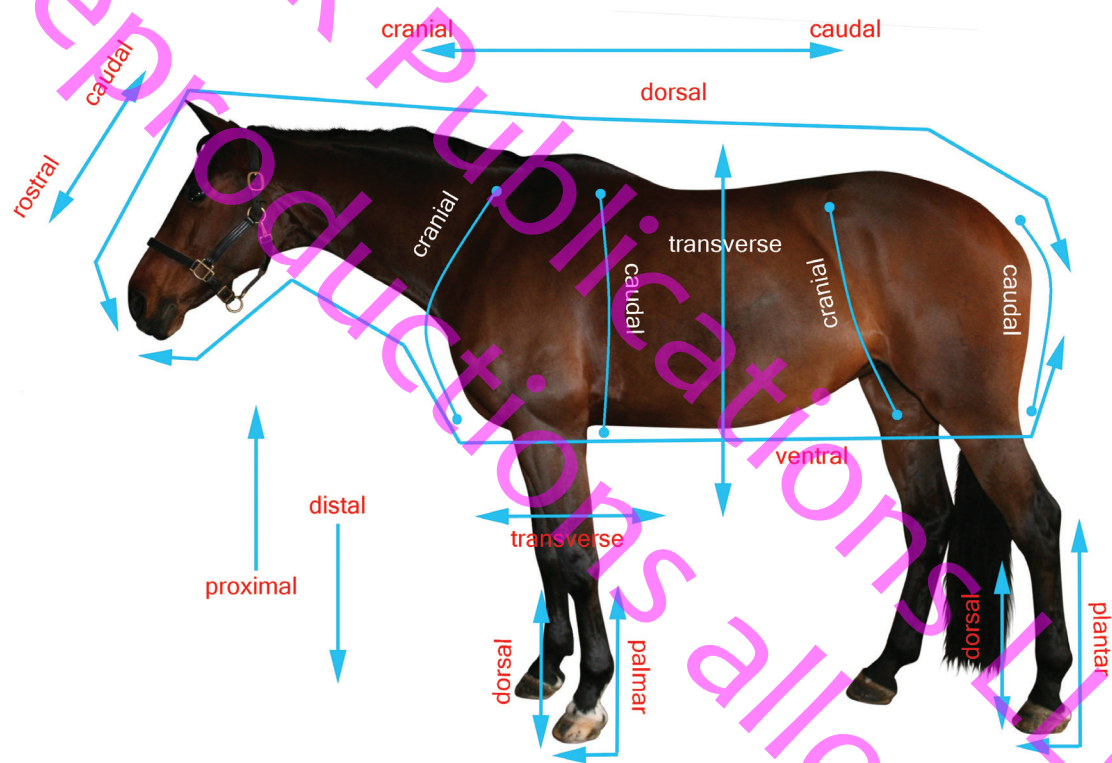
**Tendon:** Slightly contractile cord-like mass of bundled white fibrous connective tissue. They are the tails of cells found running through the muscle, forming the insertion and origin. Tendons connect bone to bone via muscle.

**Thorax:** Greek for breastplate. The trunk region.

**Vertebra:** (Latin) joint from verto, to turn.

**Withers:** The highest part of the shoulders.

## Equine Directional Terms and Planes

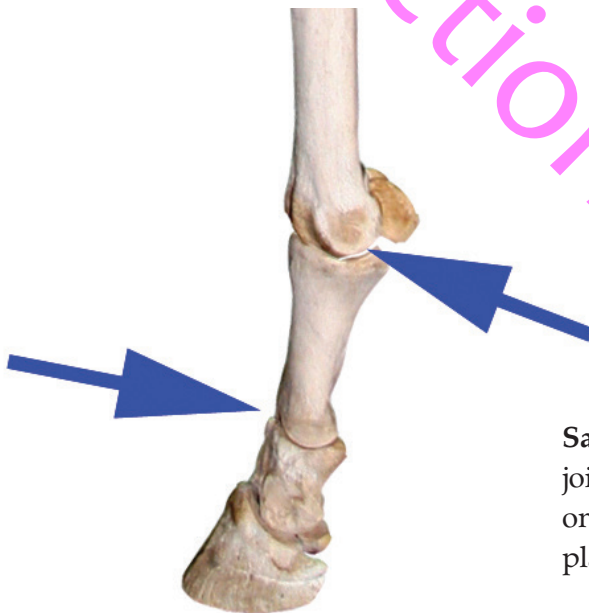
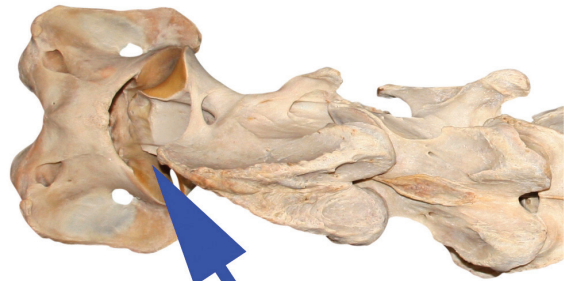


Directional terms are relative to the anatomical positioning. Sometimes this can be a bit confusing using human (biped) terms and translating them to horse (quadruped) terms. When something does not make sense, think about standing the horse up on his hind legs. The “palms” of his “hands” will face forward.

**Pivot joint (trochoid) (TROH-koyd):**

Allows rotation on the longitudinal axis.

Example: atlantoaxial joint (C1-C2) which is shown here in a dorsal and lateral view.



**Saddle joint:** The articular surface of the joint is concave on one end and convex on the other. Allows movement in two planes.

Example: pastern joint.



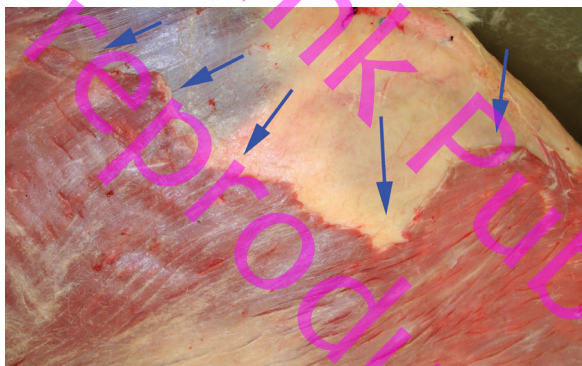
*Figure 2: Extension of the carpus (magenta arrow) and palmar extension of the fetlock (yellow arrow). Hip (purple), stifle (blue) and hock (green) extension. Photo by Paige Cerulli*

For clarity, it is important that one understands flexion means the same thing regardless of the species, as does extension. Thus flexion should denote the same direction of movement in the joint of a human, a bat or a horse. Now look at a horse's fetlock joint (as indicated with arrows in Figure 3, following page). You will notice that the limb bends forward quite distinctly at this joint when the horse is standing quietly. If we were to apply the rule that says flexion means reducing the angle of the joint we would end up bending the joint even further forward. But we know that the fetlock joint is the equine equivalent (homologue) of our knuckle, and we have already learned that curling up our fingers is flexion, so we have an apparent contradiction.

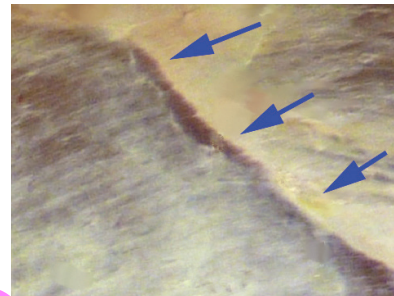
The cutaneous muscles do not cover the entire body of the horse, and vary in shape, size and muscle direction. As these muscles blend into the superficial fascia they can create distinct ridges (as shown in photos below).

These types of ridges are also seen in many horses on the trunk or in front of the flank area.

Although some references describe the cutaneous muscles as thin, broad sheets, the muscles can in fact be fairly thick in certain areas on the horse. In a study done at Michigan State University thicknesses of up to 2.7cm at the girth area of specimens were reported (Van Iwaarden, A. et al (Sept. 2012) JEVS, pp.519-524).



*Cutaneous muscles blending into the superficial fascia (the tan smooth surface in the above photo) at the wither on a dissection specimen and below on an actual horse*



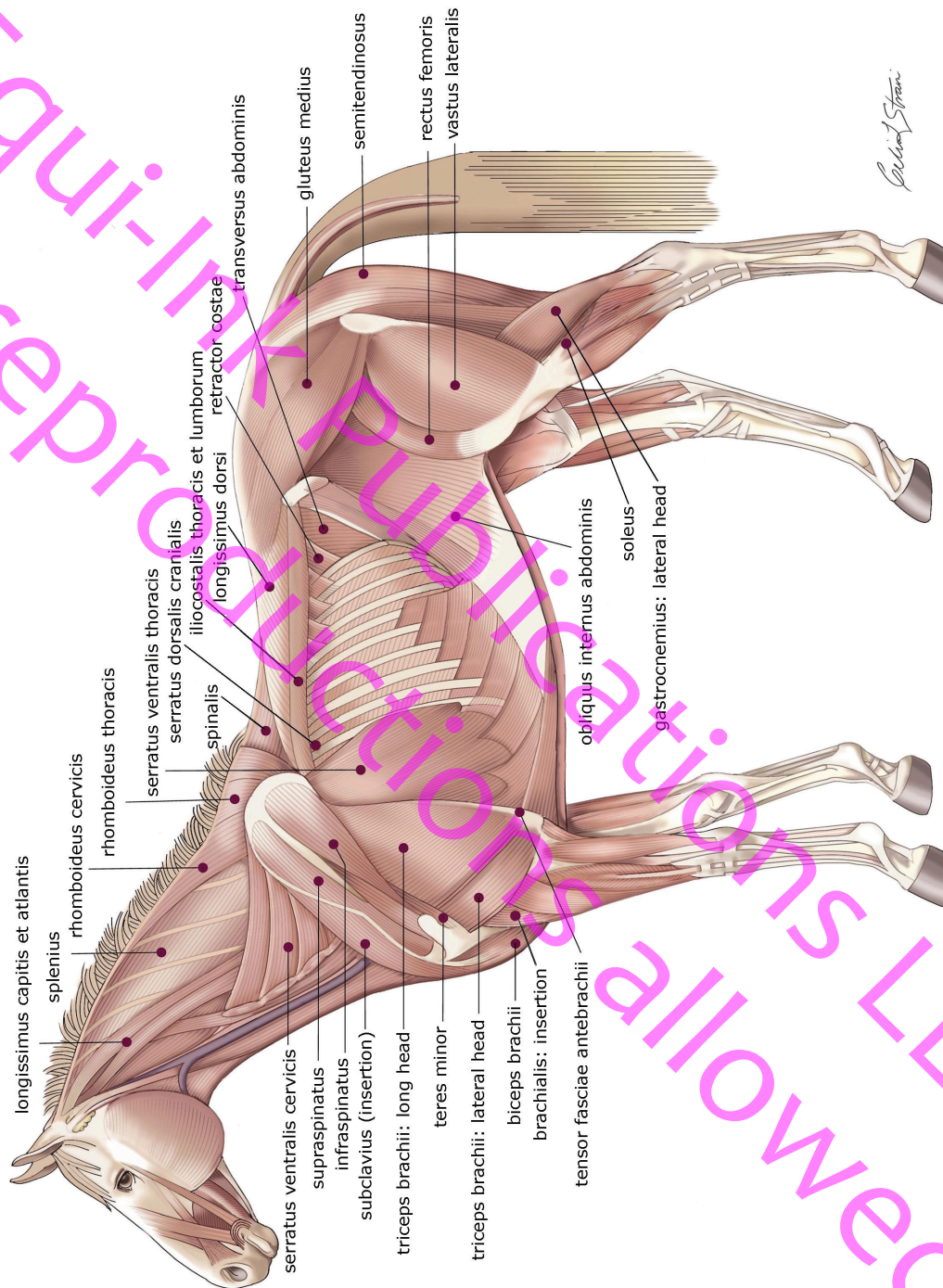
*Ridge of m. cutaneus trunci*



*Ridge of m. cutaneus trunci*



## Middle Muscle Layers: Lateral Views



## Middle Muscle Layers: Lateral Views



*Dinamico XII* Manolo Mendez Dressage Wolfemen Stallions

## Horse Gaits

All horses have four basic gaits – the walk, trot or jog, canter or lope, and the gallop or full run. Let us break these down and look at each, as well as some adapted gaits that can be seen in different horse breeds. These gaits function with different length of stride, as well as different patterns of beats.

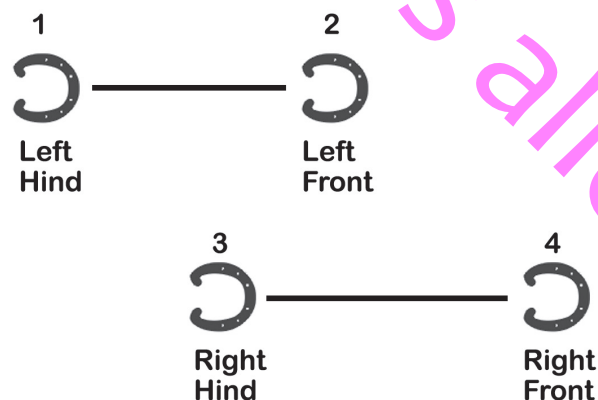
### Walk

The walk is a four-beat symmetrical gait, meaning that each hoof hits the ground once in a full stride cycle. The walk is also a lateral gait, where the horse moves two legs on one side (e.g. left hind, left front), and then two legs on the other side (e.g. right hind, right front). The hoof beats are 1-2 (slight pause) 3-4. The average stride length of the walk for most horses is two meters within a complete stride.

At the walk, the horse moves the left hind forward. Before the left hind hits the ground the horse moves the left foreleg forward. In this way, a horse's hind tracks can overstep the front foot track, and this is sometimes called overtracking. Before the right hind hoof hits the ground, the horse moves the right foreleg forward. At any time, the horse has at least two feet on the ground. Since the front hoof is lifted just before the hind hoof touches the ground, the horse's hind toe can clip the front hoof.

The walk can be diagrammed with hoof prints as shown or by using letters to represent the hoof. LH represents hoof placement of the left hindlimb; LF represents the left forelimb; RH represents the right hindlimb and RF represents the right forelimb.

**Walk: LH : LF : RH : RF**





# 11

## LAMENESS AND VARIOUS ISSUES IN HORSES

Dr. Nicole Rombach, PhD

Lameness in the horse is widely researched from both clinical and biomechanical perspectives, as it is known to be a performance-limiting factor. It is imperative that movement irregularity and/or lameness are recognized and understood by the equine bodyworker. The subject of equine lameness is extensive, and it is beyond the scope of this text to give more than a general overview. Resources are listed at the end of this section with suggestions for further reading. Dr. Gary Baxter's *Manual of Equine Lameness* is especially helpful and thorough for continuing education in this subject area.

The evaluation of conformation chapter in this manual describes common conformation faults that may influence regularity of gait and overall soundness. Prior to commencing a bodywork session it is important to obtain as much information as possible on the horse's soundness with specific emphasis on any previous or current treatments for lameness. Points to note are specific anatomical sites where lesion(s) were diagnosed, the diagnostic methods that were used, the specific treatment that was described, the

duration of the treatment and whether there have been any recurrent episodes of the original lameness since.

As part of the static examination, the bodyworker will assess the horse's conformation and how this may affect movement and soundness. This is of particular interest when assessing limb conformation and foot balance. Limbs are palpated for any evidence of swelling, heat or sensitivity to palpation. Hooves and coronary bands are palpated for evidence of lacerations, wounds, hoof cracks and heat (or cold!). Feet are picked up and cleaned, to verify that there are no stones caught in the foot and to look for any evidence of puncture to the sensitive structures of the foot.

Following the static evaluation, the horse must be assessed dynamically. Ideally, this assessment should include:

### ADDITIONAL DYNAMIC ASSESSMENTS

- Reinback and short turns to both sides on a firm surface
- Walk and trot on a straight line on a firm surface
- Small serpentine or figure-of-8 movements in walk on a firm surface
- Walk, trot and canter on the lunge on a soft surface
- Walk, trot and canter under the rider. Ask the rider to change the rising/posting trot to the "wrong" diagonal on each rein to assess the horse's reaction to changes in eccentric loading of the limbs.

If the rider has a specific issue with a horse under saddle, ask the rider to demonstrate this.

It may be useful to film horses during the dynamic observation. There are many media applications for slow-motion replay of footage, which can aid gait observations.

## Locomotion in the Lamé Horse

The normal footfall patterns for the different gaits in the sound horse are described in the "Gaits" Chapter of this text.

If the static and dynamic assessments reveal any deviation from normal gaits and/or suspicion of lameness (or a neurological deficit, which will be discussed in the following section), the horse must be referred to a veterinarian for clinical

## Shoulder/forelimbs

The orientation and size of the shoulder is a key factor when evaluating conformation. The orientation of the shoulder should be evaluated both relative to the horizontal (Figure 10: shoulder inclination) and relative to the humerus (Figure 9: shoulder angle).

For most riding disciplines, a long, sloping shoulder is considered desirable—and length and slope typically go hand in hand. A longer, larger scapula may provide a wider range of motion (greater length of stride) and more area for muscle attachment (greater strength). It may help facilitate forward/upward movement at the end of protraction of the forelimb. The ideal slope to the shoulder typically correlates with the slope of the pastern, which together help improve overall shock absorption of the forelimbs. The slope of the shoulder can also affect saddle position, as a more sloping shoulder will place the saddle further back—thus helping to shift weight from the forehand towards the hindquarters.

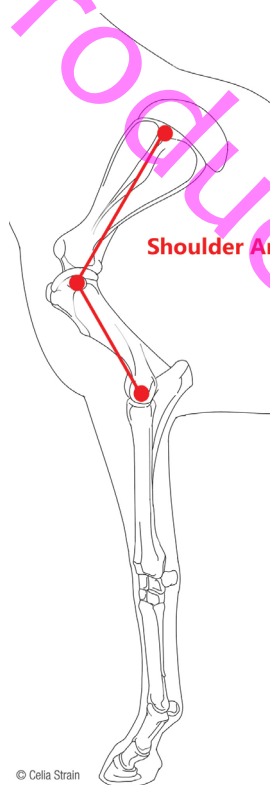


Figure 9:  
Shoulder angle

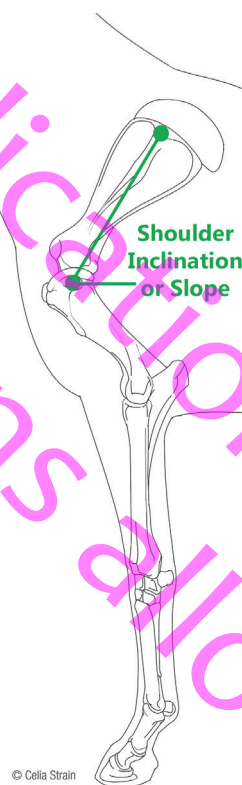
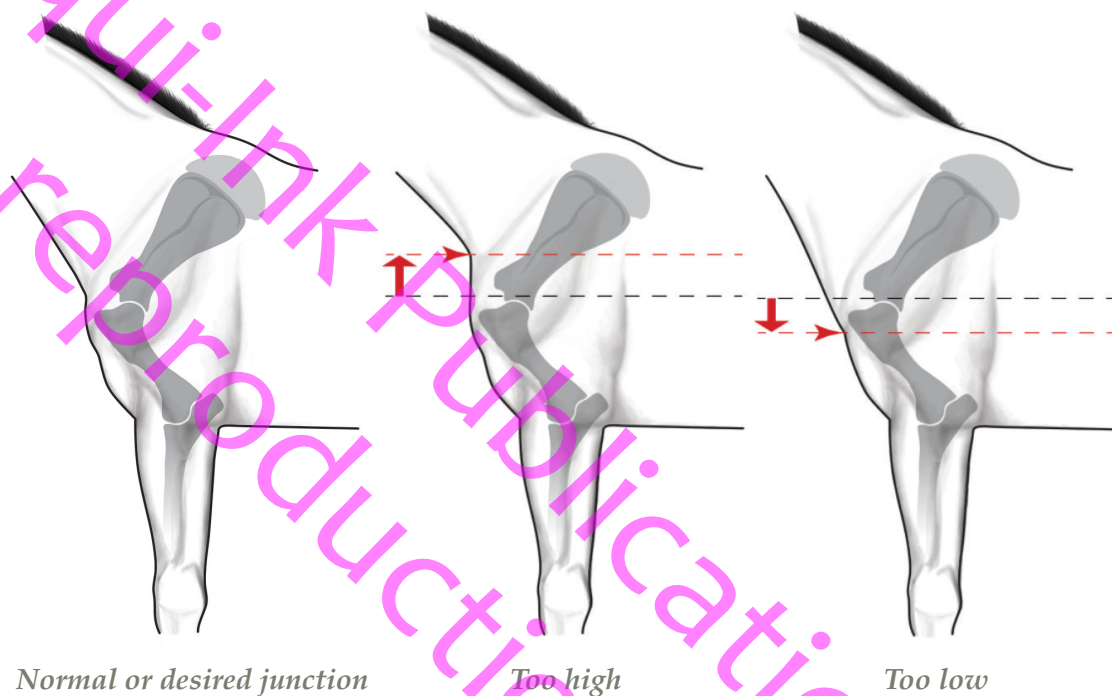


Figure 10:  
Shoulder inclination/slope

**Structural or acquired?** Structural.

**Potential consequences:** This structural difference may not have consequences in some riding disciplines, but the extra weight may put horses on the forehand. This downhill balance can be a disadvantage in sports like dressage.



## Withers

It is agreed that the sport or discipline will affect what a rider is looking for in the “ideal” horse. Withers placement and shape along with shoulder inclination and shape of the barrel will directly affect saddle fit.

## Mutton withers

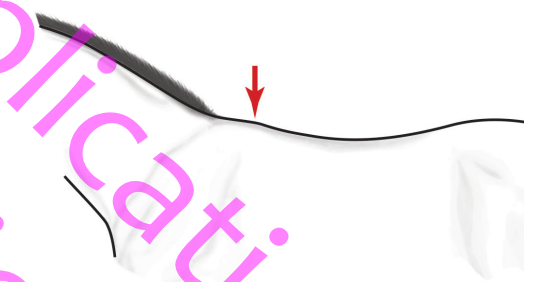
**What it is:** Low or poorly defined withers.

**Structural or acquired?** Mutton withers may be structural, most commonly associated with an upright shoulder. Withers fractures are a common injury that can occur if a horse rears up and flips over backwards, and will result in flat or ill-defined withers.

**Potential consequences:** The withers can play an important part in saddle fit, and mutton withers make it difficult to place a saddle correctly. In addition, the nuchal ligament of the neck attaches along the top of the withers, and in association with the position of the neck plays an important role as a passive stabilizing structure. Disruption to this attachment via fractured withers could have a negative impact on this function. Please note the arrow indicates mutton withers, not the nuchal ligament.



*Normal withers: neither too high, too broad or too low*



*Mutton withers*

## High withers

**What it is:** Prominent, tall spinous processes of the withers.

**Structural or acquired?** Although structural they can be accentuated making them appear even higher when accompanied by a lack of musculature.

**Potential consequences:** Many athletic horses have higher withers. However, if a saddle is not fitted properly it will slide back. This will result in discomfort as well as a drop (hollow) behind the withers.



*High prominent withers*

### Hollow behind the withers

**What it is:** A “pocket” behind the withers and atrophy of the surrounding musculature.

**Structural or acquired?** Acquired or a combination of both.

**Potential consequences:** Poor fitting saddles, other tack or blankets will create this posture. Horse's ridden incorrectly, in a hollow or inverted position will eventually lose muscle tone and the trunk will rest lower in-between the forelimbs. An underweight horse or poorly conditioned horse may also display this hollow or pocket behind the withers.

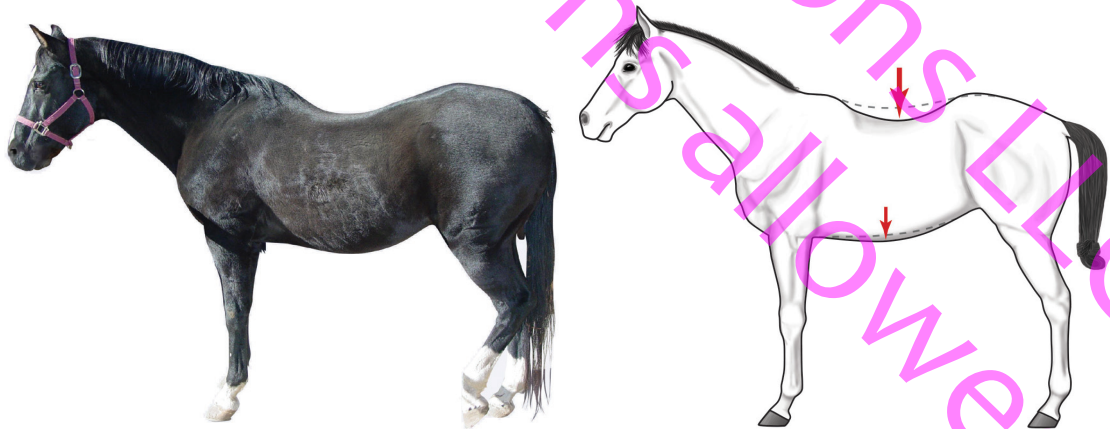


*Hollow behind the withers*

### Back and balance

#### Sway back (lordosis)

**What it is:** A ventral curvature of the spine.



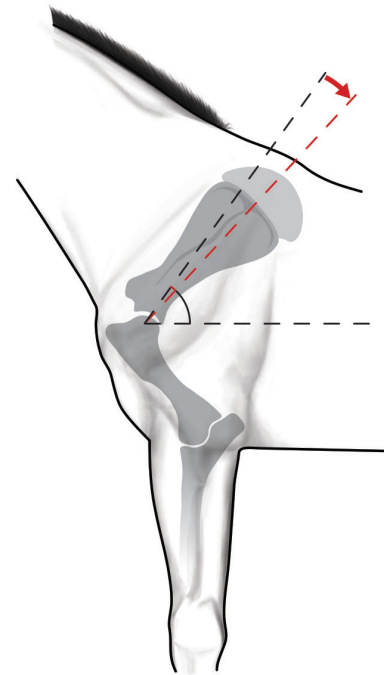
*Sway back (lordosis)*

## Laidback shoulder

**What it is:** The shoulder blade has more slope or is more laid back than the average horse when measured from the top of the scapular spine to the caudal portion of the humeral bone's major tuberosity and compared to the horizontal or ground line.

**Structural or acquired?** This could be either or a combination of both structural and acquired.

**Potential consequences:** The horse may have a longer stride if they also have a good range of motion through the elbow joint. However, horses with shoulders that are too laid back may have difficulty when it comes to fitting the saddle. The rider may also be positioned too rearward, changing the center of gravity.

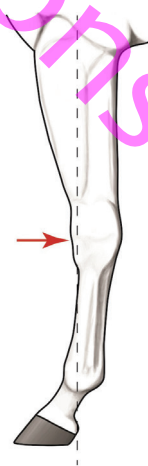


*Laidback shoulder*

## Front limb

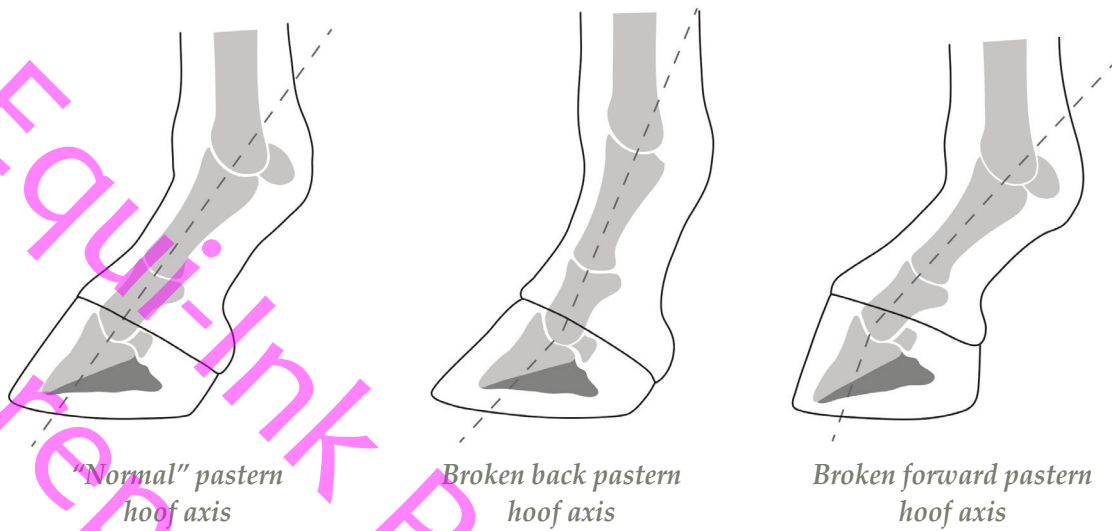
### Back at the knee (calf knee)

**What it is:** The carpus is in a slightly extended position ("bent backwards") when the horse is standing.



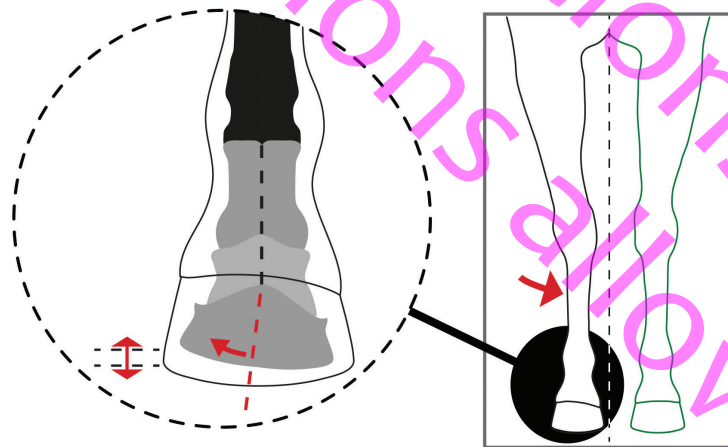
*Back at the knee*





### Medial to lateral and lateral to medial hoof imbalance

**What it is:** Many will describe looking at the coronary band to see if it is level when viewing from the front. Others will use the height of the hoof walls or heels to determine if the medial and lateral portions are symmetrical. Diagnostic imaging can determine what is involved at the distal forelimb level. The whole body approach practitioner will look at the entire animal for dysfunction that is contributing to unequal loading.



*Lateral to medial imbalance of the right forelimb*

will appear to be perpendicular to the ground line instead of the cannon bone. The proximal end of the third metatarsus (cannon) is rather wide especially since it includes the larger proximal head of the fourth metatarsus (lateral splint). The cannon bone is actually at a slight inclination similar to the femur bone.

### Sickle hock

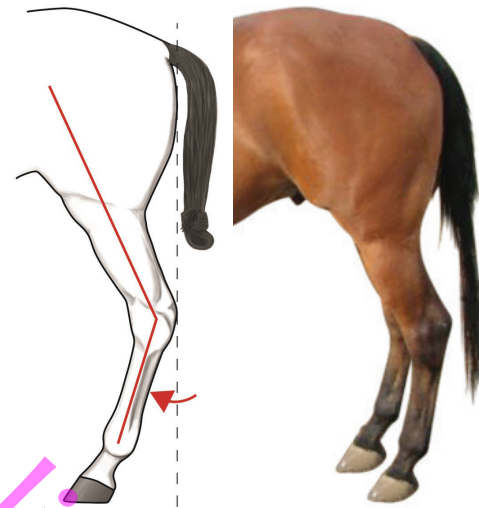
**What it is:** The term sickle hock refers to an excessively angled hock joint that results in the hind feet being placed further underneath the horse's body. The name describes the appearance of the hocks—they look like a "sickle" when viewed from the side.

**Structural or acquired?** Sickle hocks may be a basic structural characteristic in the horse. In some cases, a failure in development of the small tarsal bones within the hock joint of a foal can cause the dorsal aspect to become crushed, resulting in a sickle hock conformation.

**Potential consequences:** Sickle hocks, especially as a result of crushing of the tarsal bones, are often accompanied by hock arthritis (commonly called bone spavin). Horses affected by sickle hocks may also be predisposed to injuries to the plantar ligament that runs along the planter aspect of the hock joint. This type of injury is called "curb" and can also be described as "curby conformation."

### Post leg (straight hind leg)

**What it is:** This term refers to a very straight hock and stifle joint, in many cases accompanied by a significant drop in the fetlock.



*Sickle hock*



*Post leg*

*Straight leg*

Run your hands over the limbs looking for any of the four “T”s as well as any joint abnormalities: lumps, bumps, filling, swelling, heat, sensitivity and asymmetry in size and difference in joint height.

Make sure you palpate and evaluate all the structures of the distal limb with the limb down and pay attention to the splint bones, digital flexors, suspensory ligament and collateral cartilages when the limb is in the stance position.

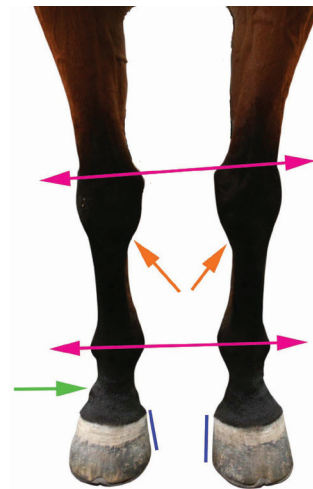
Compare the symmetry, shape, toe and heel angle of the hooves from the front, the sides and behind. The photo here shows a different shape and size of the hoof capsule and an enlarged pastern joint along with pastern bones offset as they join the hoof capsule. Compare the levels of the coronary bands.

Pick up the foot and look at the wear and compare it to the opposite, check that it is level and that the wear is acceptable and similar.

Although we look for a straight pastern hoof axis from the side, this is not always a parameter for all hoof care approaches. Some horses may not be able to meet this “ideal” angle because of their conformation.

Before you make a remark about the hooves, remember that you may be viewing a work in progress. Changes can only come over a period of time so do not be too quick to blame a farrier.

Sometimes a shoe will not look level as a result of being sprung if the horse has interfered or caught it on something. Point this out to the owner but do not take it for granted that the horse was originally shod in that manner. Hoof imbalance can lead to musculoskeletal pain.



*Cranial view  
demonstrating  
confirmation faults*



*Assymetrical hoofs*



*A "normal" pastern/  
hoof axis*

weaknesses and your likes and dislikes as well as his. You have certain preferences when someone is working on you. Knowing what the job requires in particular disciplines enables you to target areas of concern. You may approach a 15 hand cutting horse differently than a 17+ hand warm blood.

## Guidelines for Techniques and Sequence of Application

There are a few guidelines to keep in mind with regards to applying strokes to the healthy sound horse.

### Create a rapport by acknowledging and utilizing techniques to comfort and provide confidence

Make a note of the horse's favorite strokes or the areas that are his favorite scratch zones. If you find the horse objecting to a particular move or work in a specific region return to something he previously enjoyed even if it is just a good scratch! If you end your session with his favorites, especially if you have targeted a sensitive area, you will have a happy horse.

### Allow your strokes to build

"Less is more" is the mantra. Offer just enough pressure to encourage the horse to meet your pressure. As soon as he does, check in with your body mechanics to adjust if necessary. If the horse is not acknowledging the stroke or fussing too much, try another.

After desensitizing, "open or address" an area with a general stroke. This way you get the concept of the move and the



horse gets to decide whether or not he really likes the particular move. After you have learned the strokes and are not concentrating on the techniques as much as you did in the beginning, your moves will begin to flow. Once you are adept in these strokes, you may find areas which need quite a bit of work over five minutes until the tissues yield as the horse relaxes. At this level of expertise, you can drop the “three pass” rule and use your instincts to guide your work. General strokes are described in full in the “stroke section.”



## Investigate, explore and prepare

### THE FOUR “T”S OF PALPATION & BODYWORK

- Tone
- Texture
- Temperature
- Tenderness

### REPEATABLE REACTIONS MAY INCLUDE:

- Bracing
- Moving into you or away from you
- Fidgeting
- Stomping or kicking
- Stretching
- Shaking
- Snapping
- Change of breathing
- Jerking away
- Dropping downward

Investigate the area you have just prepared with a firmer touch using your fingertips or braced thumb. You are looking for a **repeatable reaction** from the horse which should not be confused with **response or release**.



## Loose fist percussion

For larger areas try closing your fist and lightly bounce on the muscle. For large muscles such as the gluteal muscles over the rump area and muscles on the topline of the horse, this stroke is ideal. To get the idea of the move, imagine your relaxed fist is landing on a trampoline and bouncing off (Figure 1).

## Loose fist percussion using the back of the hand

You can vary this same stroke for the neck or other large areas located on the side of the horse by using the back of your hand in a downward move (Figure 2).

## Hacking or tapotement

You can also use the edge of your hand to percuss. This is also referred to as hacking or tapotement [tuh-poht-ment]. It resembles an extremely relaxed karate chop that alternates with each hand. This works well in the neck area above the spine, the trunk above the shelf of the ribs and in the rump area (Figure 3).



*Figure 3: Hacking or tapotement with edge of the hand*

## Fingertip percussion or tapotement

You can try using your fingertips to gently tap sensitive muscles. This is a nice introduction for some horses that are not quite ready for percussion if the noise bothers them. However, since the fingertips direct force in a concentrated area, this move is deeper than you might expect (Figure 4).



*Figure 4: Fingertip percussion*

### Slow lower leg lift

This technique is an adaptation of myofascial release for the limbs, with a special focus on the joints, ligaments and tendons in the limb. After adopting a crouched stance (Figure 52) that allows you to brace your arms against your body, cup the leg with both hands wrapped around the cranial and caudal edges. The braced stance is used since upper body strength should not be relied on to sustain the hold.

Build up pressure by lifting the underlying tissue, working upwards slowly and lightly rocking it from side to side to check for areas which may benefit from added attention. Be aware that the horse may initially interpret this as a request to lift the leg, but will often lean down onto the limb if you remain passive and consistent with your pressure.



Figure 52: Position for the lower leg lift

### Brachiocephalicus take away

This move works well when you are concentrating on the neck region. It is a great move to use after you have thoroughly prepared the brachiocephalicus. As with most of these neck moves the application should not be attempted on horses with any known serious neck issues without coordination and clearance from the attending veterinarian.

Stand in front of the horse's point of shoulder at the midsection of the neck. Face the hind end (Figure 53). Reach under the neck and rest your palm on the lowest



Figure 53: Take away;  
view from both sides



part of the brachiocephalicus where you can support the ventral portion of the muscle without slipping off. You can start just below the point of shoulder on most horses which will include a portion of the biceps brachii. If the horse is working with you in this move he will weight his leg on the same side where you have placed your palm. Avoid the transverse processes of the neck by pushing outward first then let some of the direction aim upward and glide up slowly as the horse weights the limb. This will stretch the area even more.

#### **Rake and forearm drag (cat fight)**

If it is safe to drop the haunch “check,” you can try this move in the haunch area.

Face slightly forward and rake with the finger pads of your caudal hand starting just behind the tuber coxae and follow the “gluteal band” towards the hip joint circle.

Follow this up with the cranial arm by dragging it upwards and across the gluteal band. Begin the move at the bottom of the band just behind the tuber coxae and continue as if your arm were the bow moving across the neck of a violin. It might also help to think about throwing a punch towards the top of the tail head (Figure 54).

This move also works well on the serratus ventralis thoracis muscle.



*Figure 54: The cat fight along the gluteal band*

some bony changes in joints, no matter how wise their care programs, skills, training, good health or if they have a fantastic conformation. For instance, if you have a horse that has been diagnosed with osteoarthritis in one of the hock joints, some discomfort may typically be noted in the lower back and gluteal muscles.

## Hindlimb Work

**Working the croup muscles:** Find the hip joint circle. Rest your hand closest to the head on the haunches. With your other hand, “span” the back (caudal edge) of the point of hip (tuber coxae) and palpate towards the hip joint until you can feel the top of the femur in the hip joint area, just in front of the racing muscle line. Draw a circle around this. This is the “hip joint circle.” For gluteal work we will include the muscles in the lower back area (lumbar) and the gluteal muscles shown as pink in the photograph along with the deeper gluteal muscles which are blue and yellow lying in between the point of hip projection (tuber coxae and the “hip joint circle.”



## Thigh adductor stretch

Remember you can return the leg to the ground anytime the horse needs a break. From this position, bring the leg forward but in an oblique lateral line. This helps stretch the medial aspects of the semitendinosus and semimembranosus as well as the adductors of the hind limb. Meet the resistance then take up the slack.

### Common errors performing this stretch:

- The limb has been brought out sideways (laterally) first instead of forward at an oblique angle.
- The tarsus (hock) and/or fetlock is locked or straightened.
- The toe is too close to the ground.
- Bodyworker has no support, placing strain on their back. The arms should be against the body or supported on one or both thighs or knees.
- The direction of the stretch comes from the distal hand (the hand closest to the fetlock). This places strain on the joint and encourages the horse to place his limb on the ground.
- Gripping the tendon.
- Horse is not squared up in front.
- Bodyworker's head is under the belly.



## Lateral quad stretch

This stretch in the hindlimb takes care of the lateral quadriceps and the other abductors. Go around to the other side. Reach under the belly and invite the horse to pick up the opposite leg. Sometimes your handler can tap the targeted leg when the horse is first learning this stretch. Bring the leg towards you and forward at the same time clearing the point of hock with the supporting leg. Keep this very small at first so you do not unbalance the horse. Make sure you return the leg to the ground so it is not still in a crossed manner.

### Common errors performing this stretch:

- The limb has been pulled across medially without clearing the other leg first.
- The tarsus (hock) and/or fetlock is locked or straightened.
- The toe is too close to the ground.
- Bodyworker has no support, placing strain on their back. The arms should be against the body or supported on one or both thighs or knees.
- Gripping the tendon.
- Horse is not squared up in front.
- Bodyworker's head is under the belly.





etc. are called upon in various cases to address the needs of the patient. This team approach is increasingly popular in the animal rehabilitation world.

Any good rehabilitation program needs to start at the beginning. What are the possible reasons for the injury? While this can be a difficult question to answer in a specific case the overall concepts are straightforward and should be considered when constructing a rehabilitation program.



## Concepts of Injury

Across species and outside the equine disciplines “injury” can be classified into some general categories – primary trauma, conformational, sports specific or functional.

**Primary trauma or accidental injuries** are often severe and rarely have an underlying cause. They include slips and falls as well as tack malfunctions etc. These tend to be simple and straightforward traumas with a variable prognosis based on the location and severity of the injury. The rehabilitation program in these cases should focus on improving the expected outcome of the injury and supporting the rest of the body during the rehabilitation process.

**Conformational injuries** occur secondary to the anatomy of the horse – for example a bench kneed horse developing an injury to the medial splint bone. Injuries and degenerative disease secondary to the horse’s own conformation can be very difficult to rehabilitate. Some conformational faults (poor topline muscling) can be improved upon. Others (severe toeing out at the fetlock) cannot be corrected, but may be supported through various methods. The focus in these cases should be on the best way to support and minimize the abnormality during the injury rehabilitation, and the longer-term focus should be on muscle development to support the conformational fault and hopefully prevent re-injury. These horses are prone to re-injury due to their anatomy.

**Sports specific injuries** are injuries that a horse may incur due to their specific career or training patterns. Racehorses are more likely to develop a tendon injury than a jumping horse. A cutting horse is more likely to develop a hind end injury than a front end one. There are some interesting research studies looking at injury trends in various



doing what he pleases on a free-flow exerciser. Once again a teamwork approach is an important concept for this stage to proceed smoothly. Once a normal range of motion is achieved the next step is to focus on restoring strength.



*Hand walking next to the Circle Oak Equine free-flow exerciser and an inside view.  
Photo courtesy Circle Oak Equine*

## Restore strength

Once an injury is on the road to healing, the horse is out of pain and the areas of interest have regained normal range of motion the focus should shift to restoring normal strength. So what does that mean? That means the movement of the animal should be looked at and asymmetry of movement should be addressed accordingly. If the first two steps have been achieved, then asymmetry is most likely from weakness. Building strength is important not only for the injury to heal but also for the rest of the body to become strong enough to prevent it from reoccurring. Simple techniques such as shorter, more frequent workouts help build stability and strength. Longer, less intense workouts help build endurance. Here is where building a program that is specific to the horse's asymmetry and future career is very helpful.

Restoring strength should be done slowly with an eagle eye on the primary injury to assess its response. A gradual 5% increase in workload is recommended for most soft tissue injuries. Many bony injuries can move along a bit faster than that. Workload can be increased via time or via intensity. Intensity can be increased using weight (rider) or difficulty of movement.

## Not everyone can buy a new saddle for every horse

A trainer that has a stable of temporary horses in training cannot go out and buy a saddle that fits each and every horse, especially for short term projects. They can however go through their available saddles, choose the best fitting one from the tack room and tack up using a complementary pad or use corrective pad systems. These corrective pads are discussed in length in the saddle fit course.

Remember, however, that padding can only correct the fit of saddles that are too wide. Saddles that are too narrow CANNOT be made to fit the horse if built on a non-adaptable tree. (Editor's note: Occasionally corrective half pads can raise the saddle higher to resolve very minor issues). Likewise, a horse's body changes with development or changes when accompanied by existing structural issues requiring intervention. Like with the multi-horse trainer, the saddle may not be perfect at that point in time but may fit down the road.

Alternatively, just because the saddle fits today, it does not mean that it will also fit tomorrow. This is especially important with "custom" saddles. All too often, a client thinks that because they just purchased the most expensive custom saddle possible, that it is guaranteed to fit forever.

Custom saddles built on traditional wood or plastic trees CANNOT be adjusted. Adjusting flocking is not a correction for a pinching tree. A custom saddle is made based on measurements taken at one static moment in time. As mentioned previously, HORSES CHANGE. *It is important that one remembers not to fit a saddle to a contracted back.*



*Painful panel edge*



*Resentful horse  
with behavioral reactions*

### Every horse has its own natural girth line

No matter where you try to place the girth or cinch, it will end up in the natural girth line of the horse. Horses are pie-shaped from behind the elbow to the abdomen. Each horse will have a different girth area, both in location and width. Look on the underside of the horse's trunk and note the indentation created by the girth. Try to match up a perpendicular line from this dent (girth area) to match the saddle rigging or billets.

Billets or rigging behind the girth area will pull the saddle forward. Likewise billets or rigging in front of the girth area will cause the saddle to slip rearward.

There are different riggings on Western and endurance saddles. Full,  $\frac{7}{8}$ ,  $\frac{3}{4}$ , and center-fire are different terminologies used to describe the location of the rigging. Also, some saddles have two rigging rings, allowing movement of the latigo forward or backwards.

Crossing the billets may be helpful on some dressage saddles. The crossing action frees the triceps muscles in front, and the latissimus muscles behind. Crossed billets may also help to stabilize a saddle.

### The current saddle being assessed may not be the one that caused the tissue changes

During the session there are a few questions to ask. Find out if the saddle is new to the horse or owner, or if more than one person is riding in the current saddle, or if there are various riders for the particular horse using different saddles. The latter frequently happens in the school horse barn and also if a horse is ridden by the trainer.



*Billets too far back*

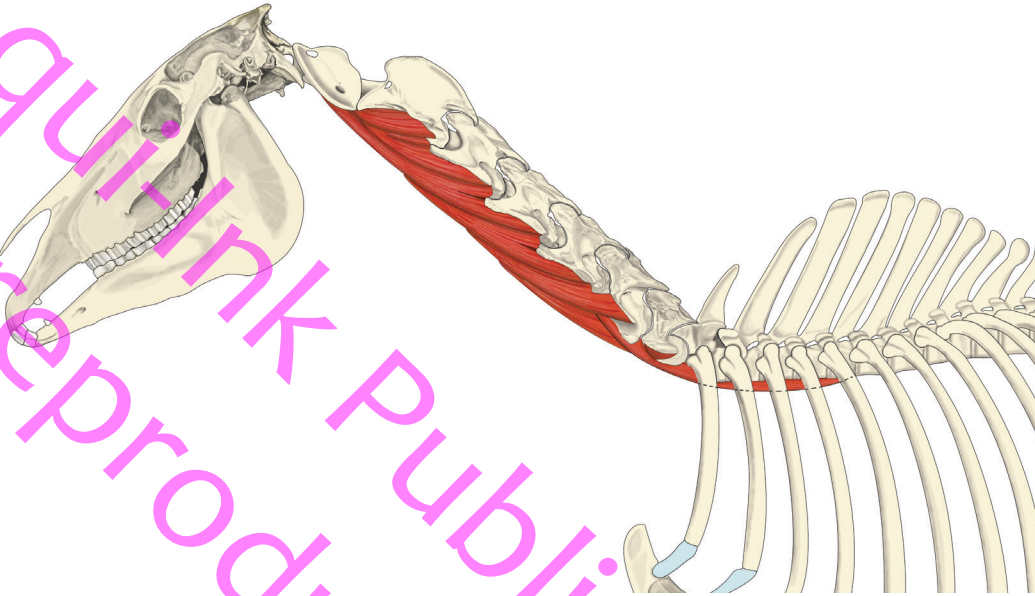


*Saddle tipped rearward*



## Longus colli

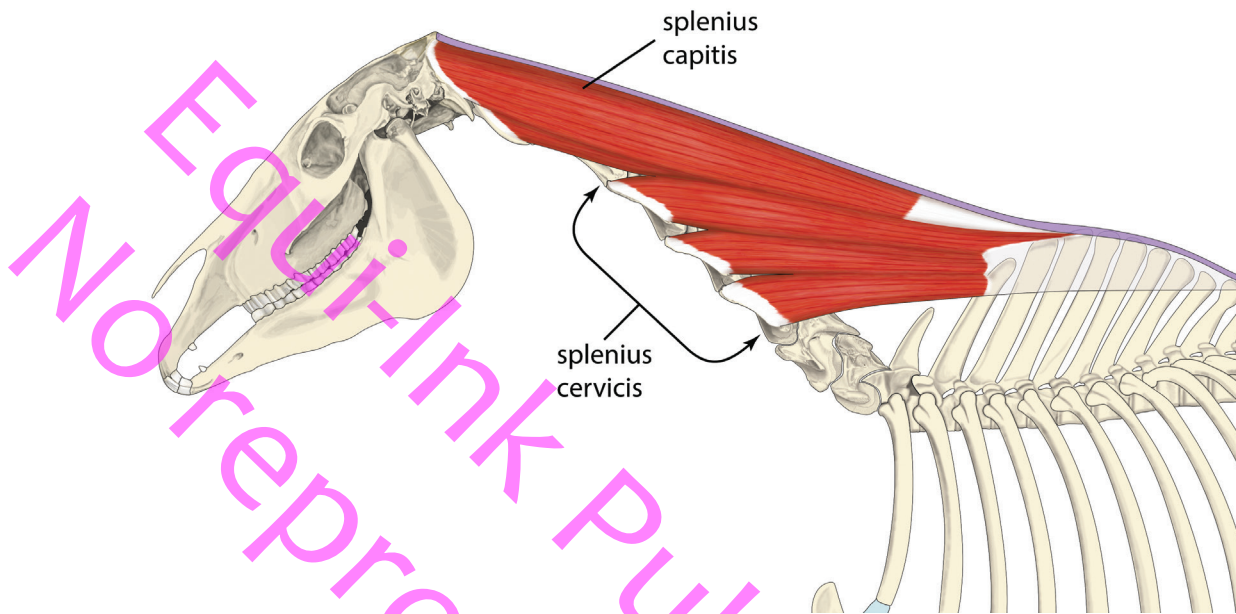
(long muscle of the neck) origins and insertions



On left and right sides, five fascicles are arranged in three layers (superficial/lateral, middle, deep), originating from the ventral process of C1, and then from each subsequent ventral process of the cervical spine, with a final cranial attachment at T1. Caudal to this, the muscle forms the longus thoracis, a single muscle belly that courses from C6/T1 to T5-T6.

Cranially, the longest superficial (lateral) fascicle crosses four intervertebral levels and the deepest fascicle crosses one intervertebral level. The left and right sides share a common tendinous attachment on the ventral aspect of the vertebral body. A central tendon runs along the full length to the level of T5 (some individual variation in caudal attachment with a few observations of final attachment at level of T6). The multi-fascicular arrangement is replicated from each ventral process from C1 to C7.

1. Lateral long fascicle, from the caudoventral process of vertebral body of C1 to attaching onto the cranioventral transverse process of C6. (Total; two segments C1-C6, C2-C7)
2. Lateral short fascicle, from the medial caudoventral position relative to 1, attaching onto the cranioventral transverse process of C5. (Total: three segments C1-C5, C2-C6, C3-C7)



## Splenius cervicis

**Origin:** This muscle arises with the splenius capitis from the **SP** of T3-T5 via the thoracolumbar fascia, and the nuchal ligament.

**Insertion:** This muscle inserts on the transverse processes of C3-C5.

**Function:** When both sides are active, they elevate the neck. When only one side is active it bends the neck laterally towards the side of contraction.

**Structure:** This part of the muscle is relatively small compared to the cranial part.

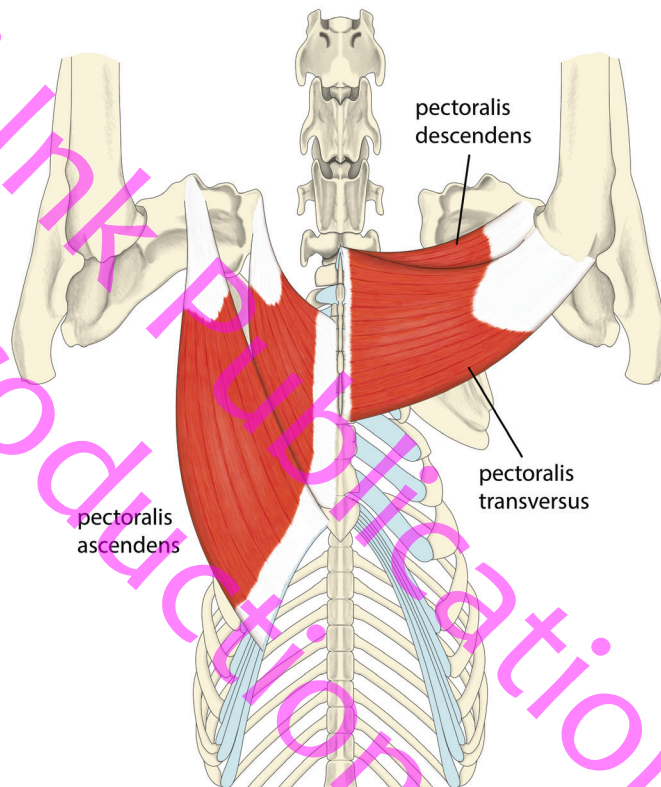
**Innervation:** The dorsal branches of the last 6 cervical nerves.

**Reaction:** More response for this portion may be noted at its insertion by palpating just above C3-C5. The horse will bend laterally to the side of functional shortening with a light to a medium pressure.



## Pectoralis ascendens (ascending pectoral muscle)

(Formerly referenced as the deep pectoral, the posterior pectoral or the caudal pectoral muscle)



**Origin:** This muscle arises from the ventral surface of the sternum, the xiphoid cartilage, the adjacent costal cartilages of ribs 4-9 and the abdominal tunic.

**Insertion:** The primary insertion of this muscle is on the cranial part of the medial tuberosity of the humerus just below the medial insertion of the supraspinatus. A slip of tendon also curves around the cranial aspect of the head of the humerus to reach the lateral tubercle, binding down the tendon of origin of the biceps as it goes. Another slip may insert on the tendon of origin of the coracobrachialis.

**Function:** If the forelimb is raised, it is retracted and adducted. If it is fixed, the trunk is drawn forward. Because of its insertion on the medial aspect of the arm this muscle can also cause pronation.

## Tensor fasciae latae (tensor muscle of the fascia lata)

**Origin:** This muscle begins on the cranioventral aspect of the tuber coxae and the adjacent lateral margin of the ilium.

**Insertion:** It ends on the fascia lata, which envelops the lateral aspect of the quadriceps and the stifle joint. This fascia is attached to the patellar ligaments, the tibial crest and the third trochanter as well as the intermuscular septa of the region.

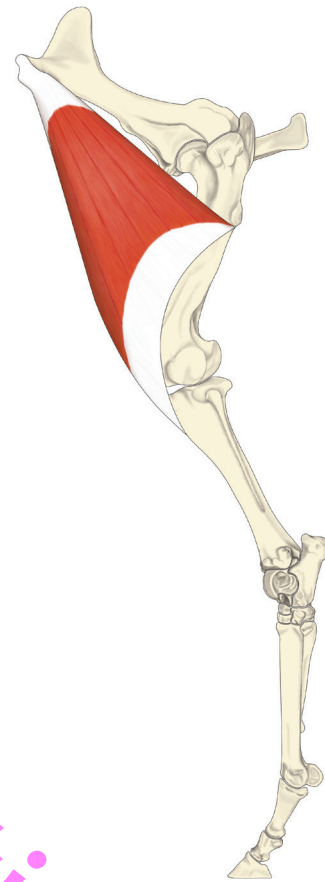
**Function:** It flexes the hip and extends the stifle. The muscle may have a relationship with lifting the medial patellar ligament from the medial lip of the trochlea.

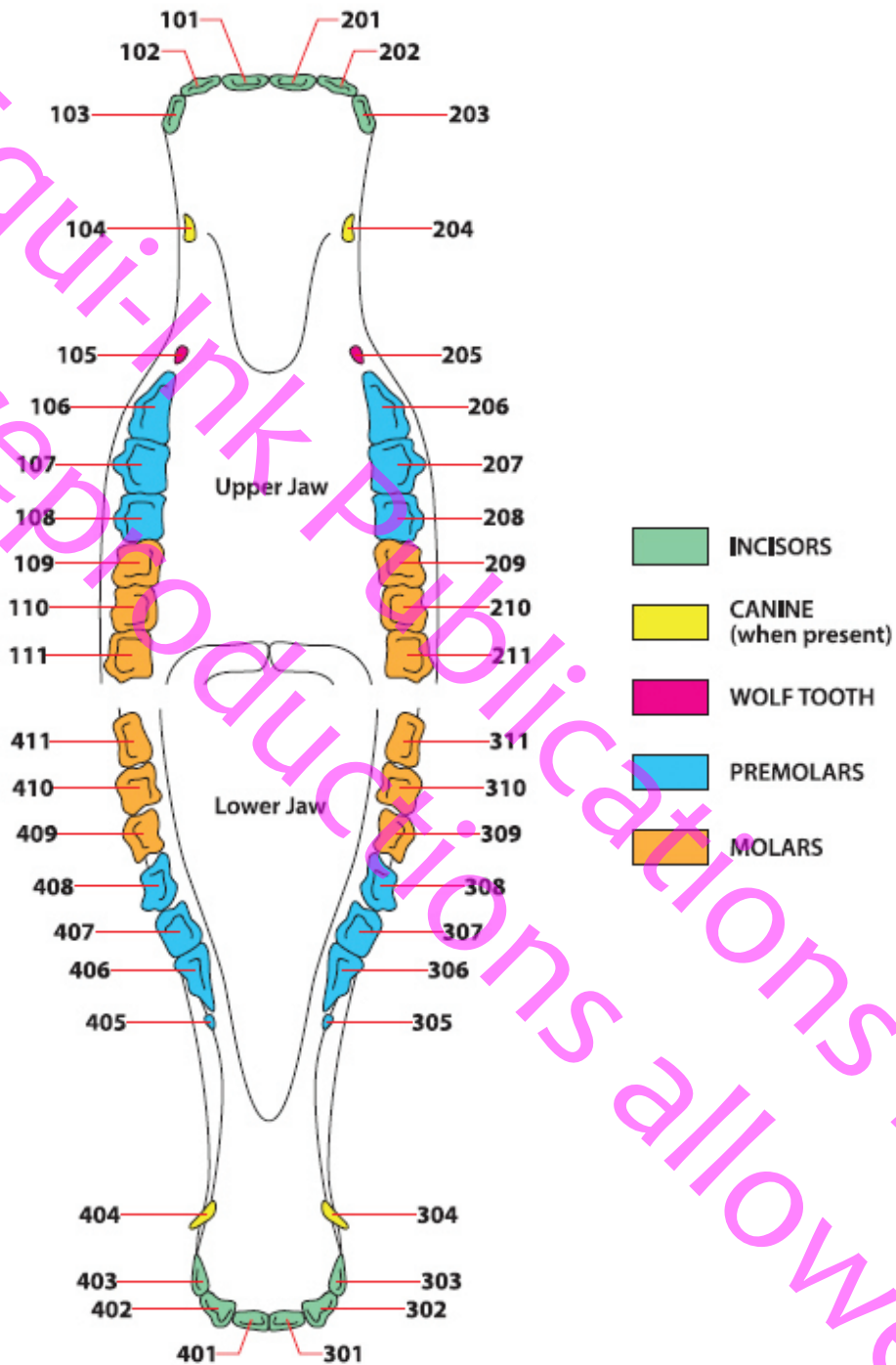
**Structure:** This is a superficial muscle, triangular in shape, forming the cranial edge of the thigh. Its caudal edge meets with the superficial gluteal muscle and forms a muscular septum. These two muscles (the tensor fasciae latae and superficial gluteal) are similar in shape but go in opposite directions. The muscular part of the tensor fasciae latae is shaped like the tail of a carp with a fairly deep “v.” The two halves or the muscular portions are more or less equal in size. The more medial portion extends somewhat onto the medial aspect of the quadriceps with the caudal edge of the muscle lying against the cranial edge of the superficial gluteus. The muscular part of this muscle only extends about halfway down the femur. The entire distal part is aponeurotic blending imperceptibly with the fascia lata.

**Innervation:** Cranial gluteal nerve.

**Reactions:** The horse will tighten the muscle, cow kick or move away in response to light or medium pressure.

**Problems:** The horse may appear to show excessive abduction on the forward stride landing outside of the track. The horse may move on three tracks. He may step medially or find crossing over behind difficult. Problems in this muscle may appear as a stifle issue.





## Anatomical numbering system

This system uses letters and numbers to describe where each tooth is.

R or L is used to describe whether the tooth is right or left. Man and max then are used to describe mandibular or maxillary. A letter is used to describe the type of tooth:

- **I = incisors**
- **C = canines**
- **P = premolars**
- **M = molars**

Finally, a number is then used to describe first, second and so on.

An example is LmaxP2 which refers to the left maxillary second premolar.

Some dentists will also refer to arcades, which refers to the four rows of cheek teeth in the mandibular and maxillary regions.

## Dental issues

Regular exams will prevent most dental issues occurring, but it is not uncommon for a horse to exhibit minor dental issues occasionally, even if he is examined regularly. The range of problems a horse may experience is surprisingly vast, but good care should ensure the horse does not suffer unnecessarily.

### ➤ Deciduous teeth

If a young horse has difficulty shedding their milk teeth they may experience pain. This can lead to quidding, problems masticating properly and issues such as head tossing. The caps may break in half as they are pushed upwards by erupting permanent teeth. Young horses often have teething bumps, which generally disappear and are not considered a problem if they are bi-lateral. Young horses should have their teeth checked every six months, to monitor them as they develop. Your equine dentist will be able to detect malocclusions, remove any caps as the adult teeth appear and extract wolf teeth.

### ➤ Retained caps

If the caps are not shed naturally they can become trapped and have to be removed. Eating can be painful and they can affect the development of the adult teeth.