

## Parts of the Horse

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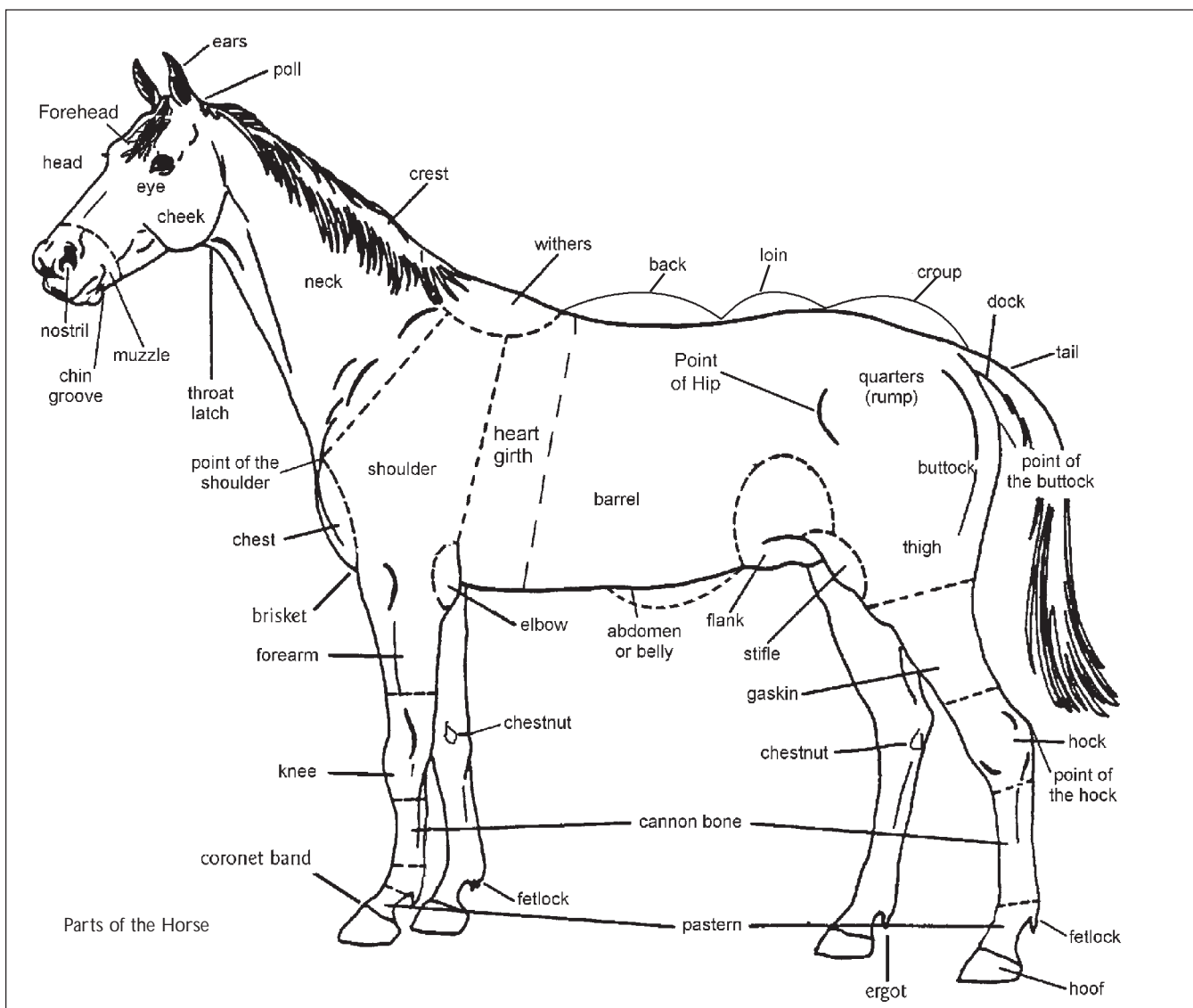
**Abdomen or Belly** The broad area underneath the horse between the elbow and the flank.

**Back** The horse's back runs from the withers to the loin. This contains part of the spinal column.

**Barrel** The large area below the back in the general vicinity of the rib cage. This is where the heart, lungs and stomach of the horse are housed.

**Brisket** The area directly between the forelegs at the front of the abdomen.

**Buttock** The muscled area below the dock and above the thigh.



## 4 - H H o r s e P r o j e c t M a n u a l - P a r t s o f t h e H o r s e

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**Cannon Bone** The long bone between the knee or hock and the fetlock joint.

**Cheek (Jowls)** Distinct rounded bones on the sides of the horses jaw.

**Chest** The muscled area at the front of the horse below the neck attachment down to the legs. The width, depth and muscling of the chest will influence how well the horse can move. A chest that is too wide produces a labouring, waddling stride and a chest that is too narrow may interfere with the horse's travelling.

**Chestnut** A horny growth on the inside of each leg. They are above and on the inside of the knee of the front leg and below and on the inside of the hock of the back leg.

**Chin Groove** The hollow between the chin and the branches of the jaw.

**Coronet/Coronary Band** Area at the bottom of the pastern where hair stops and hoof growth begins.

**Crest** The top line of the neck.

**Croup** The area at the top of the rump and in front of the tail. It extends from the highest part of the hip to the tail.

**Dock** The solid part of the horse's tail, containing the tailbone.

**Ears** Two ears located on the top of the horse's head.

**Elbow** The joint at the top of the forearm.

**Eyes** Two eyes located on the sides of the skull.

**Fetlock** The joint between the long pastern bone and the cannon.

**Flank** The region between the barrel and the hindquarters.

**Forearm** The upper part of the foreleg, between the elbow and the knee.

**Gaskin** A muscled area of the hind leg, above the hock and below the stifle.

**Head** Includes the area from the muzzle to the poll.

**Heart Girth** A line drawn around the barrel just behind the elbow and withers.

**Hock** The joint of the hind leg below the gaskin and above the cannon bone.



# 4 - H H o r s e P r o j e c t M a n u a l - P a r t s o f t h e H o r s e

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## Parts of the Horse

(continued)

**Hoof Wall** A horny covering from the coronet band to the ground protecting the sensitive part of the foot.

**Knee** The joint of the front leg below the forearm and above the cannon bone.

**Loin** The short muscled area joining the back to the croup.

**Muzzle** Describes the area including the nostrils, chin and mouth.

**Neck** Muscled area from the poll to the withers attaching the head to the body.

**Nostril** The part of the muzzle through which the horse breathes.

**Pastern** The area above the coronet band and below the fetlock joint.

**Point of the Buttock** Is the highest point of the buttock at the extreme rear of the animal.

**Point of the Hip** The bony point lying just forward and below the croup.

**Point of the Hock** The most prominent part of the hock at the back.

**Point of the Shoulder** The bony point at the extreme lower end of the shoulder blade, just above and to the side of the chest.

**Poll** A point between the ears at the top of the head where the head joins the neck.

**Shoulder** The area of the horse's front quarters where the front leg is attached to the body with muscles and tendons.

**Stifle** Is a joint at the front of the thigh in the flank area.

**Thigh** The large muscled area below the croup, below and in front of the buttock and behind the stifle joint.

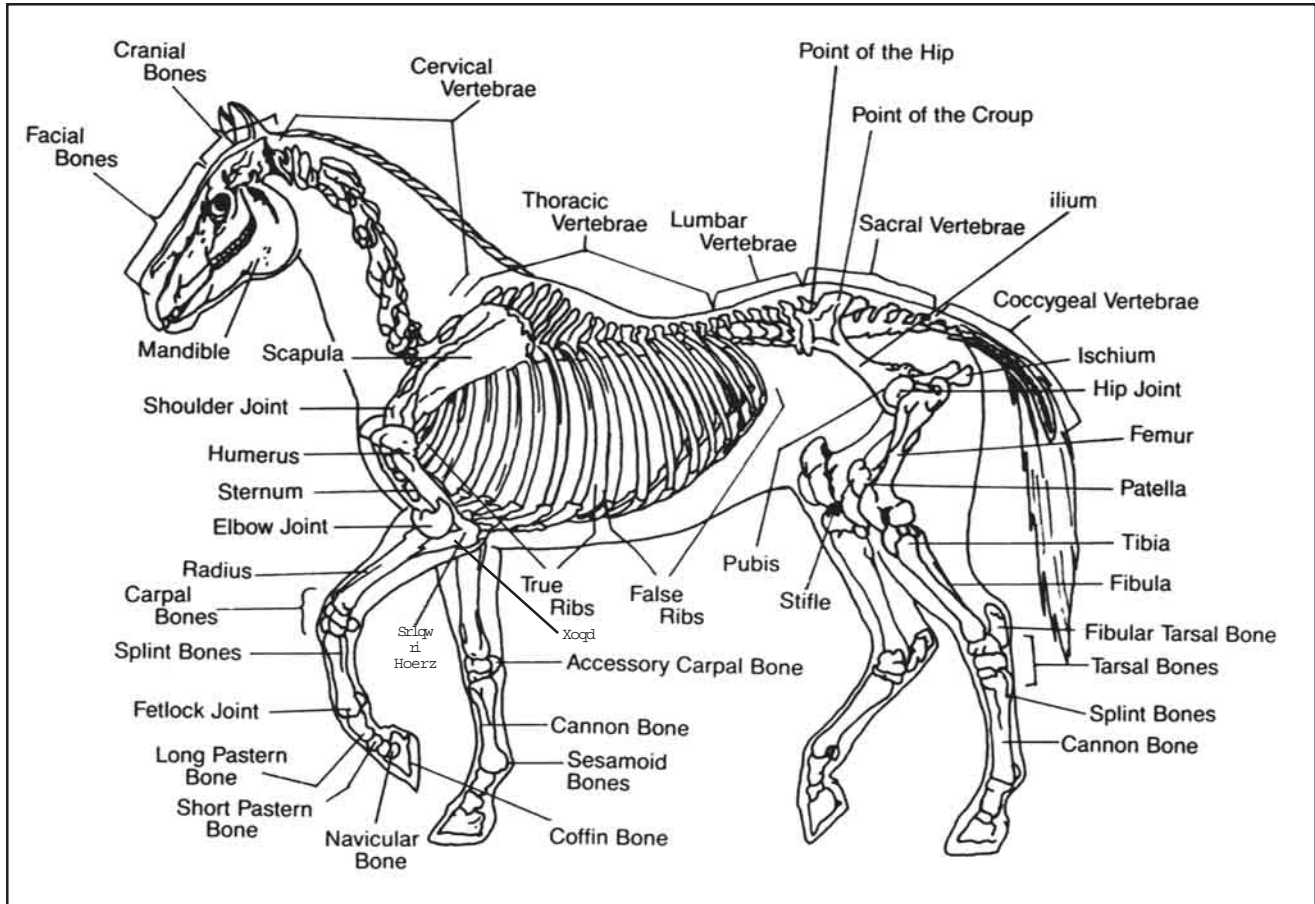
**Throat Latch** The area behind the jaw where the head attaches to the neck.

**Upper Arm** The area above the elbow to the point of the shoulder.

**Withers** The prominent ridge near the base of the mane where the neck and back join.

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## Anatomy of Skeleton of a Horse

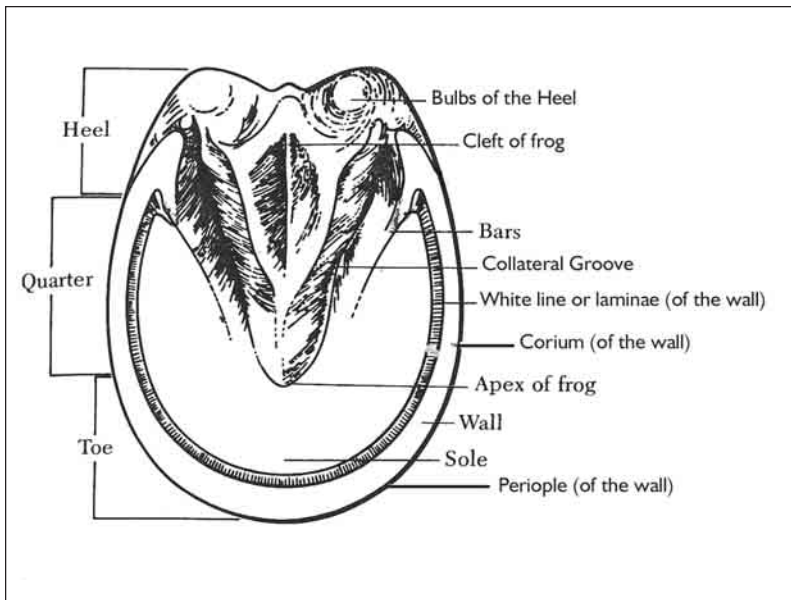


### Parts of the Hoof

**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.



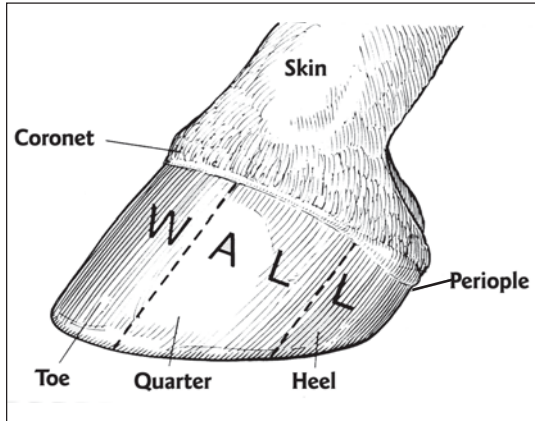
**Collateral Groove (or commissure)** Separates the frog from the bar and the sole.

**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.

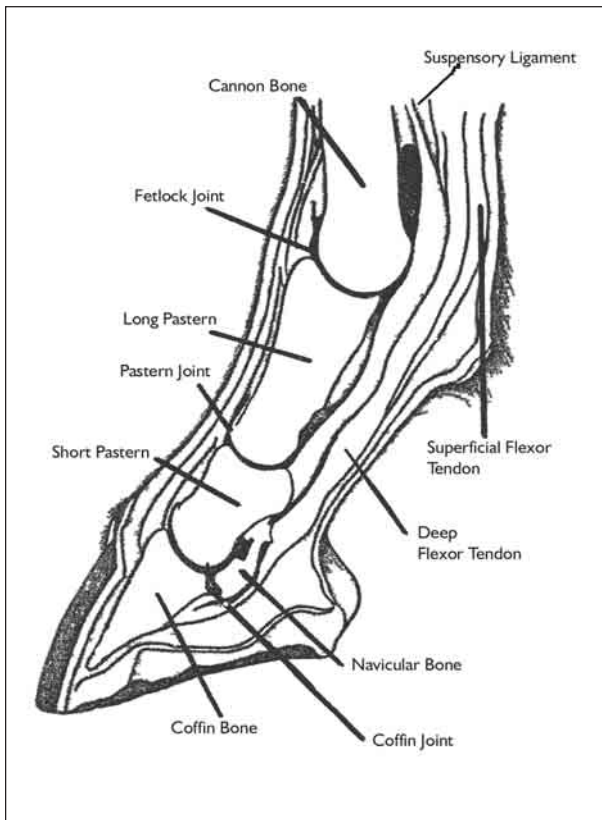
Damage to ligaments and tendons are most likely to occur in the lower leg because they take the most force during movement. All movement of the lower leg is done by ligaments and tendons.



**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.

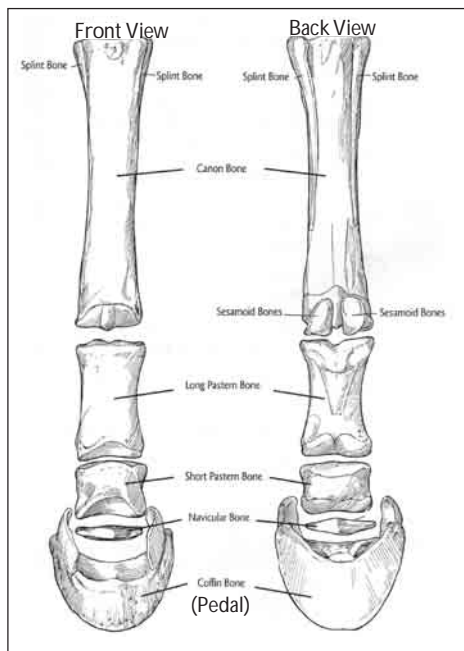


The normal working condition of the ligament and tendon are affected by the angle that the hoof is trimmed. Improper trimming can change the hoof angle causing tendons and ligaments to stretch or contract further than normal. If the slope is excessive, the flexor tendon will stretch. If the pastern is 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.

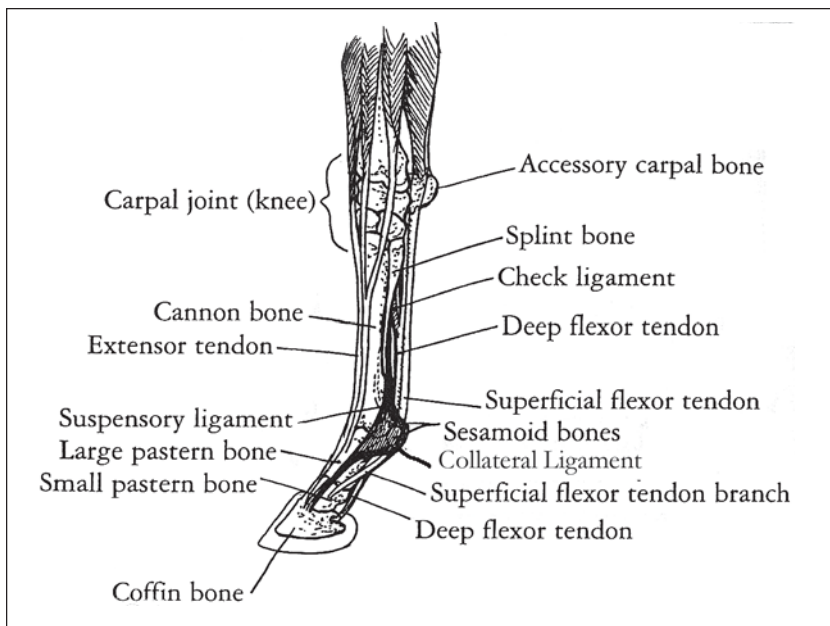
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## Fetlock



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

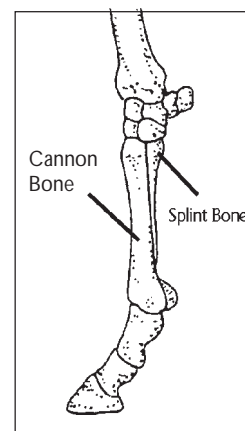
- U Long Pastern Bone
- U Cannon Bone
- U Two Sesamoid Bones
- U Sesamoid Ligament - Connects the sesamoid bones to the cannon and pastern bones.
- U Superficial Flexor Tendons - are found in a groove between the sesamoid bones. They connect the pastern to muscles above the knee or hock.
- U Deep Flexor 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.

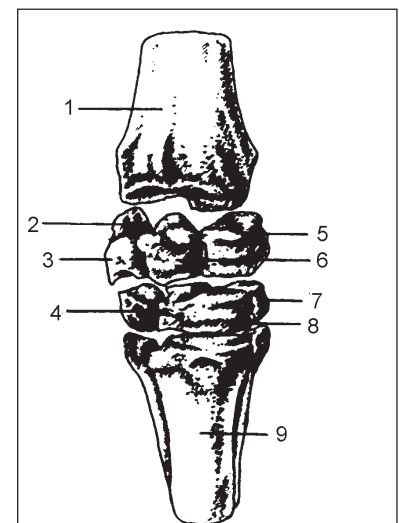
Horses can sleep standing up because of the **check ligament** at the back of the knee. While the horse is awake, a muscle holds the knee straight. When the horse goes to sleep, this muscle relaxes and the check ligament keeps the knee from buckling forward because it is attached to the deep flexor tendons.

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.



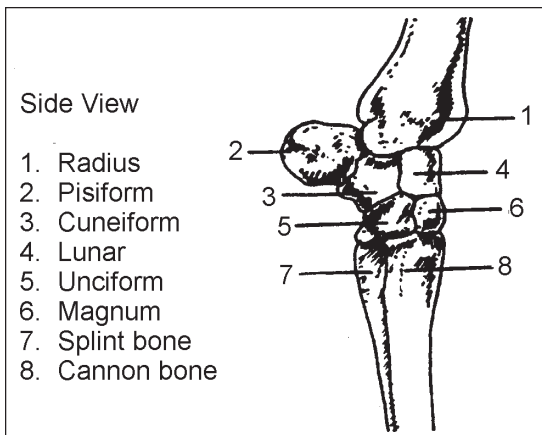
**Knee** The knee is made up of seven carpal bones located between the cannon bone and the radius. These bones are joined together by short collateral ligaments. These keep the carpal bones from separating. Longer ligaments are located on the sides to keep the layers of bones from separating. The suspensory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

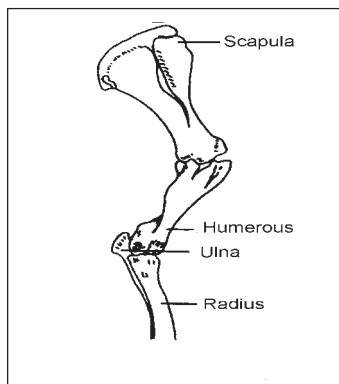


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## Upper Leg and Elbow

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.

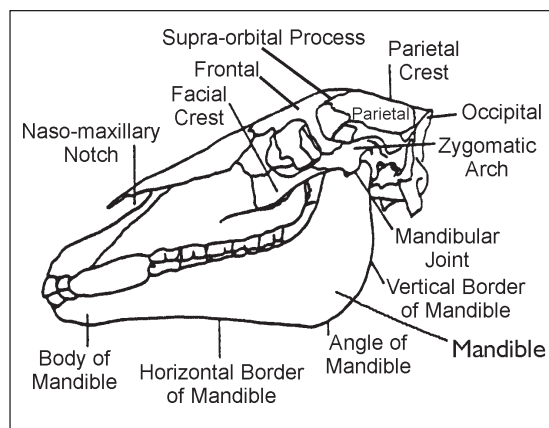
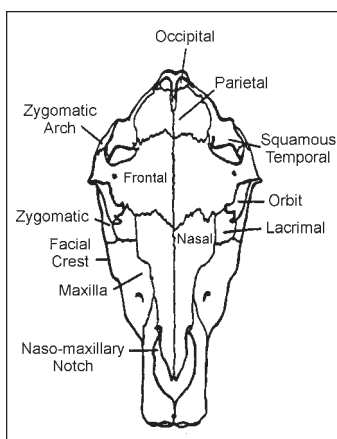
## Shoulder

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

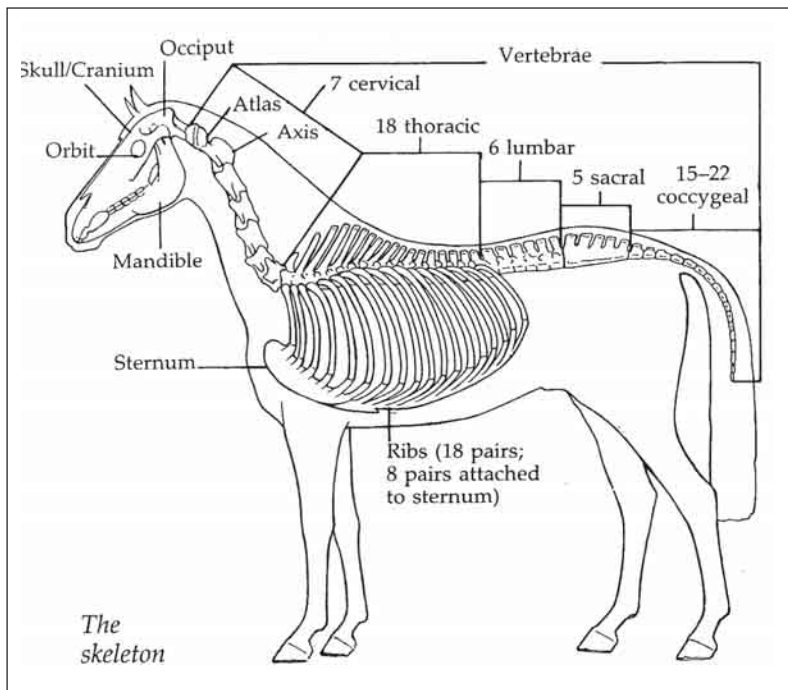
The head of the horse is made up of bones and cartilage. Unlike other bones in the body, these bones are non-moveable and not held in place by ligaments. The shape and length of the skull are important breed characteristics. The size and depth of the orbit (eye socket) is affected by the breed of the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

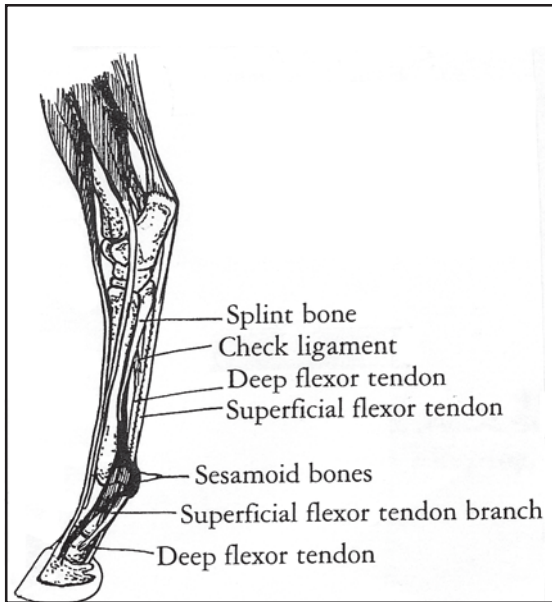


The flexibility of the spine is varied. Most of the movement is in the neck. It can be moved almost 180° horizontally and can be raised and lowered. As the cervical vertebrae are lowered the thoracic vertebrae move upward, rounding the back. This is what we ask the horse to do when we ride it in a collected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

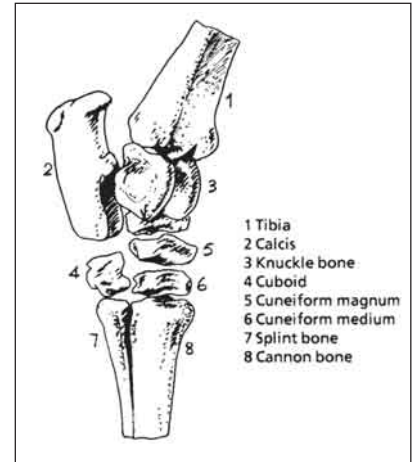
# 4 - H Horse Project Manual - Parts of the Horse

**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.

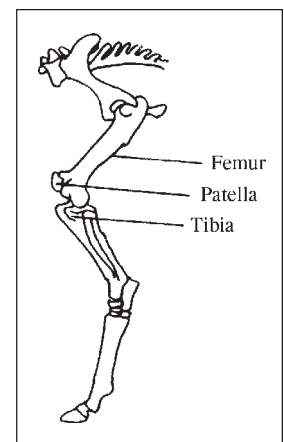
U Plantar ligament - is part of the “*stay apparatus*” of the hind limb. It helps the check ligament to lock the joint so the horse can stand even when relaxed or sleeping.



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.

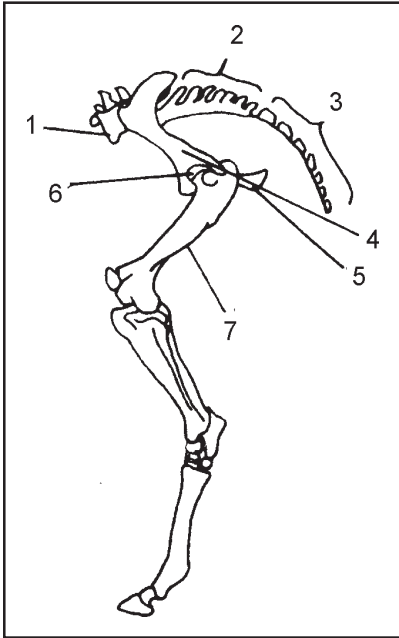
**Gaskin and Stifle** The gaskin and stifle area are located above the hock in the hind leg. They are made up of the tibia, a cartilage disc, patella and femur. The stifle flexes forward.

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.

## 4 - H H o r s e P r o j e c t M a n u a l - P a r t s o f t h e H o r s e

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### Muscular System (continued)

Muscles work by contracting (shortening of muscle fibers) and relaxing (lengthening of muscle fibers). Skeletal muscles tend to work in pairs because muscles can only pull, not push. One muscle group flexes (bends a joint) and another extends (straightens). In the leg of the horse are a group of muscles that cause flexion of a joint (flexor muscles) and an opposing group that extends or straightens the joint (extensor muscles).

**Flexion** - The shortening (flexing) of a muscle to bend a joint.

**Extension** - The lengthening (extending) of a muscle to straighten a joint.

The contractive process is a chemical reaction within the muscle that produces heat in addition to performing work. The heat of contraction and recovery is important in body temperature regulation. This is why, in cold weather, horses shiver to produce heat to help them maintain body temperature.

### Training and Muscles

Muscle is an extremely adaptable tissue. A horse's muscles adapt in relation to the specific type of training it receives.

Training for quick bursts of high-intensity exercise involves training for strength. This involves increasing muscle mass through high-intensity exercises for short periods of time to increase strength.

Training for endurance, three-day eventing, cattle drives or combined driving etc. involves building up the muscles over a period of time where the work load on the muscles is progressively increased.

Overexertion of a muscle, without adequate conditioning, will lead to muscle fatigue. A careful conditioning program, combined with proper nutrition, will prevent muscle disorders.

# 4 - H H o r s e P r o j e c t M a n u a l - P a r t s o f t h e H o r s e



## Other Body Systems of Horses

The **respiratory system** includes the lungs and air passages. Its primary function is to oxygenate the blood so that oxygen can be carried to the tissues. The movement of air into and out of the lungs is referred to as *respiration*. This system adapts well to function during exercise, as respiration rates are related to exercise intensity (the higher the intensity of activity, the higher the horse's respiration rate will be).

The **circulatory (cardiovascular) system** includes the heart and vessels and functions to pass blood through the tissues of the body.

The **digestive system** includes the gastro-intestinal tract and the urinary system. This system is discussed in relation to feed, in the chapter on Feed.

The **nervous system** includes the brain, spinal cord, associated nerves and special senses. It can perceive and immediately react to changes in the external and internal environment of an animal. The nervous system also stores and associates sensations in the memory for future use.

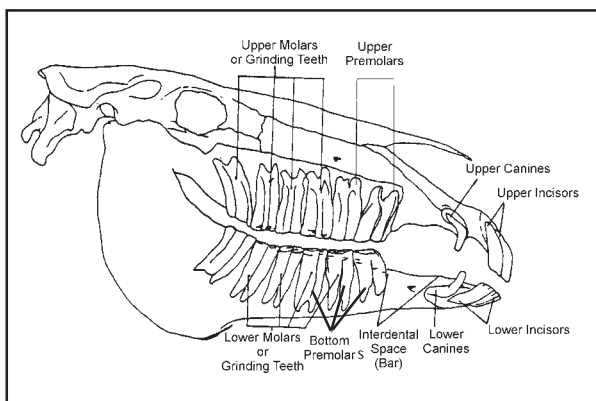
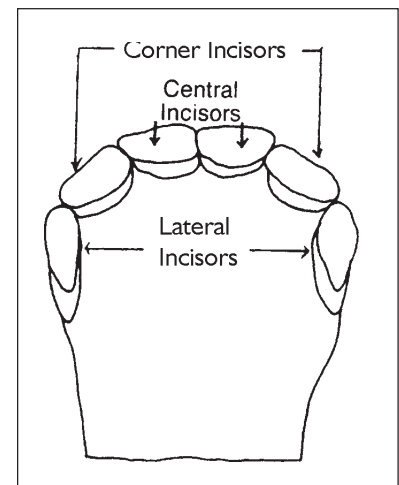
The **endocrine system** includes a number of ductless glands of the body that secrete hormones, which are transported through the circulatory system, for chemical control of the body.

The **reproductive system** includes the ovaries, testicles and associated organs.

The **integumentary system** includes the skin and hair that covers the horse's body and forms the boundary between the animal and its environment.

## Teeth

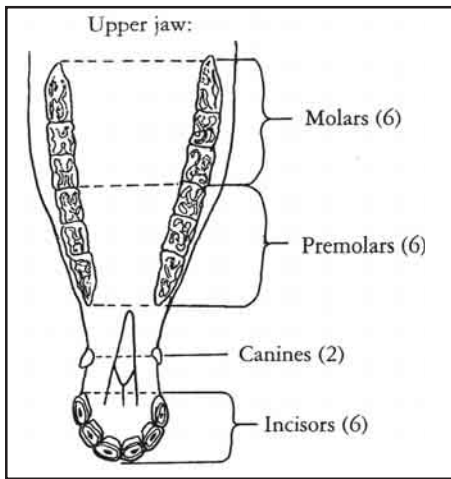
The front biting teeth of the horse are called **Incisors**. Incisors are broken down to central incisors, corner incisors and lateral incisors.



The rear, grinding teeth of the horse are called **Molars**.

Between the molars and incisors, there is a gap called the **interdental space** or **bars**.

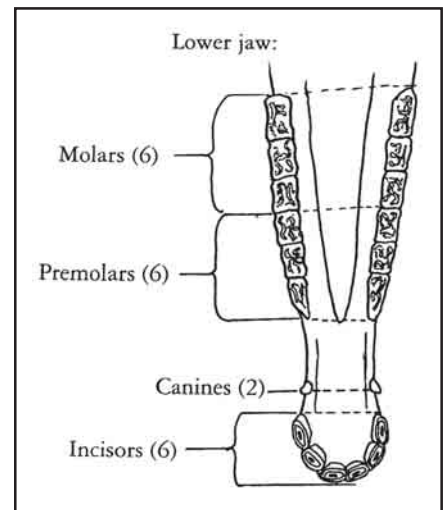
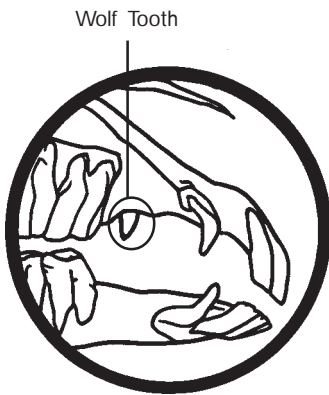
# 4 - H Horse Project Manual - Parts of the Horse



On a mature horse, behind this space are 6 molars on each side that are used for grinding feed. The front molars are called *premolars*. The molars grind feed by lateral movement of the lower jaw against the upper jaw.

**Canines (Tushes or Bridle) Teeth** These are all commonly used terms to describe the smaller teeth that grow about half way between the premolars and the incisors in the interdental space. Geldings and stallions most commonly develop these teeth at about four years of age. They are not removed, but they may require occasional trimming to keep them shorter than the incisors so that they do not interfere with bridling. Mares do not usually get bridle teeth.

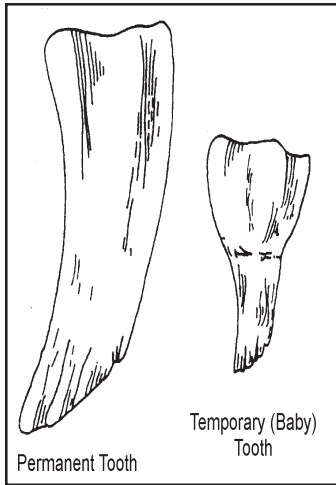
**Wolf Teeth** - Wolf teeth are very small rudimentary teeth that sometimes develop in front of the premolars. They usually grow in at one to two years of age and both colts and fillies can have them. They are more commonly found on the upper jaw but can develop on the lower jaw as well. They should be removed because they can easily break and cause problems with bridling.



**Number of Teeth** - Some identifications can be made by the number of teeth a horse has:

Foal:	12 molars	Mature	24 molars	Mature	24 molars
	12 incisors	Mare	12 incisors	Stallion/	12 incisors
	<hr/>		<hr/>	Gelding:	<u>4 canines</u>
	24 Teeth		36 Teeth		40 Teeth

## Teeth and Age



Teeth can be used to determine the age of a horse. In time the teeth of the horse change according to a known pattern. The method is reasonably accurate but it may be affected by the type of feed the horse eats and the habit of cribbing.

When a foal is born, it has no incisors. The first two central incisors (upper and lower) appear within 10 days. The next incisor (corner) on each side will appear up to six weeks later. The lateral incisors grow in when the horse is six to ten months of age.

In a young horse, it is easy to identify baby teeth and permanent teeth. Baby teeth are round, white and have a narrow base. Permanent teeth are yellow and are an even width from top to bottom.













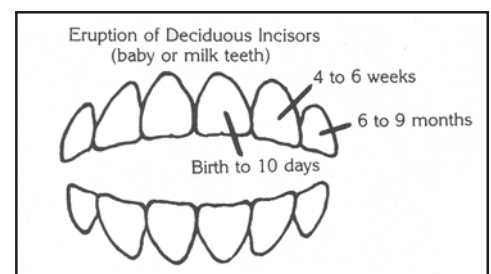
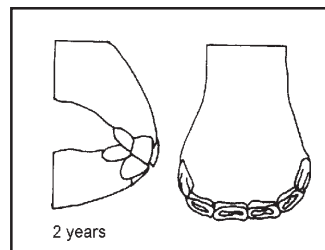
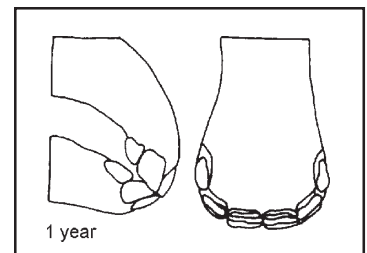
## Eruption of Teeth First Period

This period covers the growth of the "baby" teeth to 24 months. The "baby" teeth all appear and are being used by 2 years.

Temporary "baby" teeth are replaced with permanent teeth.




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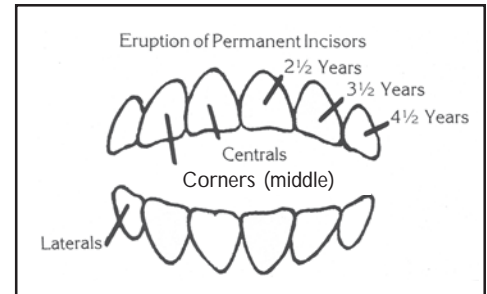
	Birth - 10 days: Central incisors appear	
	4-6 weeks: Corner incisors appear	
	9 months: Lateral incisors appear	
	2 years: All incisors in wear	
	2 1/2 years: Central temporary incisors shed, central permanent incisors appear	





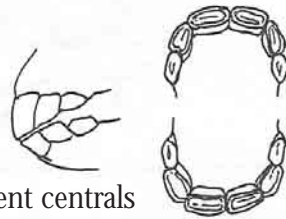
## Second Period

- 
 After two and a-half years the temporary central incisors loosen and the permanent central incisors erupt.
- 
 Three and one-half to four years, the permanent corner incisors erupt.
- 
 Four and one-half to five years, the permanent lateral incisors erupt.

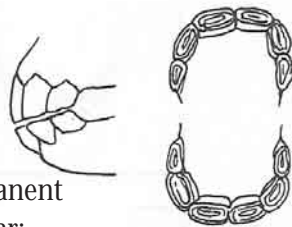


### Appearance And Wear Of Permanent Teeth

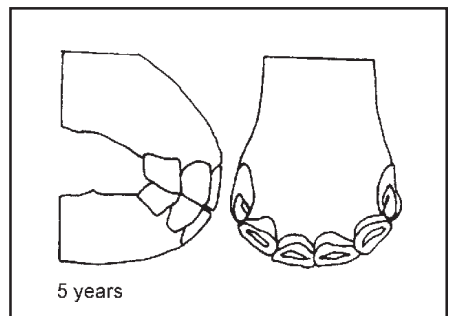
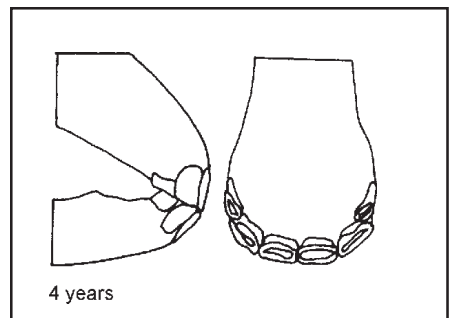
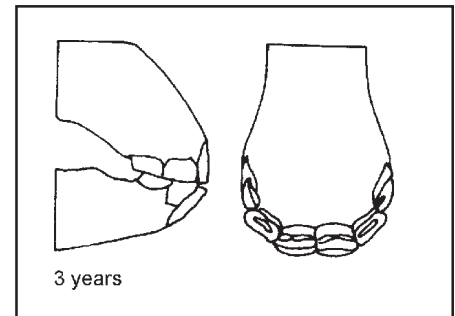
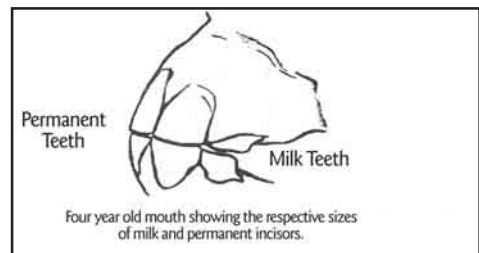
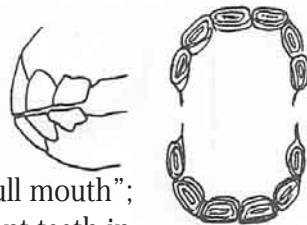
3 years: Permanent centrals in wear; permanent corners appear



4 years: Permanent corners in wear; permanent laterals appear

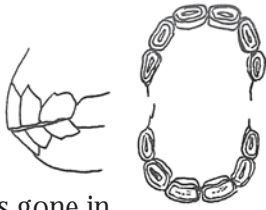


5 years: "Full mouth"; all permanent teeth in wear



## Third Period

6 years: Cups gone in lower central incisors



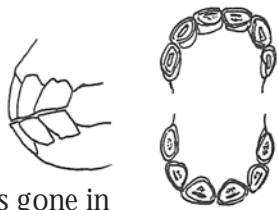
7 years: Cups gone in lower corners, hook on upper lateral



8 years: Cups gone in all lower incisors; dental star appears



9 years: Cups gone in upper centrals; dental stars present



10 years: Cups gone in upper corners; Galvayne's groove appears



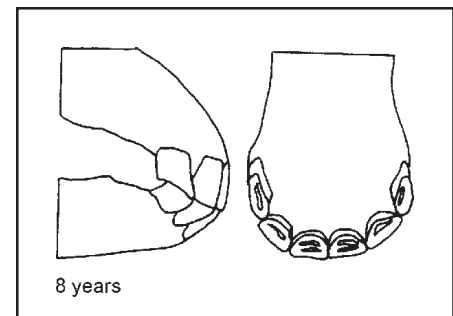
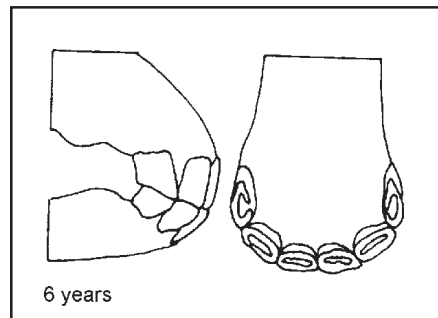
11-12 years: All cups gone; "smooth mouth"



## Third Period

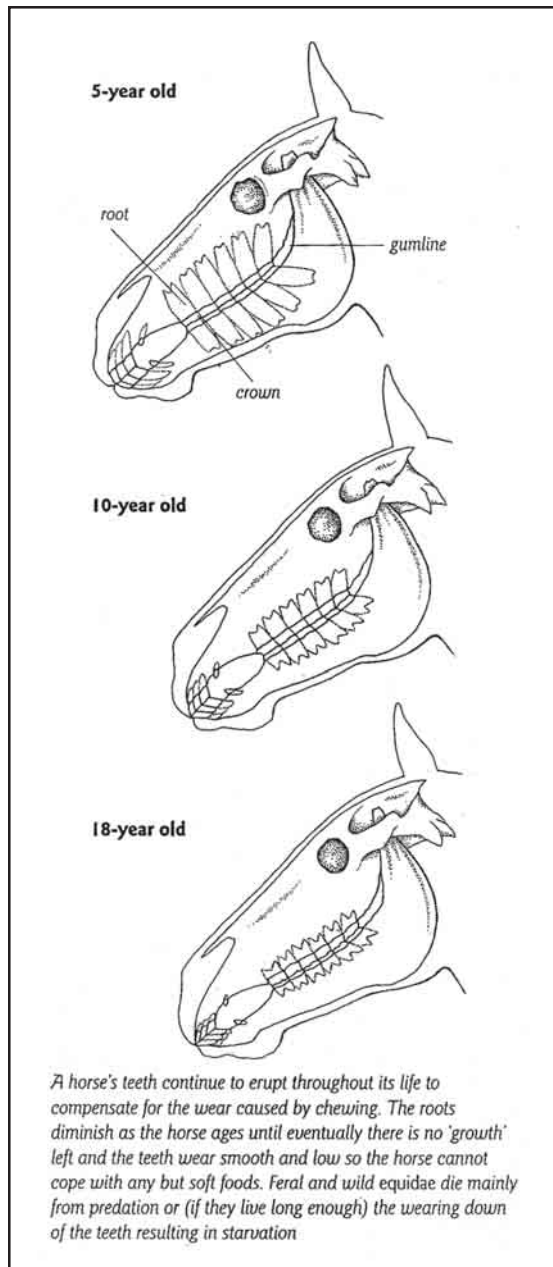
This is the period noted by the wearing of the lower incisors and the disappearance of the cup.

- U Six years of age is estimated by the size, shape and disappearance of the cup of the central teeth. The cup will be gone by the time the horse is 10-12 years old. The cup does not disappear from all of the incisors at the same time. At age six, the cup disappears from the lower central incisors.
- U By eight, the cups have disappeared from the central, corner and lateral incisors of the bottom jaw.
- U All the cups of the top and bottom incisors will be gone by the time the horse is 10-12 years old.

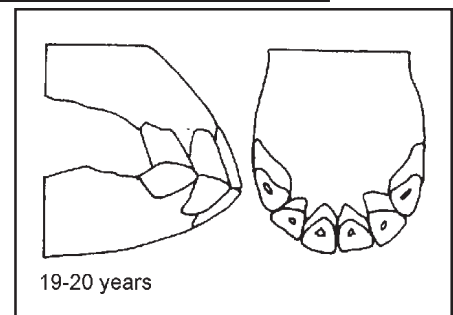
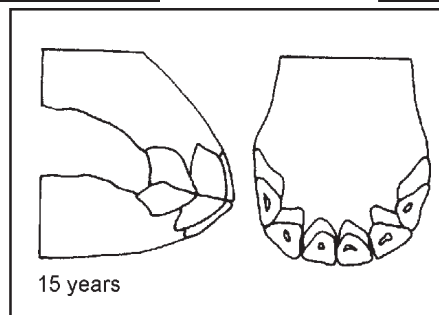
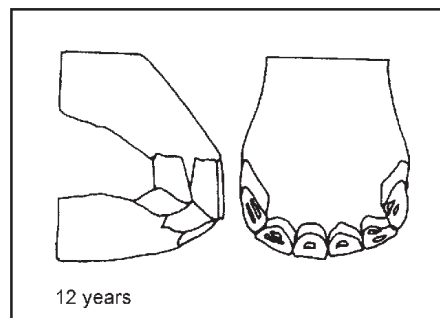
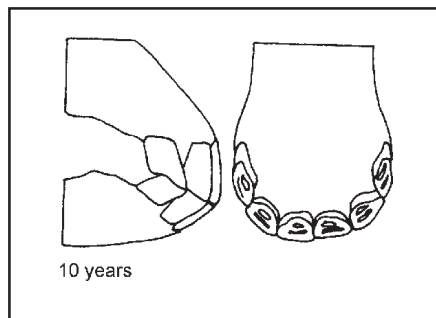


## Fourth Period

This period is noted by further wearing of the teeth, including the upper incisors and the angle of the teeth.



- U After nine years it is difficult to age a horse accurately by its teeth. The most noticeable change is in the tooth angle, which slants outward further as the horse ages. By 12 years of age, the dental cup disappears in the upper incisors and the horse has what is called a "smooth mouth".
- U At 15 years the dental star is smaller, but centered and clearer.
- U After 20 years of age, the teeth may become shorter. Space between the incisors may increase. The angle of the tooth from the gum to the crown slants further.

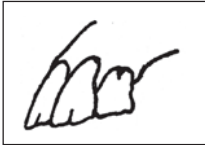


# 4 - H Horse Project Manual - Parts of the Horse

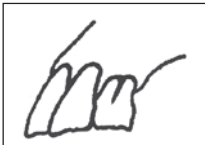
## Other Clues To A Horse's Age

As a horse uses its front teeth, they wear. The diagram shows how, after 5, 9, 15, and 20 years, the crown, cup and dental star wear down.

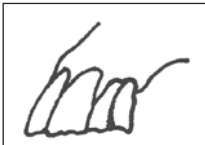
Galvayne's Groove



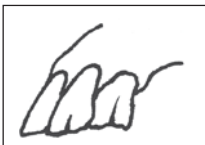
Starts at 9-10 years.



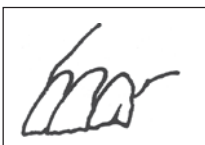
Halfway down at 15 years.



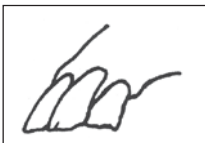
Full length at twenty years.



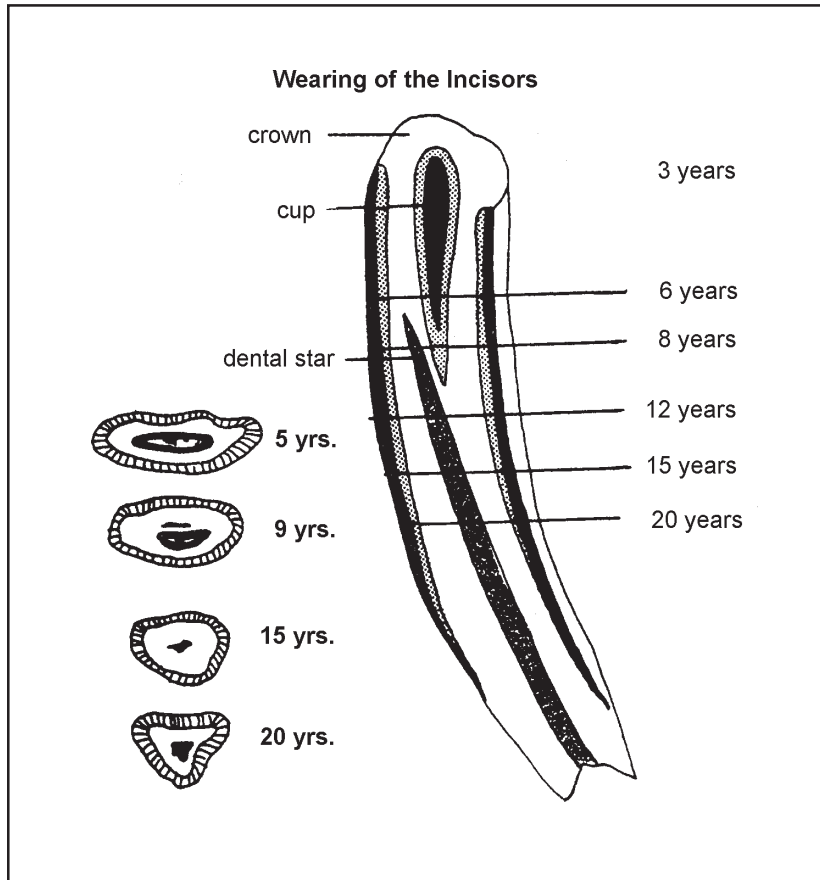
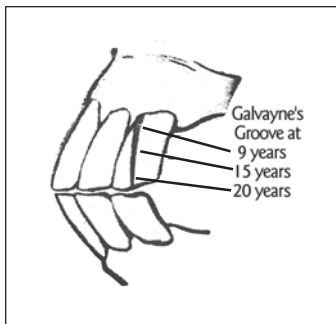
Begin to recede from gum line at 20 years.



Halfway gone at 25 years.



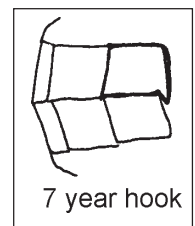
Completely gone at 30 years.



## Changes in the Upper Corner Incisors

### 7 Year Hook

At seven years of age, a hook appears on the edge of the upper corner incisor. This hook disappears by 8 or 9 years of age.



### Galvaynes Groove

Is a groove that appears on the outer surface of the upper lateral incisor teeth. It appears at about 9-10 years of age at the top of these teeth and develops down the tooth more as the horse ages. At 15 years it will have developed more than a half of the way down the upper lateral incisors. By 20 years it reaches the bottom of the lateral incisor teeth. After 20 years old the Galvayne's groove gradually disappears from the top down and cannot be seen in a thirty year-old horse.