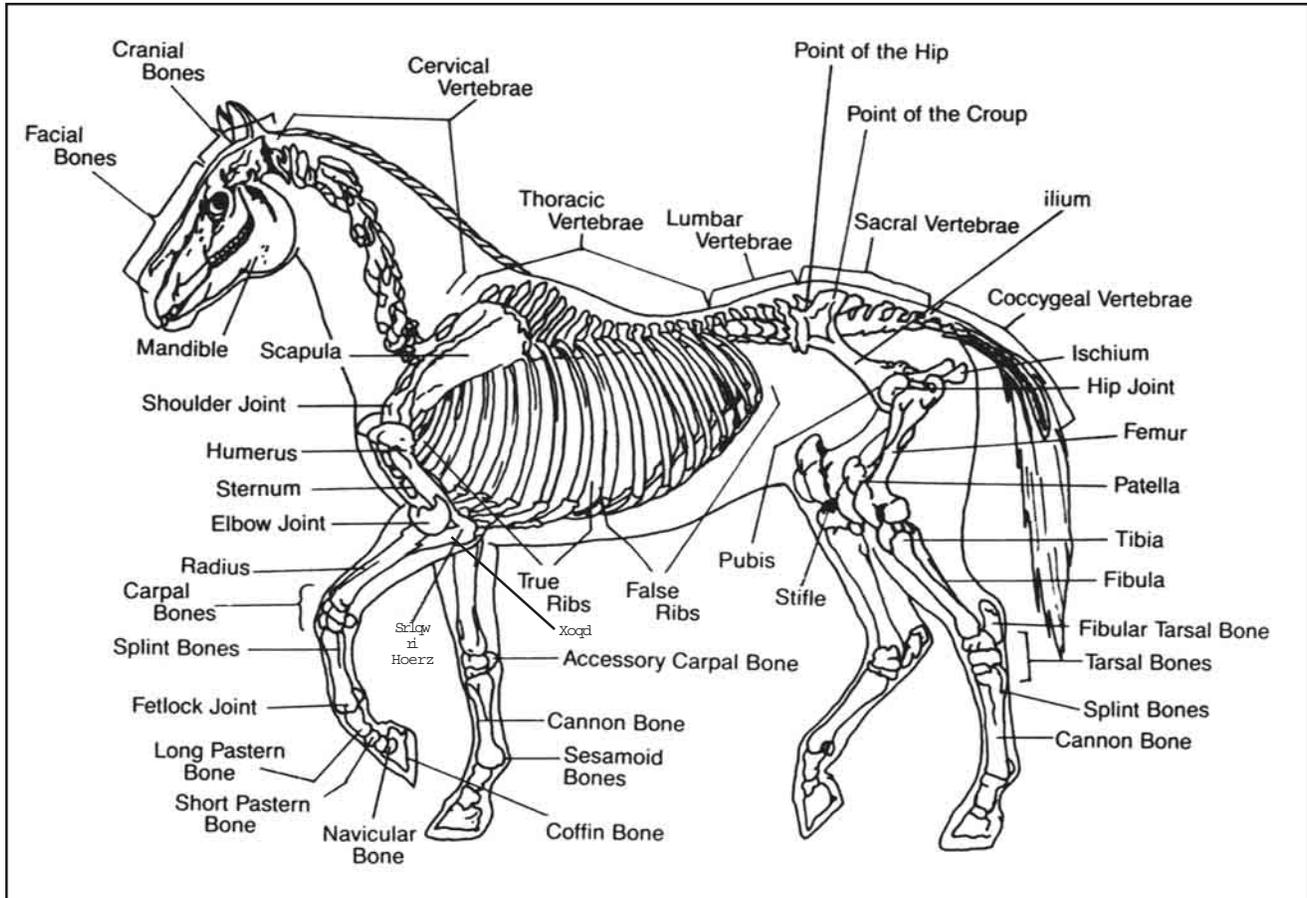


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Anatomy of Skeleton of a Horse

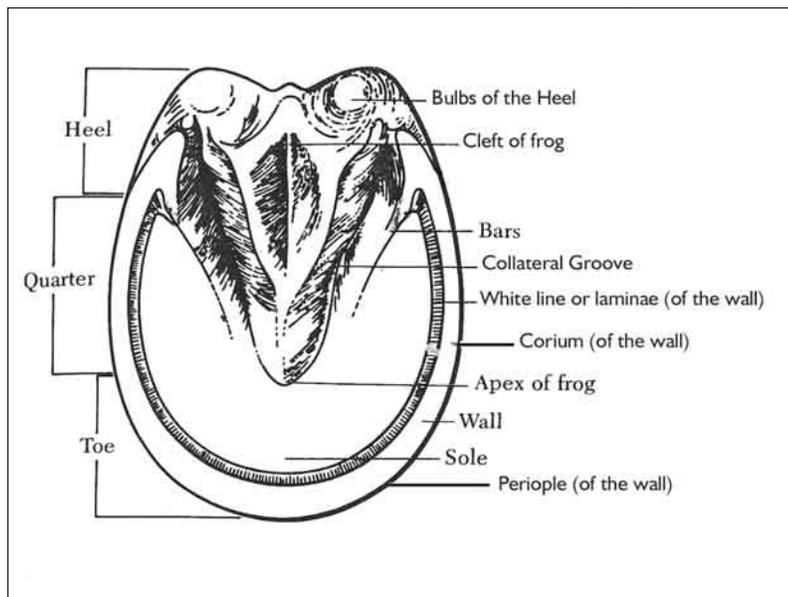


Parts of the Hoof

Bars The thickened raised portions of the wall near either side of the frog.

Bulbs of the Heel The back raised part of the heel.

Cleft of the Frog The central groove of the frog.



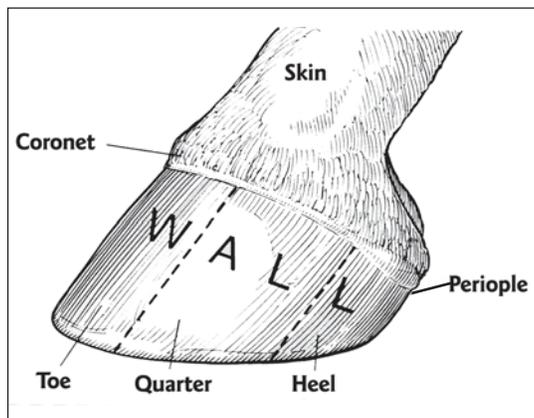
Collateral Groove (or commissure) Separates the frog from the bar and the sole.

Coronary Band (Coronet) The narrow band of scaly tissue at the hairline, from which the hoof wall grows. It is the junction of the skin and the hoof wall.

Corium The corium is the middle layer of the hoof wall and is the thickest. It contains the pigment that gives the hoof its color. The hoof will be the same color as the skin above it.

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Frog The frog is a triangular shaped elastic tissue in the sole of the hoof. The frog has a point (Apex) and a central groove. The frog blends into the bulbs of the heel. The frog distributes pressure as the horse moves and the action of the frog, when it makes contact with the ground, helps circulate blood back up the leg. The frog normally sheds several times a year.



Heel The hind region of the hoof.

Laminae (Interior Layer) Parts of the internal layer of the hoof that blend with the thick middle layer of the hoof.

Periople (Outer Layer) The periople is the waxy outer coating of the hoof wall. This layer is covered with thin horny scales that reduce the evaporation of moisture from the hoof and protects the hoof from drying out.

Quarter The side to rear region of the hoof behind the toe, where the hoof begins to curve.

Sole The bottom of the hoof visible when the hoof is lifted from the ground. The sole is divided into seven parts: the wall, white line, sole, bars, frog, cleft of frog and the heel.

Toe The front of the hoof.

Wall The hoof wall is the hard outer portion of the foot. It is not an even thickness around the foot. It is thickest at the toe, where it is under the most pressure, and thins at the quarters. The hoof wall is made up of three layers: the Periople, the Corium and the Laminae.

White Line (Laminae) The connection between the sole and the wall.

Anatomy and Physiology

Anatomy and Physiology are the sciences of the bodily structure and function of animals. Understanding the relationship of form to function can help us better choose, care for and manage our animals.

The following are some terms important to this science:

Ligaments Ligaments are tough, flexible fibers that hold bones together.

Bones, ligaments and tendons together affect the horse's ability to move and to prevent injury.

Tendons Tendons are connective tissue that attach muscle to another body part, usually bone. The tendons may be short (as at the shoulder blade) or long (as in the legs).

The Frontquarters

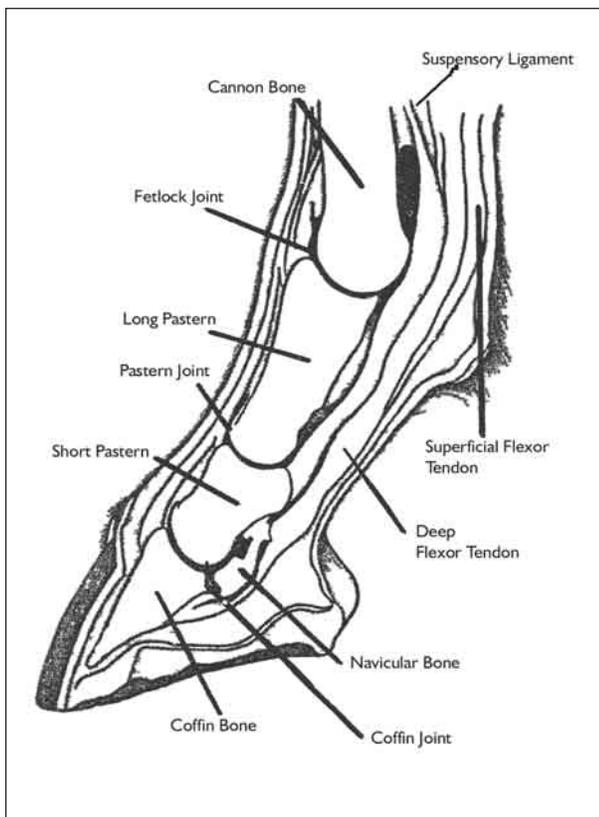
The front legs of the horse carry 60 to 65 per cent of the weight of the horse. The legs of the horse are interesting because there are no muscles below the knees in the lower leg, only tendons, ligaments and bone. Damage to ligaments and tendons are most likely to occur in the lower leg because they take the most force during movement. All movement of the lower leg is done by ligaments and tendons.



Pastern The pastern is made up of:

- A. Long Pastern Bone
- B. Short Pastern Bone
- C. Suspensory Ligament
- D. Superficial Flexor Tendon

The suspensory ligament system is attached to the navicular bone at the back of the foot, runs up the back of the long and short pastern bones and controls extension of the pastern. The suspensory ligament and flexor tendon support the angle of the pastern and together they stretch and contract as the horse moves.

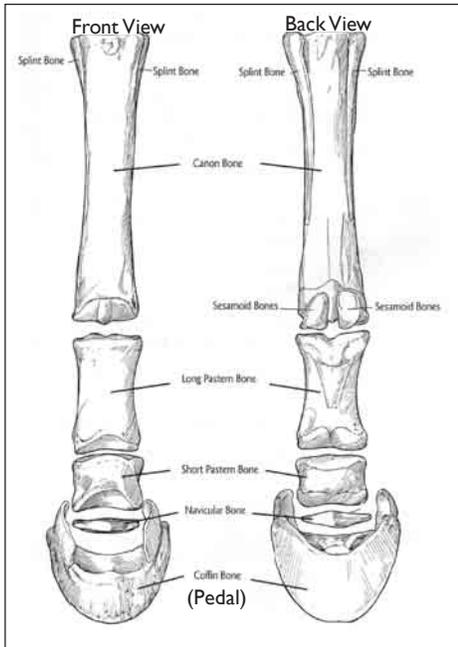


The normal working condition of the ligament and tendon are affected by the angle that the hoof is trimmed. Improper trimming can change the hoof angle causing tendons and ligaments to stretch or contract further than normal. If the slope is excessive, the flexor tendon will stretch. If the pastern is too upright the two joints will be under stress. This puts pressure on the cartilage between the bones, increasing the risk of fractures and arthritis. Generally, trim the hoof so that its angle matches the pastern angle.

Ligaments in the leg may be pulled. Stretching the flexor tendon and/or the tendon sheath is common in horses with long sloping pasterns, long toes and from work on soft, heavy ground or slippery footing.

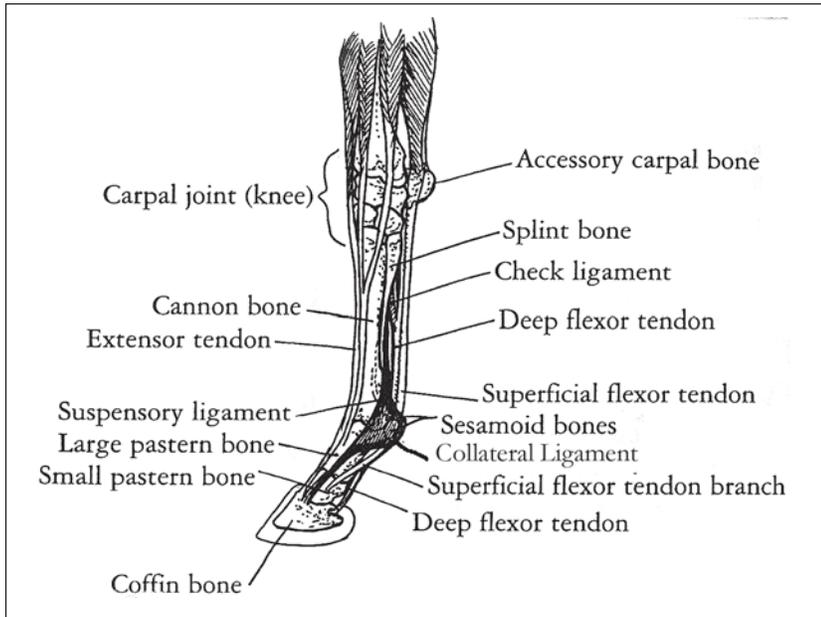
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Fetlock



The fetlock joint is the junction of four bones. It includes the:

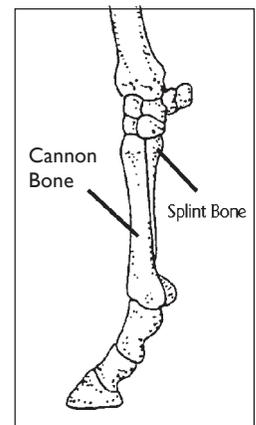
- U **Long Pastern Bone**
- U **Cannon Bone**
- U **Two Sesamoid Bones**
- U **Sesamoid Ligament** – Connects the sesamoid bones to the cannon and pastern bones.
- U **Superficial Flexor Tendons** - are found in a groove between the sesamoid bones. They connect the pastern to muscles above the knee or hock.
- U **Deep Flexor Tendons** - are found in a groove between the sesamoid bones. They connect the coffin bone to muscles above the knee or hock.
- U **Collateral Ligament** - connects cannon bone to pastern bone.
- U **Suspensory Ligament** - acts like a sling over the other ligaments.



The fetlock joint has many possible injuries. As well as a variety of fractures, there are many types of ligament injuries. The most common are strains, pulls and sesamoid fracture (caused by a ligament pulling free, taking the sesamoid bone with it).

Cannon Bone

The cannon bone is the longest single bone in the lower leg. Splint bones are attached on each side even with the upper end of the cannon bone by interosseous ligaments. These ligaments eventually ossify (turn into bone) with age, joining the cannon and splint bones.



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The suspensory ligament continues up the back of the leg.

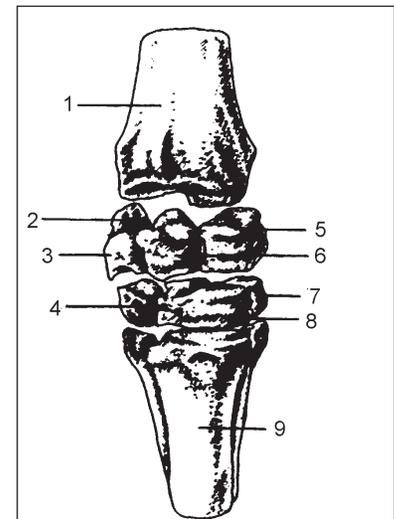
Horses can sleep standing up because of the **check ligament** at the back of the knee. While the horse is awake, a muscle holds the knee straight. When the horse goes to sleep, this muscle relaxes and the check ligament keeps the knee from buckling forward because it is attached to the deep flexor tendons.

The lower leg area is subject to a variety of stress injuries. Splint bones are easily injured because they are not firmly attached at both ends. The most common injuries are caused by strain from exercise or poorly aligned knees. This puts extra pressure, or force, on the splint bones causing them to break or become inflamed. They may also be caused from hitting the splint bone with the opposite hoof.



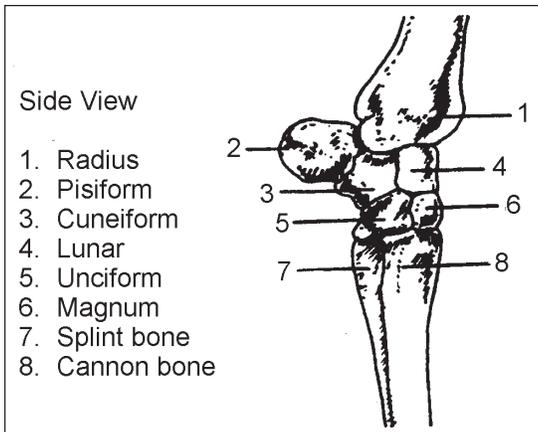
Knee The knee is made up of seven carpal bones located between the cannon bone and the radius. These bones are joined together by short collateral ligaments. These keep the carpal bones from separating. Longer ligaments are located on the sides to keep the layers of bones from separating. The suspensory ligament from the cannon bones is attached to the third and fourth carpal bones.

To move the knee, there are two carpal extensor tendons, two digital extensor tendons and two digital flexor tendons.



Front View

- 1. Radius
 - 2. Pisiform
 - 3. Cuneiform
 - 4. Unciform
 - 5. Scaphoid
 - 6. Lunar
 - 7. Trapezoid
 - 8. Magnum
 - 9. Cannon bone
- Seven Carpal Bone



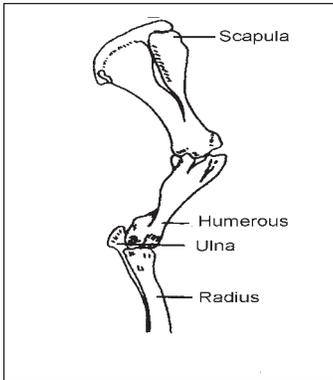
Most knee injuries are caused by poor lower leg conformation. If the cannon bone is not centered below the carpal bones, there will be excess pressure on the carpal bones. This can cause fractures or arthritis.

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Upper Leg and Elbow

The upper leg and elbow are made up of the:

- A. Radius
- B. Ulna
- C. Humerous



In the upper leg, we finally see muscle. If you look at the forearm muscle, it looks short. It is longer than it appears because it does a three quarter wrap around the bone as it goes toward the body of the horse. The muscles are interesting because they can move the body forward when the horse stands on the leg or moves the leg forward when there is no weight on the leg.

This area is important to the stride of the horse. The length of the humerus affects how far the leg can swing forward and upward.

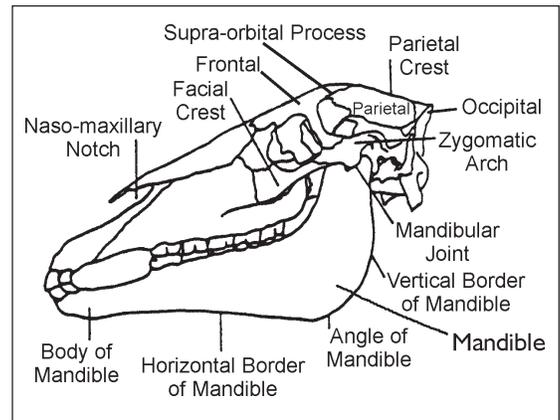
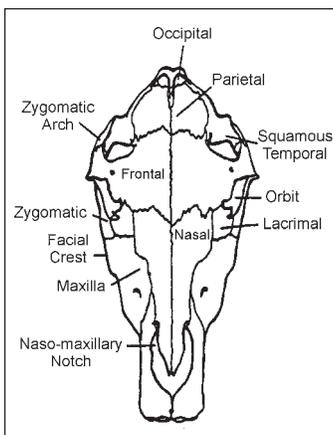
Shoulder

The shoulder is made up of the scapula bone. This bone is unique in that it is not attached to the leg and body with ligaments. Instead, it depends on a large ball joint (between the scapula and humerus) and heavy muscle layers to keep it in place. The muscle connects it to the chest, spine and ribs. The scapula is covered by strong muscles. There is no attachment to the bones of the body of the horse.

Movement of the shoulder and upper leg are caused by muscles, as is all movement. These muscles allow the shoulder to flex from a 45° to an 80° angle.

The Skull

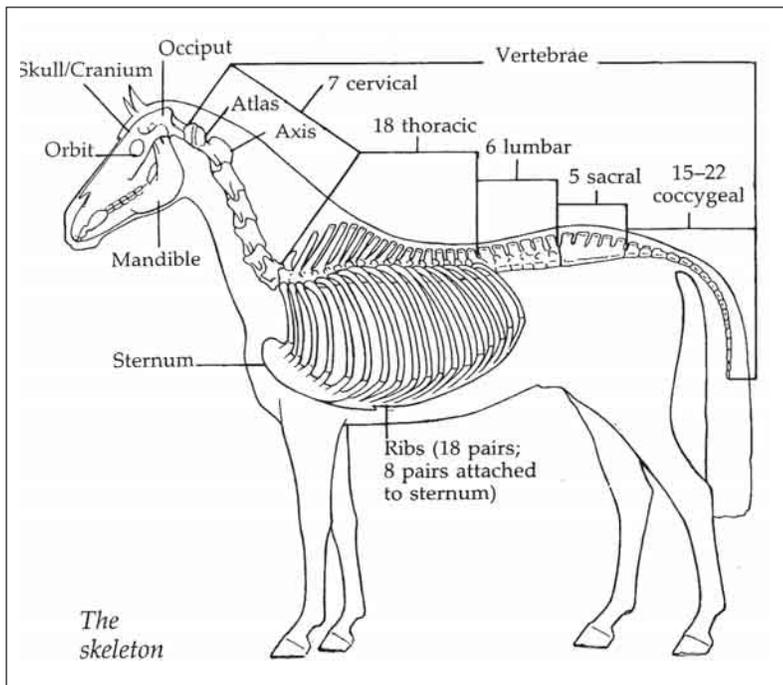
The head of the horse is made up of bones and cartilage. Unlike other bones in the body, these bones are non-moveable and not held in place by ligaments. The shape and length of the skull are important breed characteristics. The size and depth of the orbit (eye socket) is affected by the breed of the horse.



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Spine The spine is made of vertebrae that are held together by short ligaments. It is divided into groups of vertebrae. These are:

- A. Cervical Vertebrae - neck
- B. Thoracic Vertebrae - withers, back
- C. Lumbar Vertebrae - from last rib to croup (covers loin area, but goes back further than the loin)
- D. Sacral Vertebrae - croup to dock
- E. Coccygeal Vertebrae - tailbone



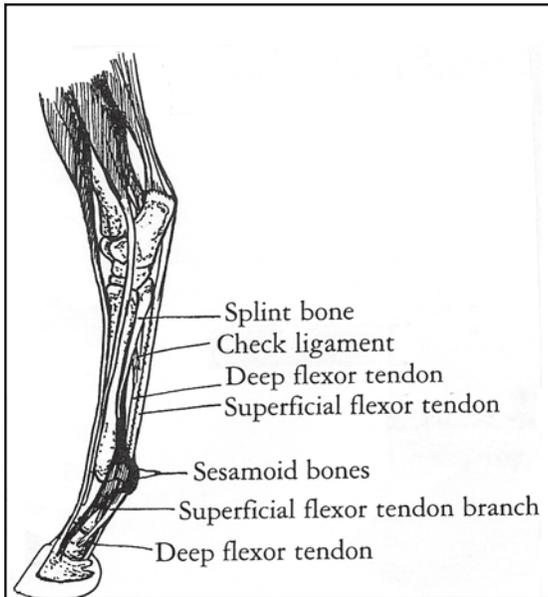
The flexibility of the spine is varied. Most of the movement is in the neck. It can be moved almost 180° horizontally and can be raised and lowered. As the cervical vertebrae are lowered the thoracic vertebrae move upward, rounding the back. This is what we ask the horse to do when we ride it in a collected manner. This is called longitudinal flexion. Most of the rest of the spine has very limited flexibility.

The Hindquarters

The hindquarters carry less percentage of the weight of a horse than the front. However, they are the source of power to give the horse impulsion for moving forward or backward. The hindquarters are the area from the flank to the tail and down the hindleg.

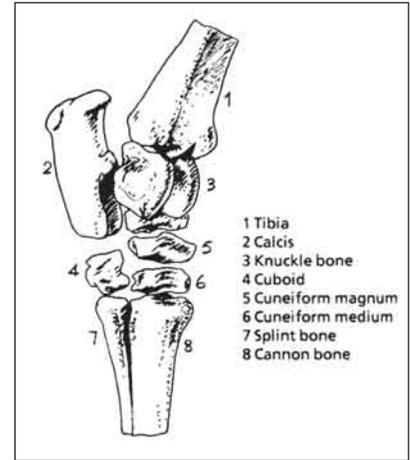
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Hock The hock is made up of six tarsal bones attached to the tibia, the cannon bone and the splint bones. Ligaments found in the hock include:



U Collateral ligament - like in the knee, these hold the tarsal bones in place, including the tibia, cannon bone and splint bones. They keep the leg bones lined up.

U Plantar ligament - is part of the “*stay apparatus*” of the hind limb. It helps the check ligament to lock the joint so the horse can stand even when relaxed or sleeping.

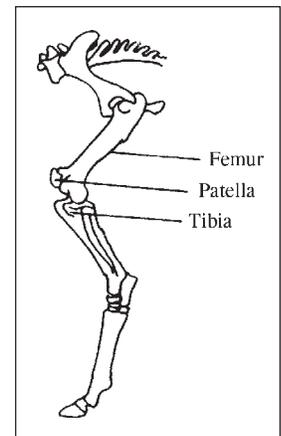


Most tendons that flex the joint in the hock are located in the front. This is because the hind leg flexes forward and extends behind the body.

Gaskin and Stifle

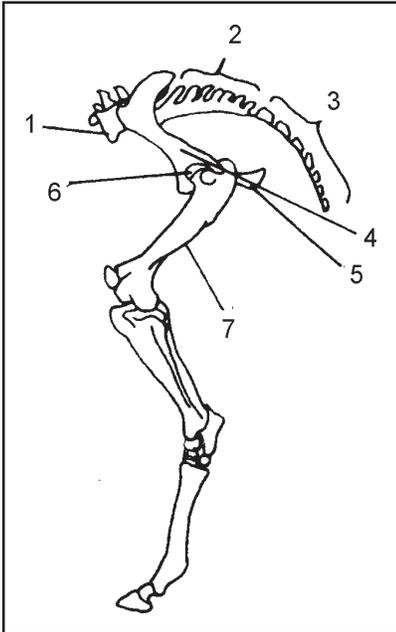
The gaskin and stifle area are located above the hock in the hind leg. They are made up of the tibia, a cartilage disc, patella and femur. The stifle flexes forward.

The muscles attached in this area allow for the drive off the hind quarters needed for running and jumping. While more muscle gives an increase in strength, fatigue happens more quickly in bulky muscles.



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Hip The hip area is made up of the:



1. Lumbar Vertebrae (goes from the last rib to the point of the hip and covers the loin)
2. Sacral Vertebrae (croup)
3. Coccygeal Vertebrae (tail)
4. Ilium
5. Ischium (point of buttock)
6. Pubis
7. Femur

These bones form the pelvic area. It slopes away from the spine at a 60° angle. The ilium is attached to the spine by ligaments.

The length of the pelvis varies with the breed, but length and width are necessary to any breed. The longer the pelvis, the longer the muscling.

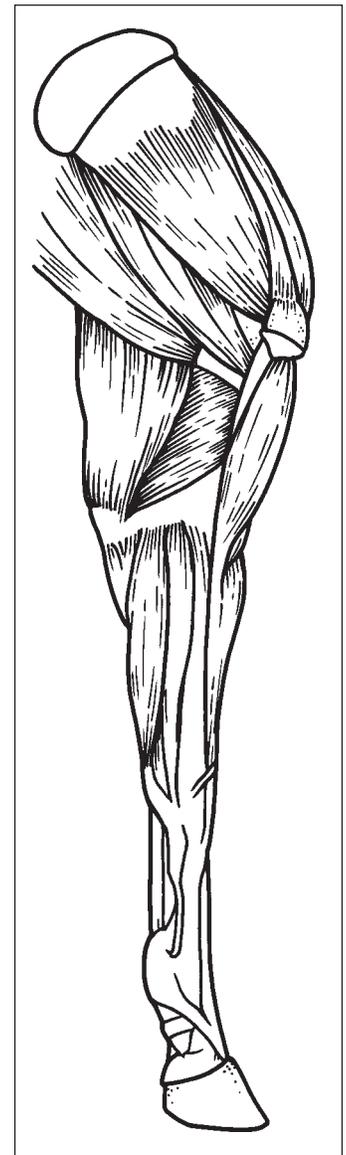


Muscular System

The muscles are the largest tissue mass in the horse's body.

Muscles are classified as:

-  **smooth muscle** - this muscle type is involuntary (automatic) and is active in the digestive tract, respiratory and urinary and reproductive systems.
-  **cardiac (heart) muscle** - this muscle type is involuntary (automatic) and is active in the circulatory system.
-  **skeletal muscle** - this muscle type is voluntary and functions in the movement of the horse.



Muscles of the Front Leg
*note the lack of muscles in the lower legs of the horse.