

Animal Anatomy and Physiology Part 1

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Standard: 02-0211-03

- Students will understand animal anatomy and physiology as it relates to nutrition, health and management of domesticated animals

Objective: 02-0211-03-01

Students will demonstrate knowledge of animal body systems

Demonstrate knowledge of skeletal
system of animals.

Animal Structures and Function

- Animals are composed of a variety of interdependent systems
- No one system can function entirely on its own
- In order to keep animals healthy, producers make sure that all systems function properly.

Skeletal System

- Bone

- Attach muscles

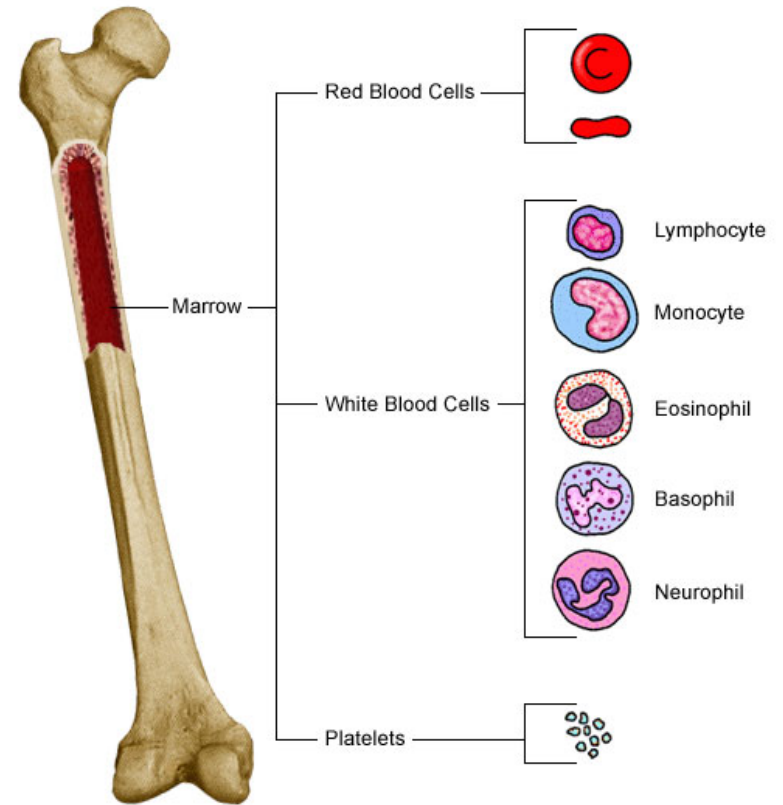
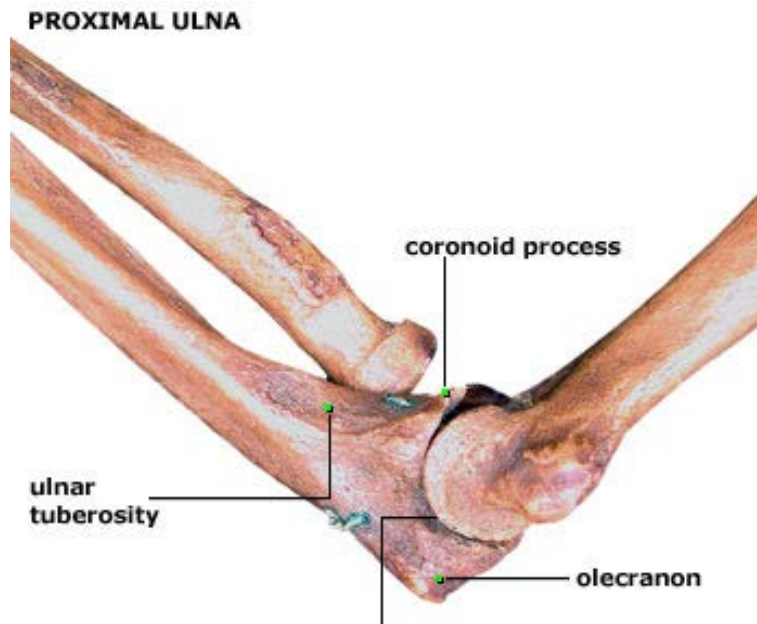
- Serves as levers (pengungkit) in movement
- It is a framework of hard tissue
- Gives support

- Protect internal organs and soft tissue

- Storage of minerals

"Bone"

- Hard tissue
- Mostly calcium
- Provides support
- Makes Red Blood Cells



“Cartilage”

- Shiny, white hard tissue
- Found at the end of long bones
- Prevents bones from grinding against each other
- Firm, flexible tissues that is not as hard as bone

“Ligament”

Strong, white bands of tissue
that connect two bones
together

Joints are where different bones
meet

“Tendon”

Shiny white bands of tissue
that connect muscles to
bone

“Marrow”

Soft tissue filling the spongy
interiors of bones

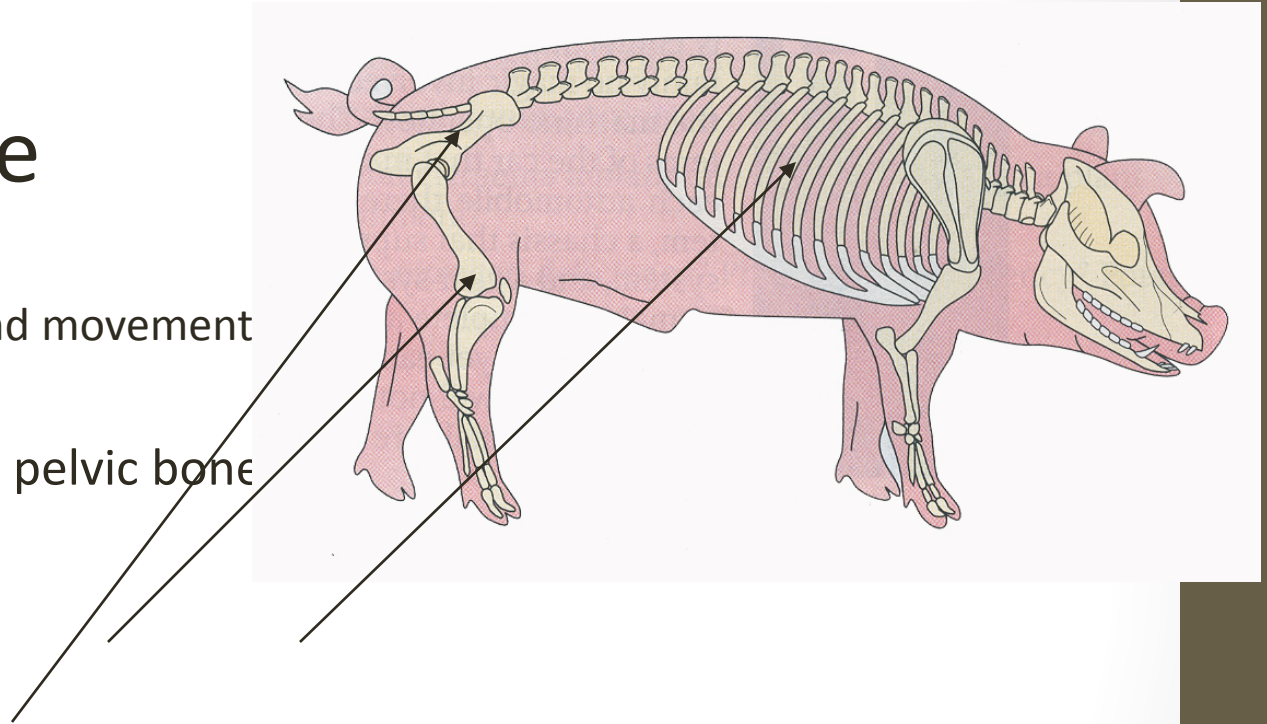
Bone Characteristics

- Number of bones varies with age and species
- Bones may be long or short
- Bones may be flat, or irregular
- Contains Vessels, Nerves, and Marrow
- Bones can repair themselves
- Organic material gives elasticity
- Inorganic matter gives rigidity (kekakuan)

Skeletal System

• Types of Bone

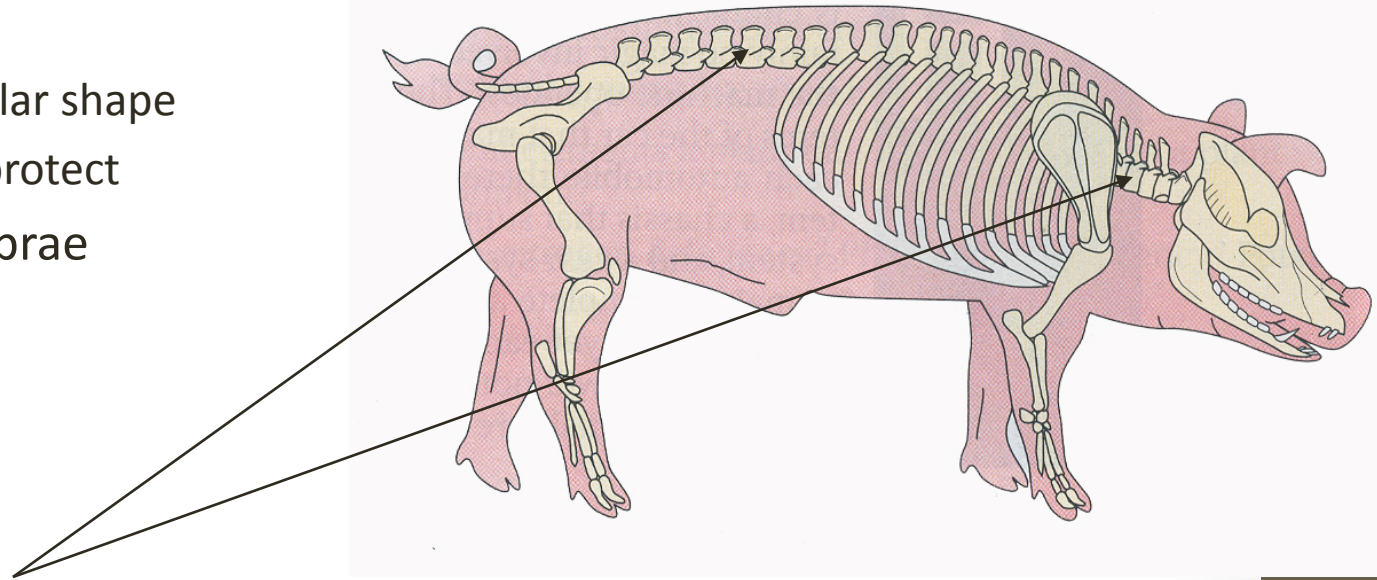
- Long Bones
 - Provide support and movement
 - Levers
- Example -- legs, ribs, pelvic bone



Skeletal System

• Types of Bone

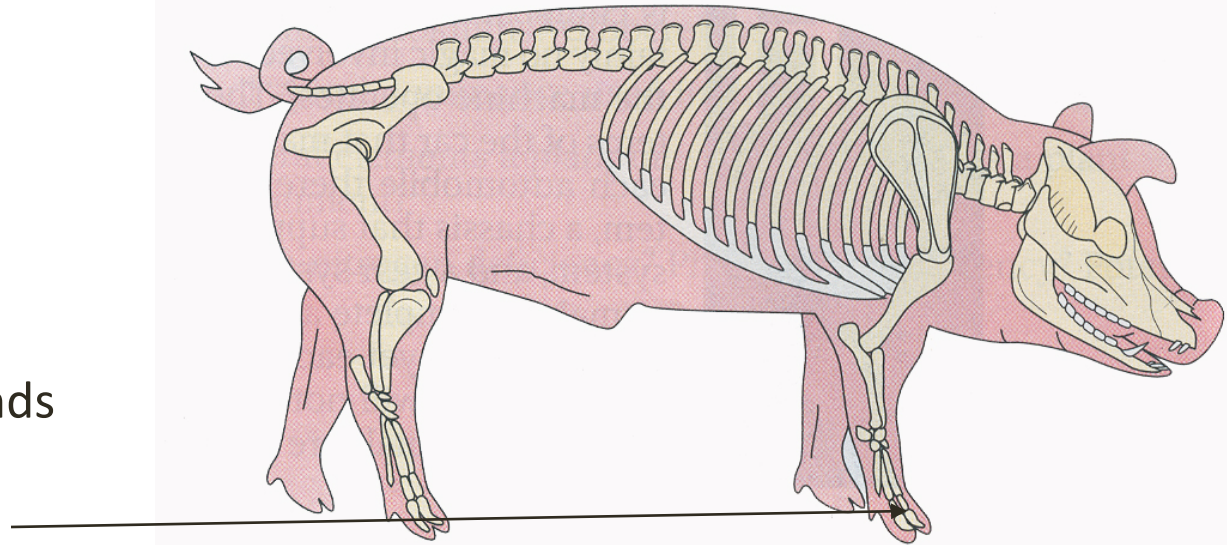
- Irregular Bones
 - Have an irregular shape
 - Support and protect
- Example -- vertebrae



Skeletal System

- **Types of Bone**

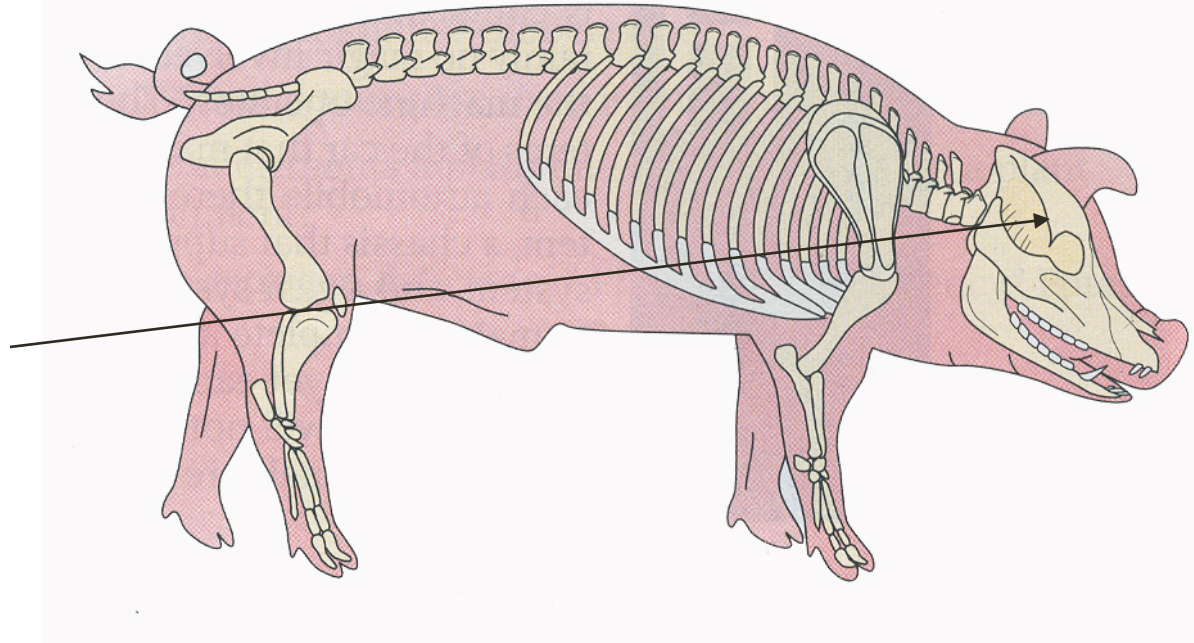
- Short Bones
 - Joints
 - Comfort and mobility
- Example -- feet and hands



Skeletal System

• Types of Bone

- Flat Bones
 - Thin and flat
 - Protect organs
- Example -- skull

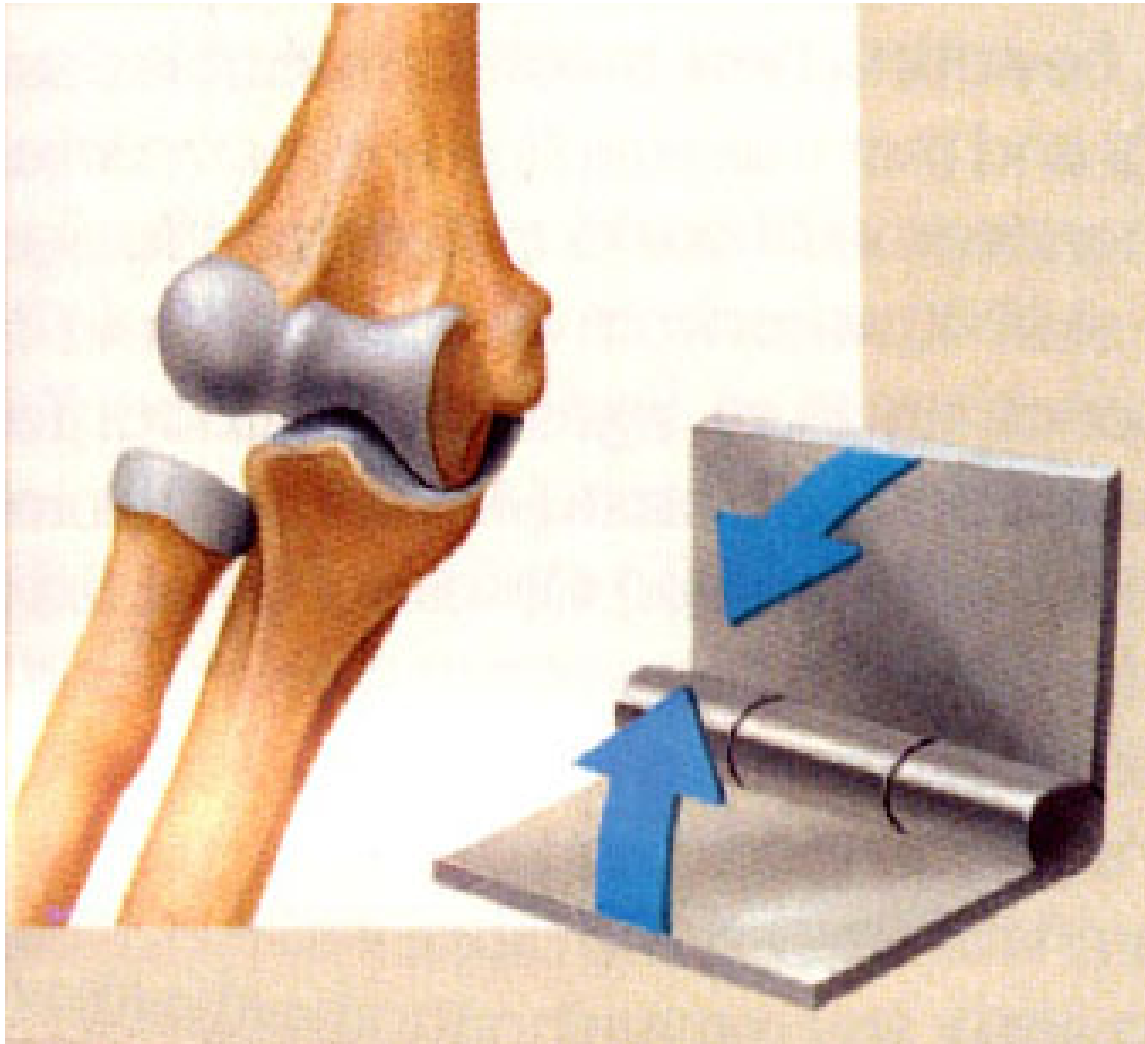


Skeletal System

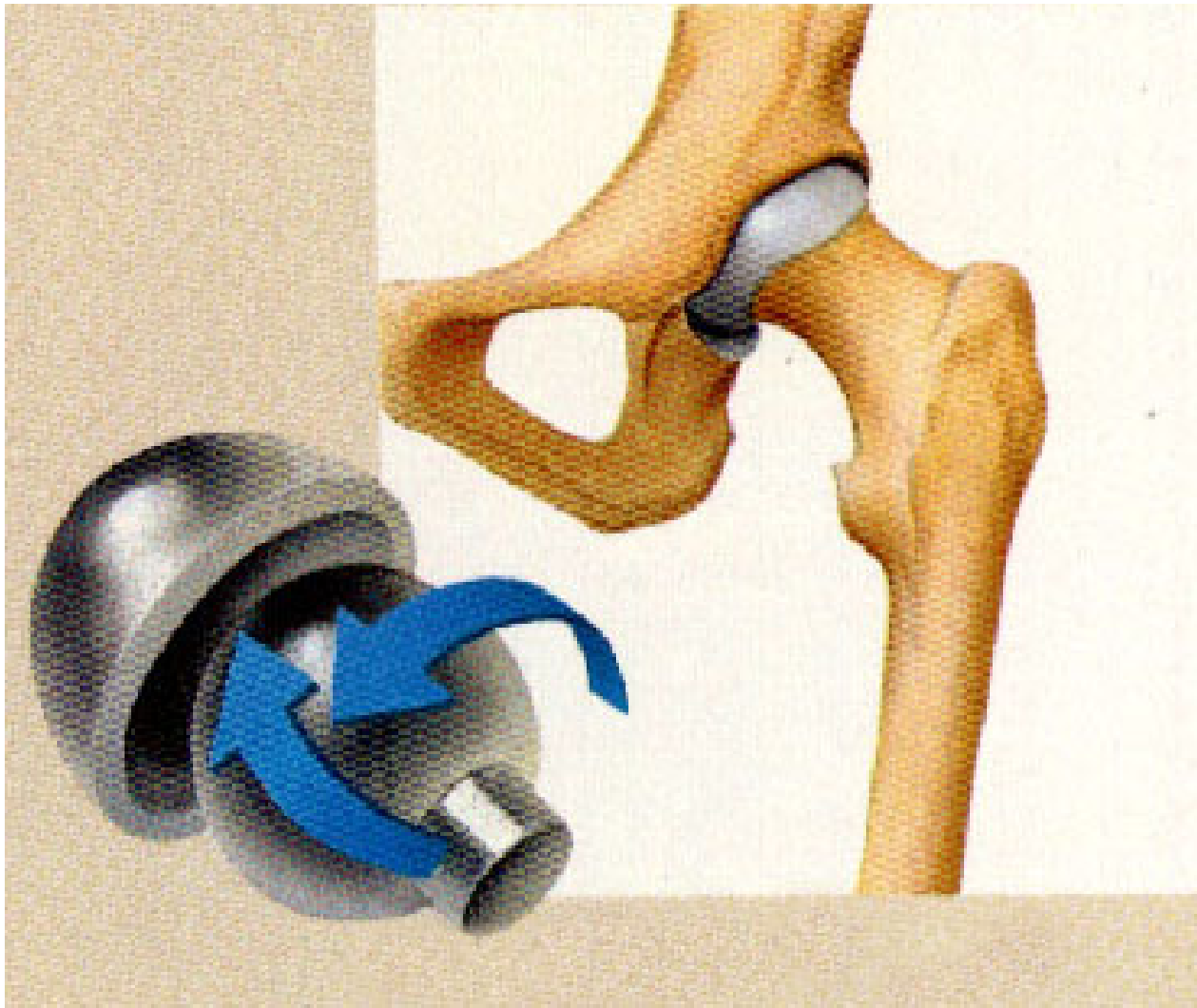
- Joints

- Classified by the way they move.

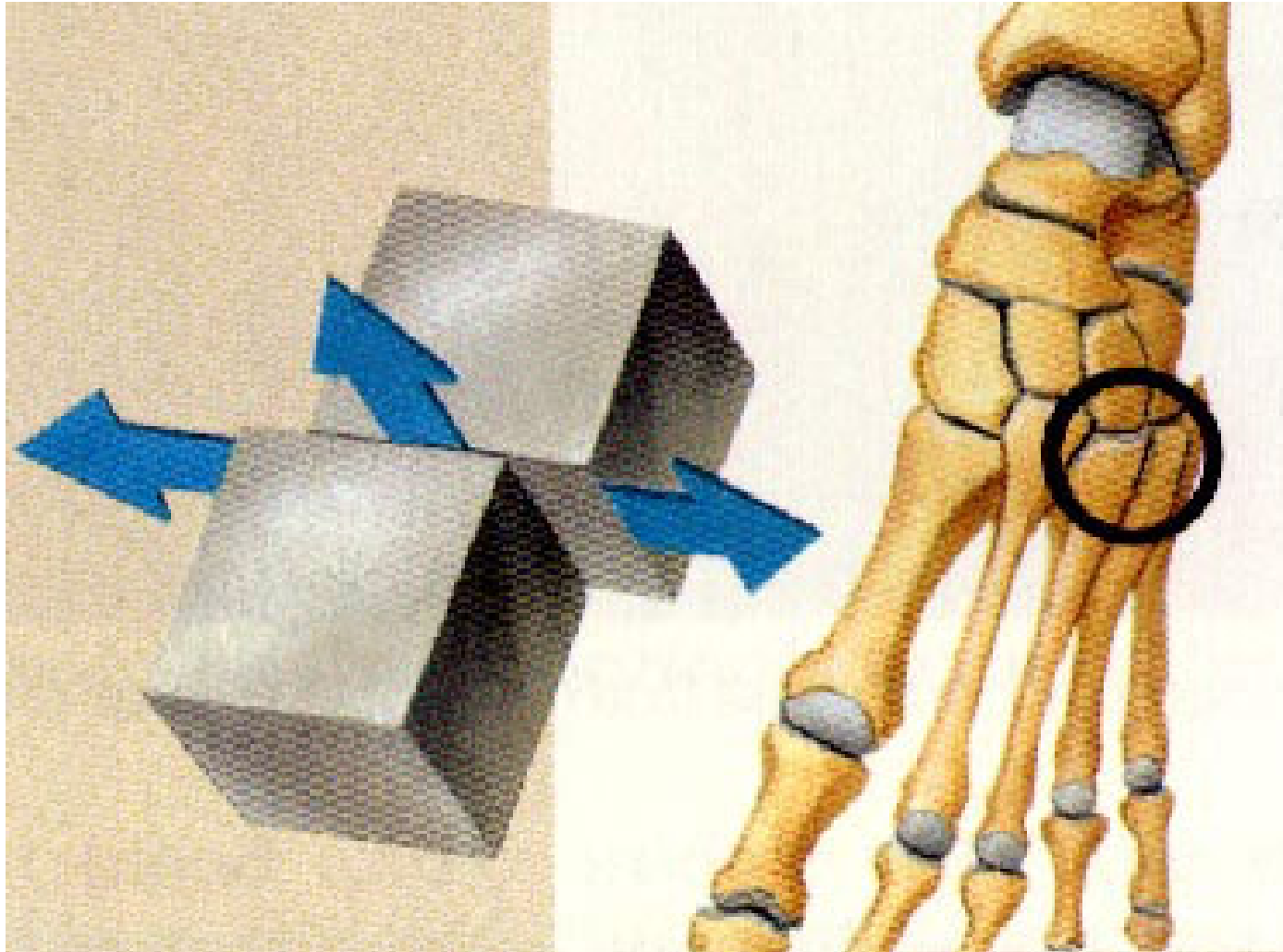
Hinge Joint



Ball and Socket



Gliding



Axial Skeleton

- Skeleton that includes the skull and the bones that support it.
 - Vertebral column
 - Ribs
 - sternum

Axial Skeleton

- Skull
 - Nasal cavity
 - Mandible
 - Sinuses
 - Temporal bone
 - Turbinate (cartilaginous bone)
 - Example Nose

Axial Skeleton

- Spinal column—vertebrae
 - Protects the spinal cord
 - Contains
 - Cervical or neck area
 - Involved with head and neck movement
 - Most flexible part of the axial skeleton

Vertebrae Spinal Column

“Thoracic”

- Upper wall of the chest cavity
- Ribs are attached
- Limited movement and flexibility

Vertebrae Spinal Column

“Lumbar”

- Lower back region
- Usually includes vertebra
- Framework for the loin area
- More flexibility than thoracic but less than cervical (servicalis)

Vertebrae Spinal Column

“Sacral”

- Rump area
- Several vertebrae fused into one bone—Sacrum
- Connected by a firm joint with the hip (pelvis) bones on each side of the sacrum

Vertebrae Spinal Column

“Coccygeal”

- Tail Bone area
- Contains 15-20 Vertebrae
- Essentially no spinal cord

Appendicular Skeleton

- Includes the bones of the arms and legs and structures associated with them
- Used for locomotion
- Eating
- Defense
- Connected to the axial skeleton by muscles and/or bony joints

Appendicular Skeleton

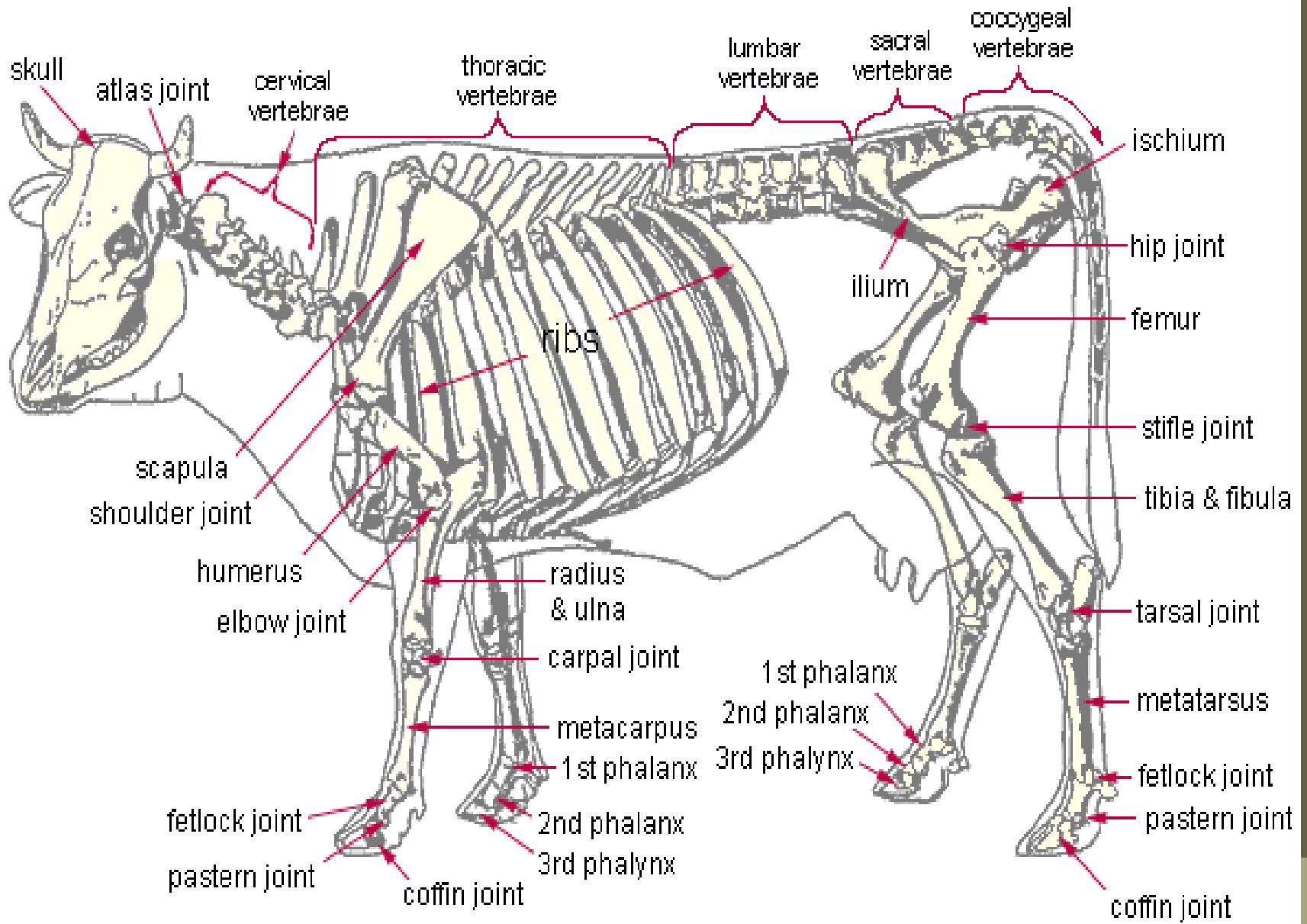
“Foreleg”

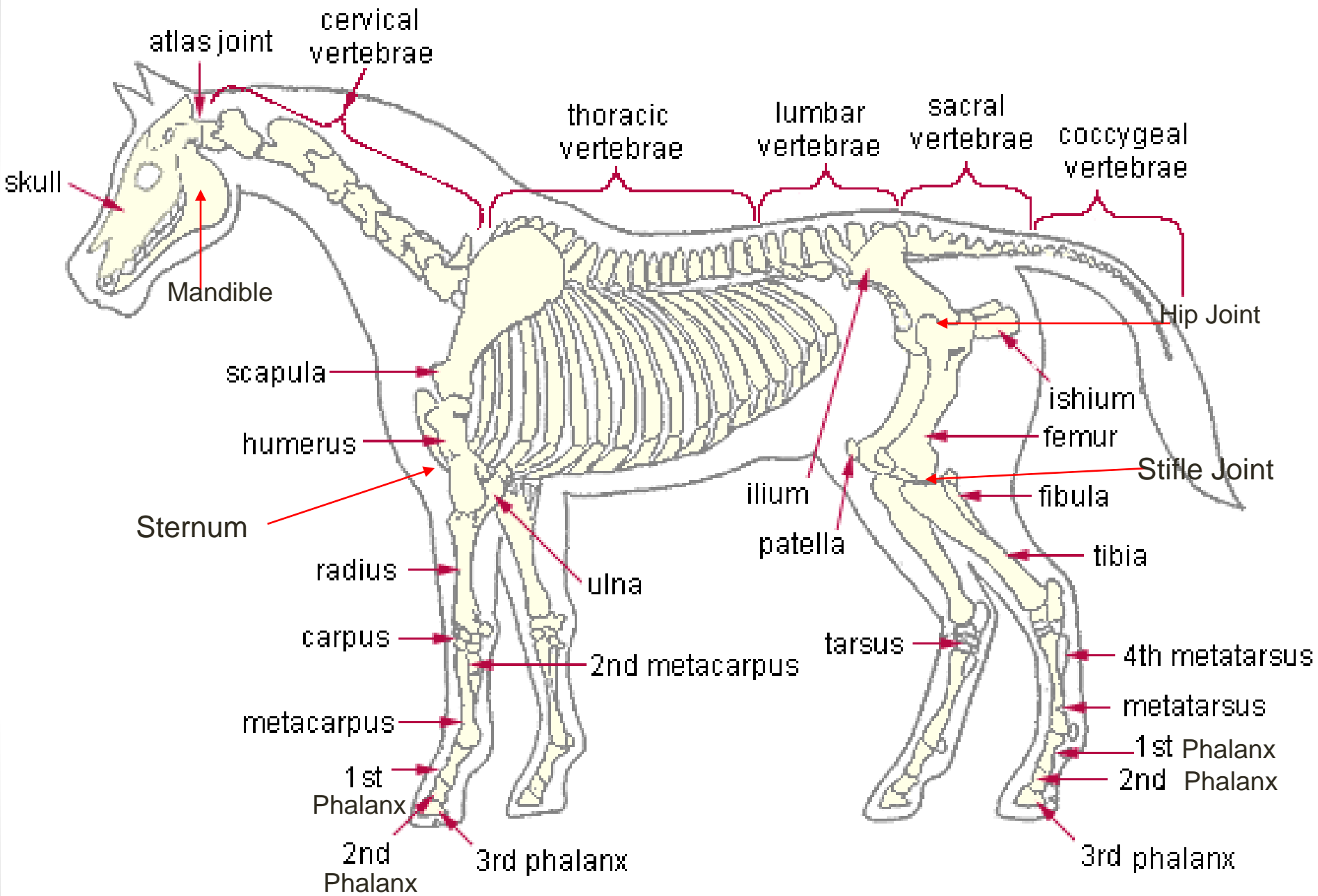
- Scapula—Shoulder Blade
- Humerus
- Radius and ulna
 - Fused together
 - Connected with humerus to make elbow joint
- Carpal Bones—Knee bones
 - Absorbs and dissipates concussive actions
- Metacarpal Bones
- Phalanges
- Sesamoid
- Distal or Navicular Bones

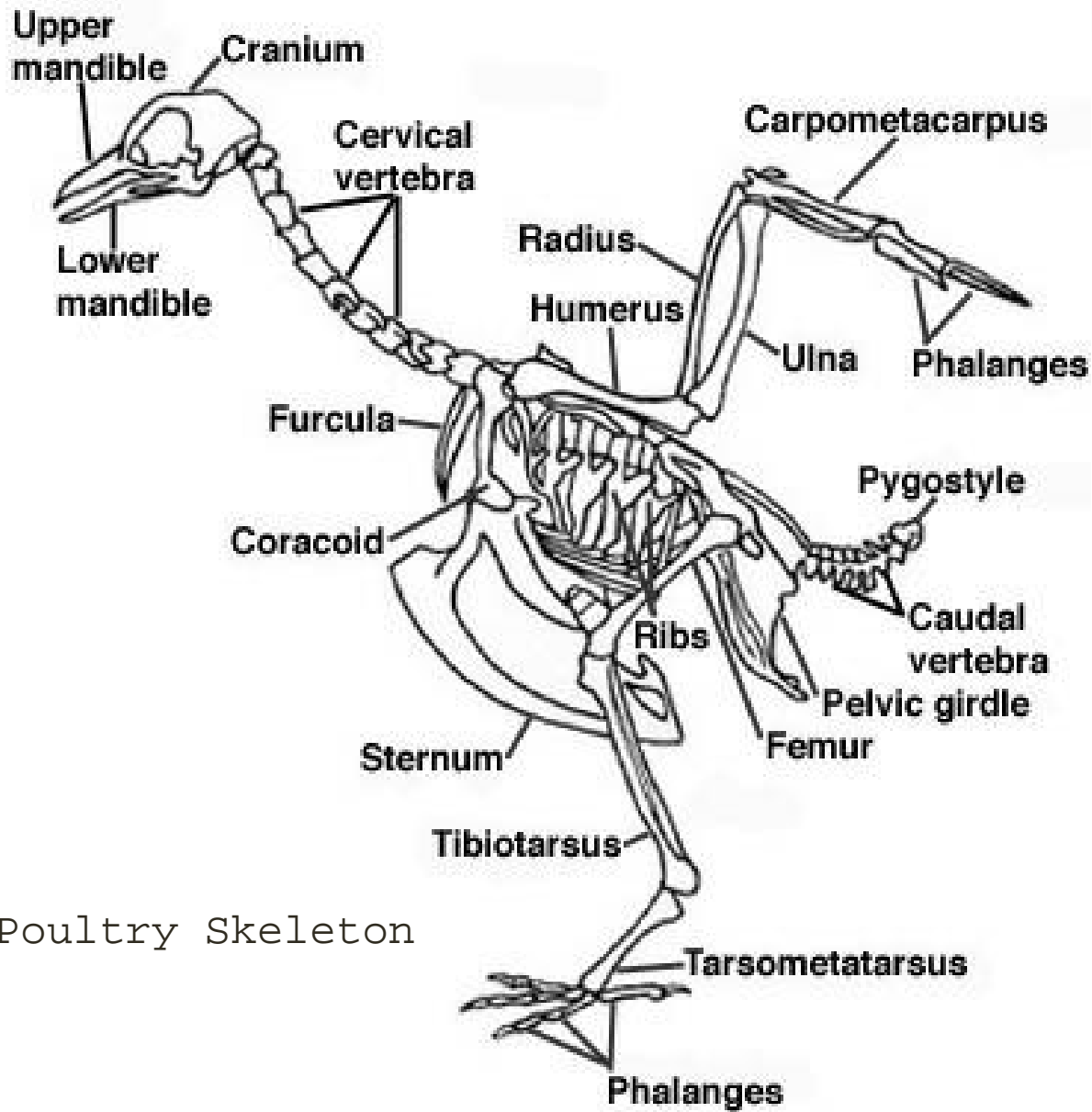
Appendicular Skeleton

Hind Leg

- Femur – thigh bone
- Patella- bone in front of stifle joint
- Tibia & Fibula
 - Contains Tarsus- “Hock”
- Metatarsus
- Phalanges
- Sesamoids

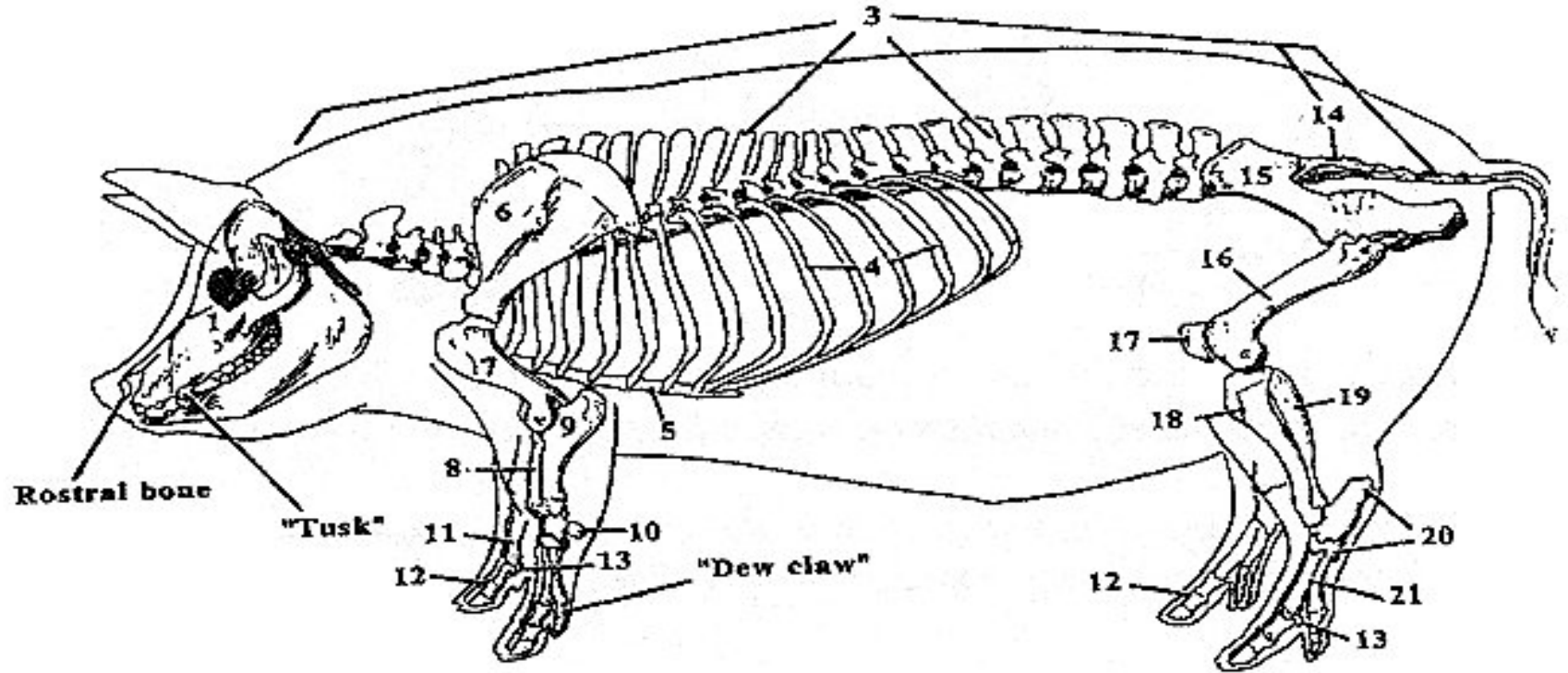






Poultry Skeleton

Swine Skeleton

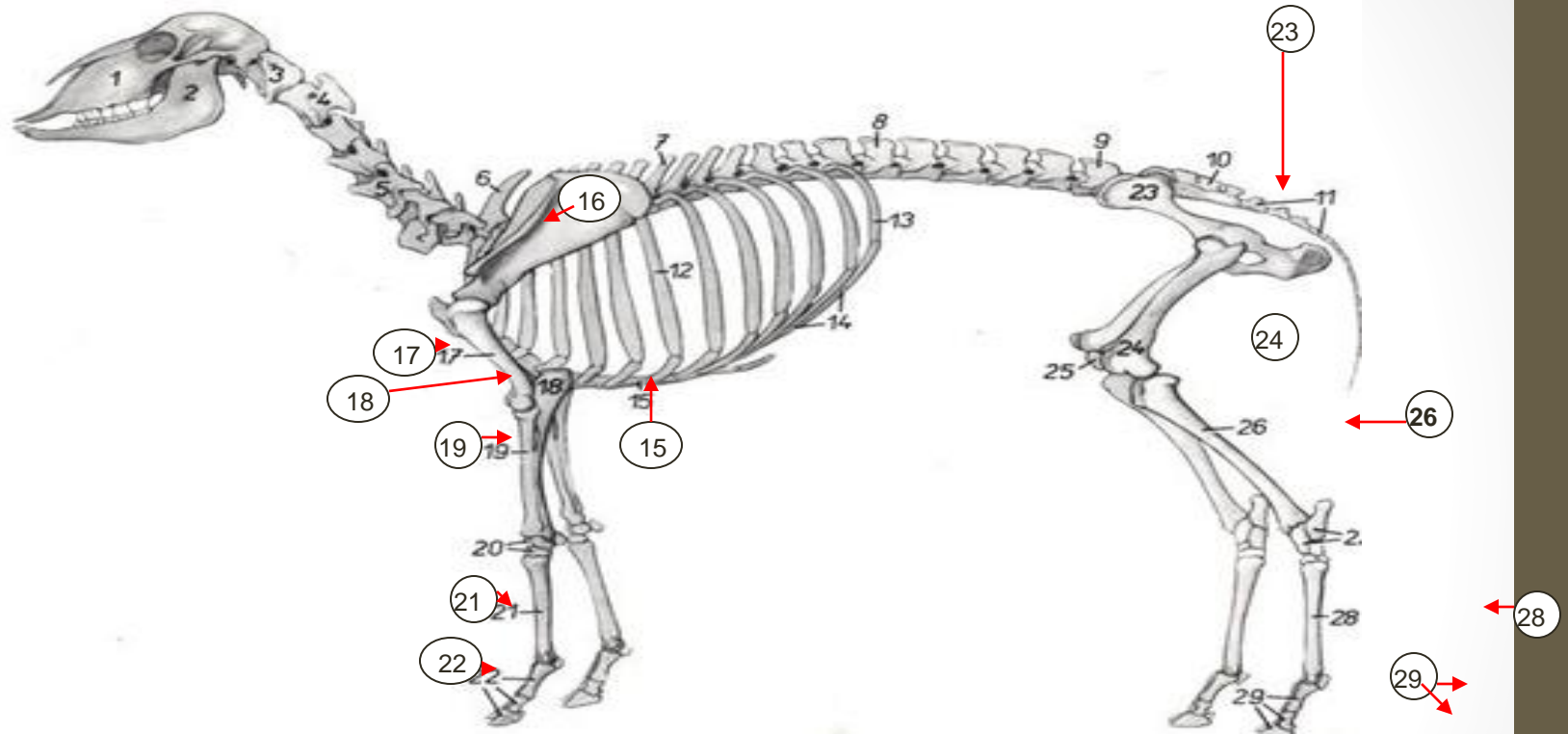


- 1. Skull
- 3. Vertebral Column
- 4. Ribs
- 5. Sternum
- 6. Scapula
- 7. Humerus
- 8. Radius

- 9. Ulna
- 10. Carpal Bones
- 11. Metacarpal Bones
- 12. Phalanges
- 13. Sesamoid Bones
- 14. Sacrum (part of the Vertebral Column)

- 15. Os Coxae
- 16. Femur
- 17. Patella
- 18. Tibia
- 19. Fibula
- 20. Tarsal Bones
- 21. Metatarsal Bones

Sheep Skeleton



15. Sternum

16. Scapula

17. Humeres

18. Ulna

19. Radius

21. Metacarpal

22. Phalanges

23. Coxae

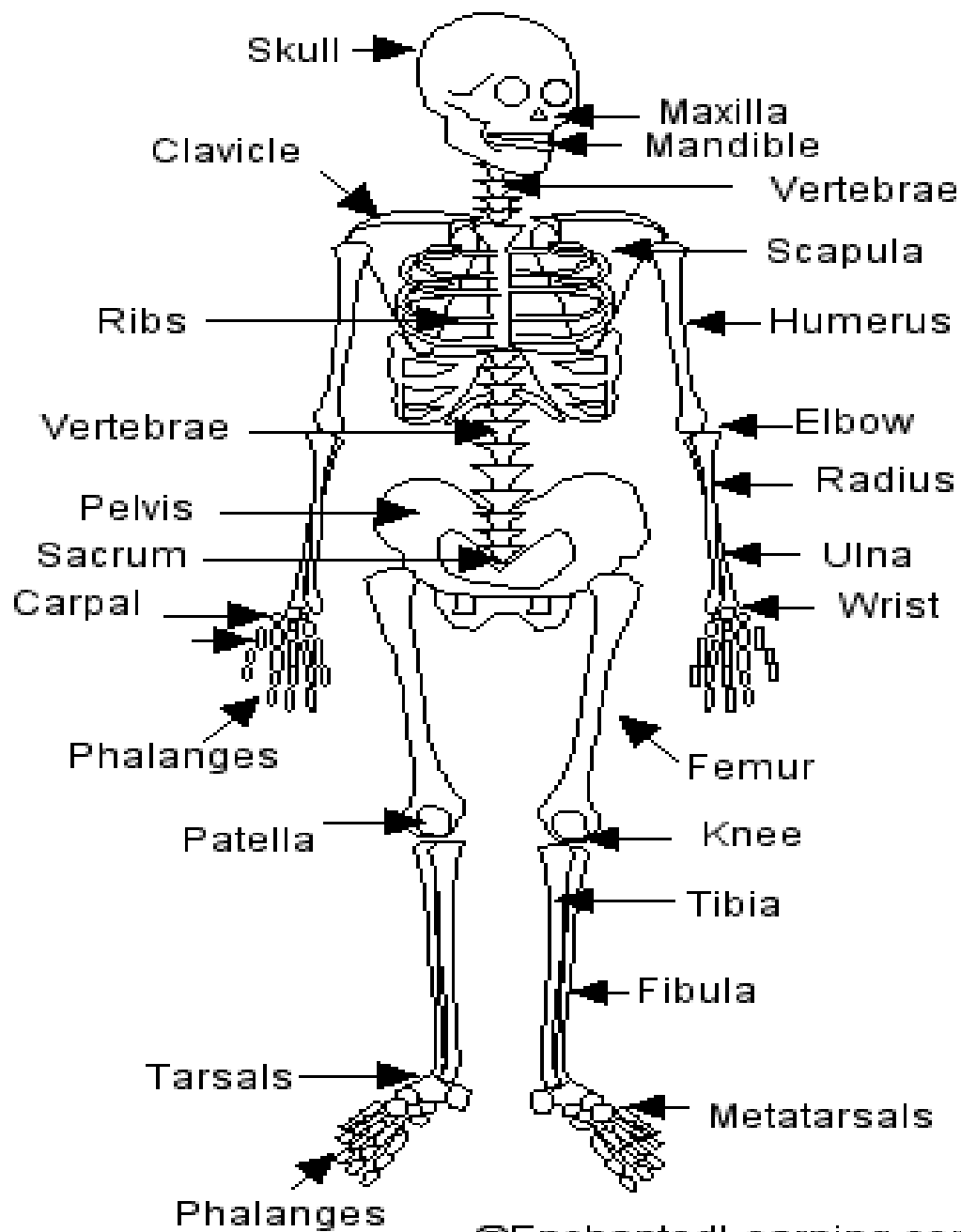
24. Femur

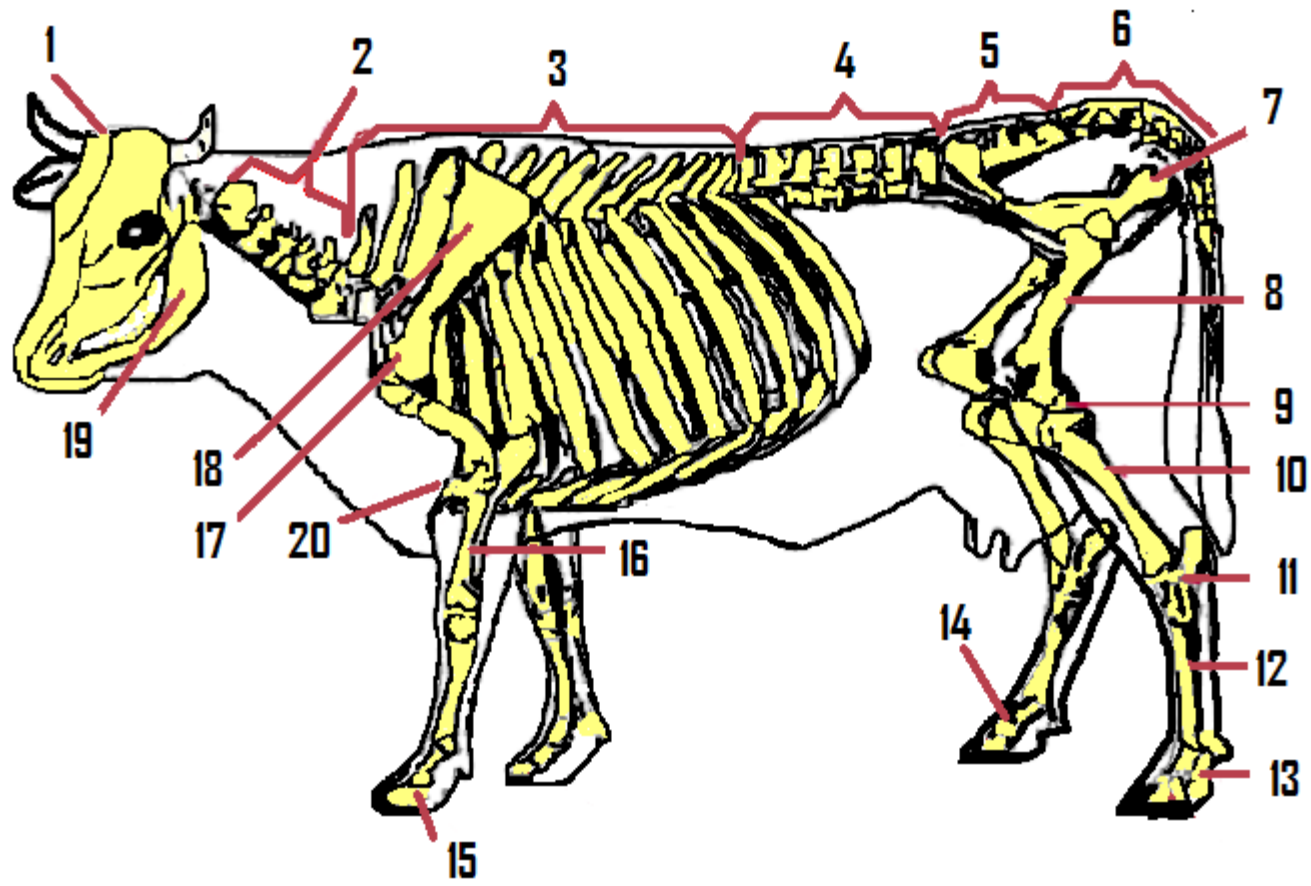
26. Tibia & Fibia

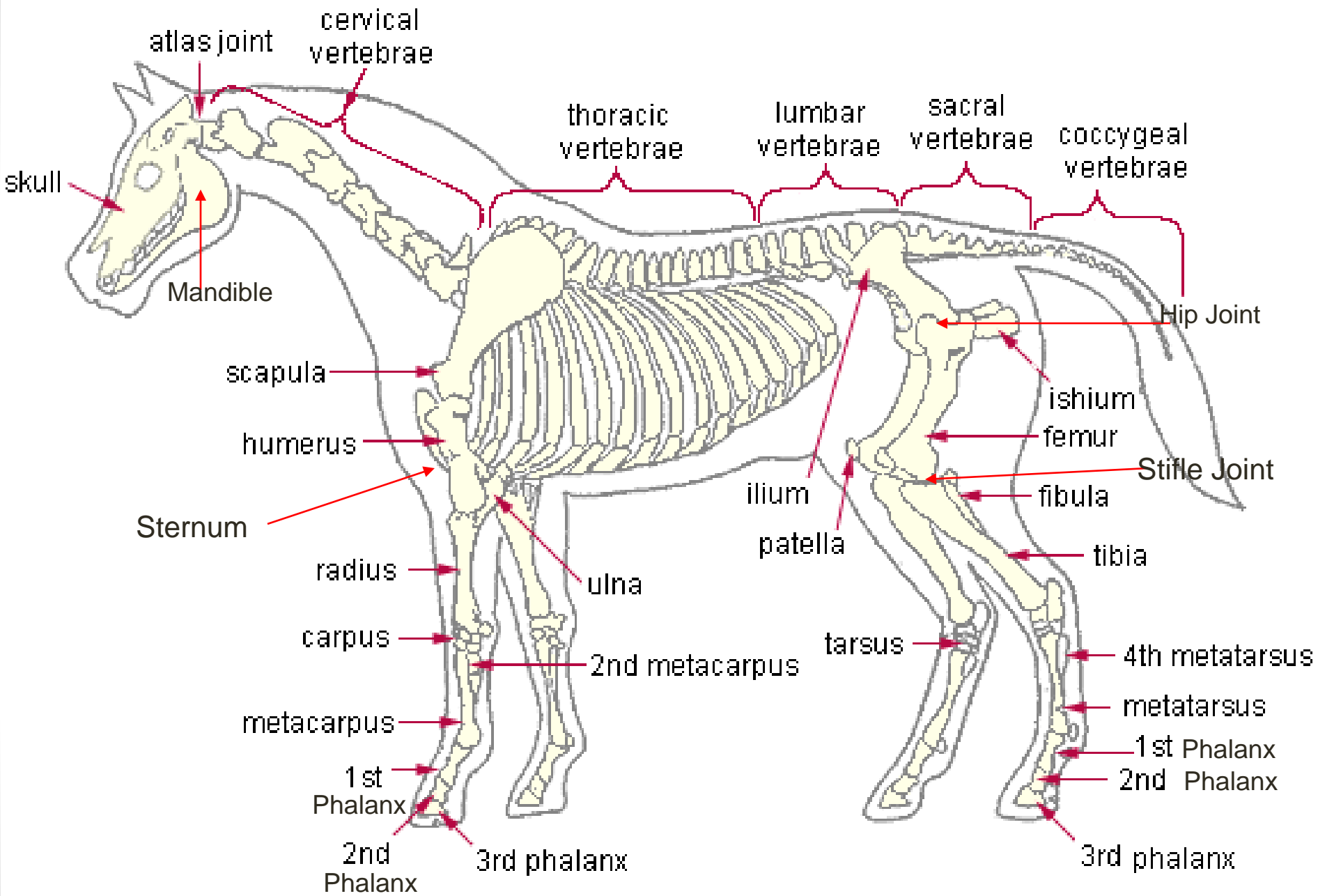
28. Metacarpal

29. Phalanges

Human Skeleton







Indicator: 02-0211-03-01-03

Skeletal System Test

Indicator: 02-0211-03-01-04

Demonstrate a knowledge of Muscle
Systems of Livestock.

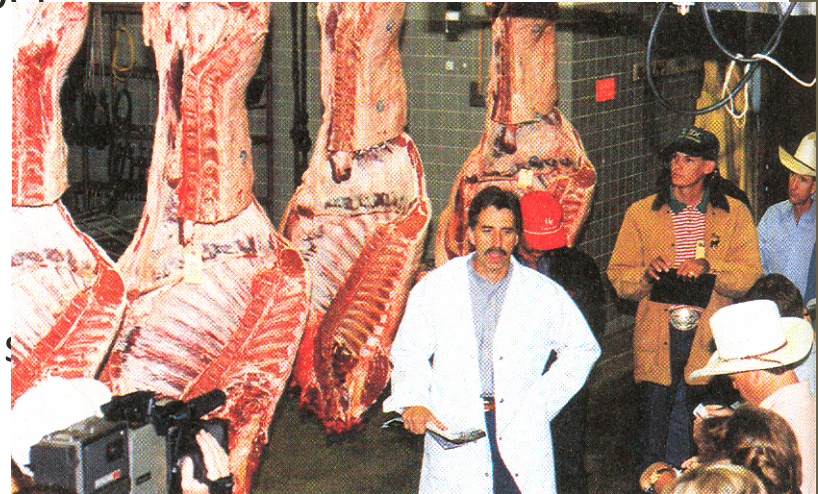
Muscle System

- **Function**

- To provide movement for the proper functioning of the organs.

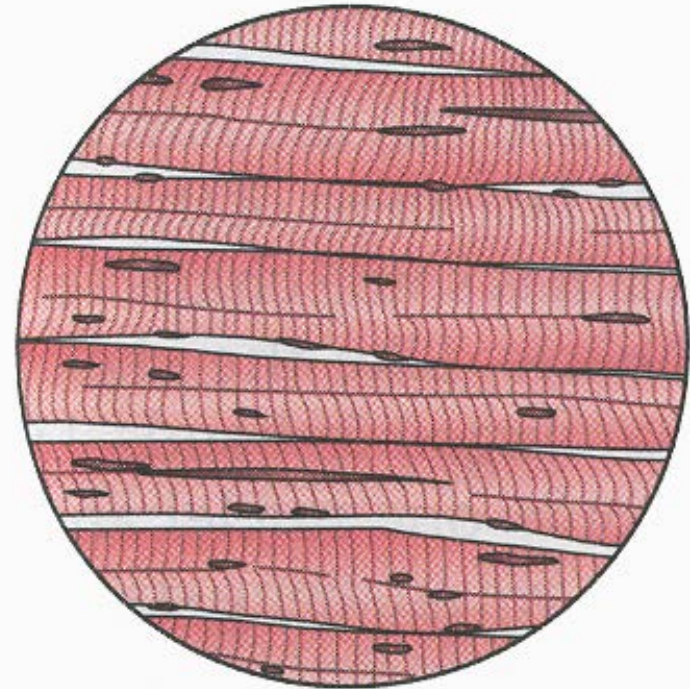
- **Meat production**

- Muscles are processed into meat
- 30-40% of the animal's body is muscle



Muscle System

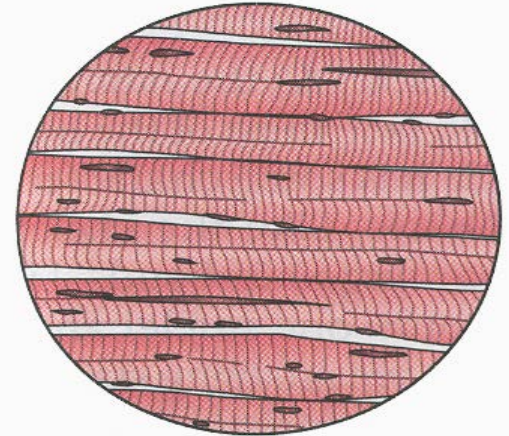
- Skeletal Muscle
 - Movement for the bones
 - Voluntary movement
 - Composed of long, striated bundles that contract and relax



Skeletal muscle

Muscle System

- Skeletal Muscle
 - Red Muscle
 - Contain many mitochondria;
 - Lots of blood; contract for long periods of time



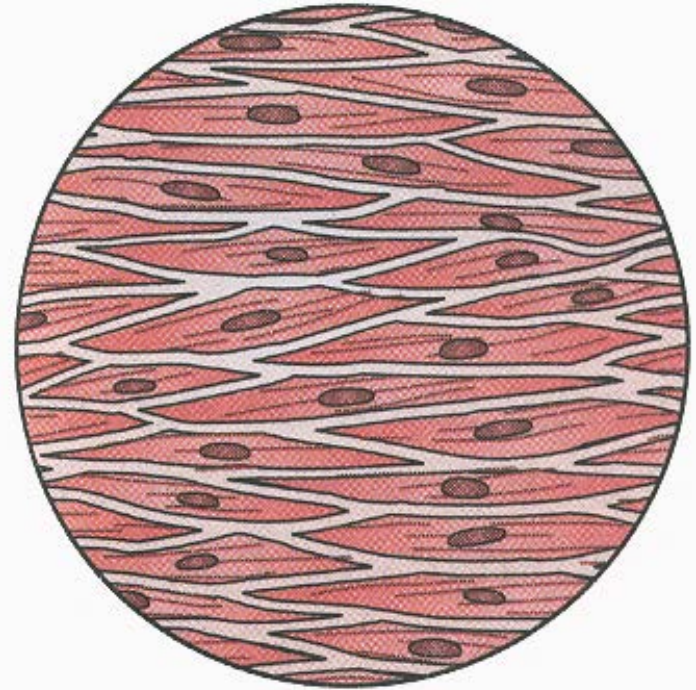
Skeletal muscle

Muscle System

- Skeletal Muscle
 - White Muscle
 - Fewer mitochondria
 - Contract faster
 - Fatigue faster.

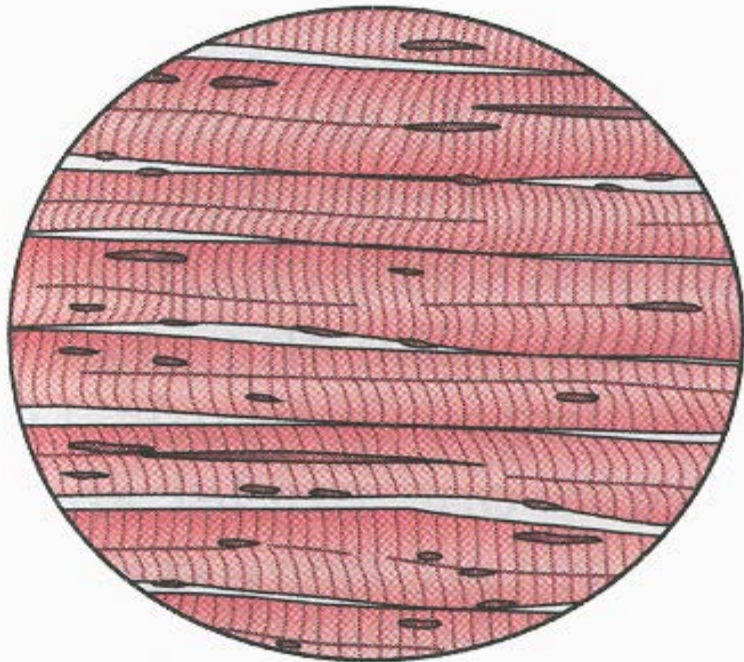
Muscle System

- **Smooth Muscle**
 - **Movement**
 - Controls movements of the internal organs
 - Involuntary.
 - **Examples--** Digestive tract, urinary tract

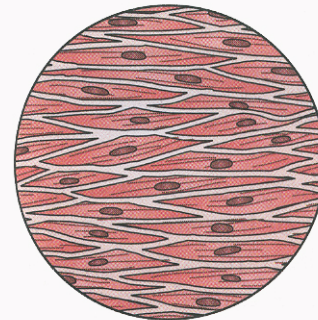


Smooth muscle

Muscle System



Skeletal muscle



Smooth muscle

Muscle System

- Cardiac Muscle
 - **Movement**
 - Muscles that control the heart
 - Involuntary

- ✓ Muscle is the lean meat of the animal that is used for human consumption.
- ✓ The purposes of muscles are to provide for movement in cooperation with the skeletal system.
- ✓ Muscles may be voluntary or involuntary.
- ✓ Voluntary Muscles
 - * Controlled by the animal
 - * Walk, Run, Eat

✓ Involuntary Muscles

- * Operate without control of the animal
- * Functions while the animal sleeps
- * Digestion, Heart beat, Breathing

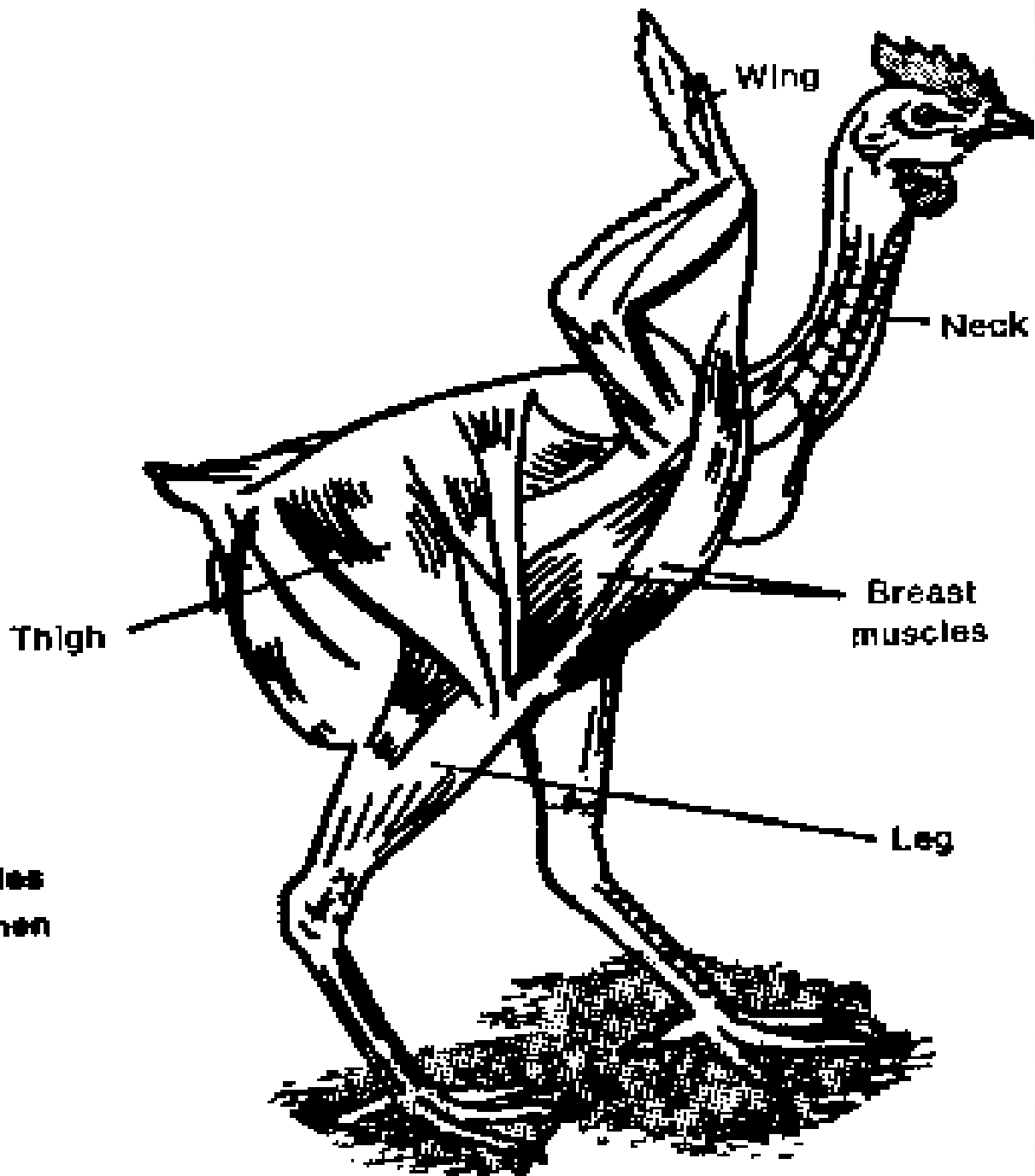
✓ Muscle Composition

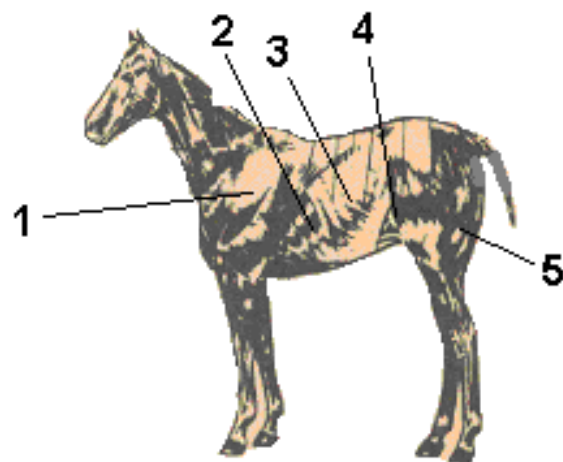
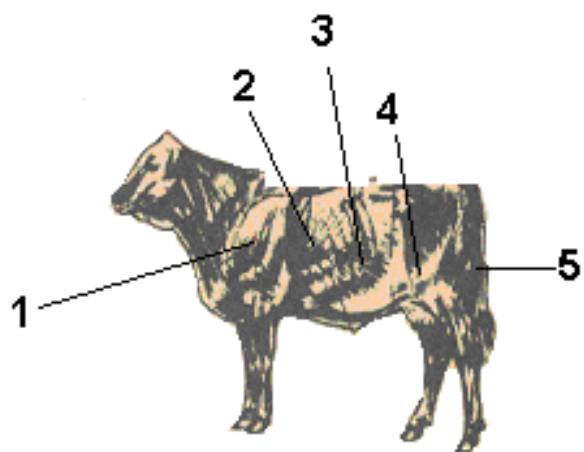
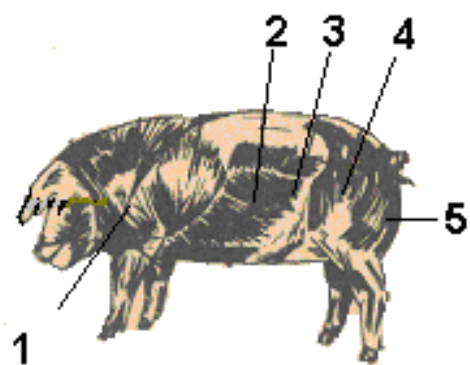
- * Mostly Protein
- * Protein is required for the maintenance and growth of the animal
- * Proteins are nutrients that are made up of amino acids.
- * Amino acids are the building blocks of muscles.

✓ Muscle Cells

- * Grow rapidly until sexual maturity.
- * Have the greatest feed efficiency until sexual maturity.
- * Different from other cells:
 - Long and relatively thin
 - Have many nuclei
- * Animal growth is caused by the increase of muscle size and not more muscles.

**Muscles
of a hen**





1--Deltoid

2--Latissimus Dorsi

3--Obliquus Abdominis

4--Tensor Fasciae Latae

5--Semitendinosus

Indicator: 02-0211-03-01-05

Livestock Muscle System Test

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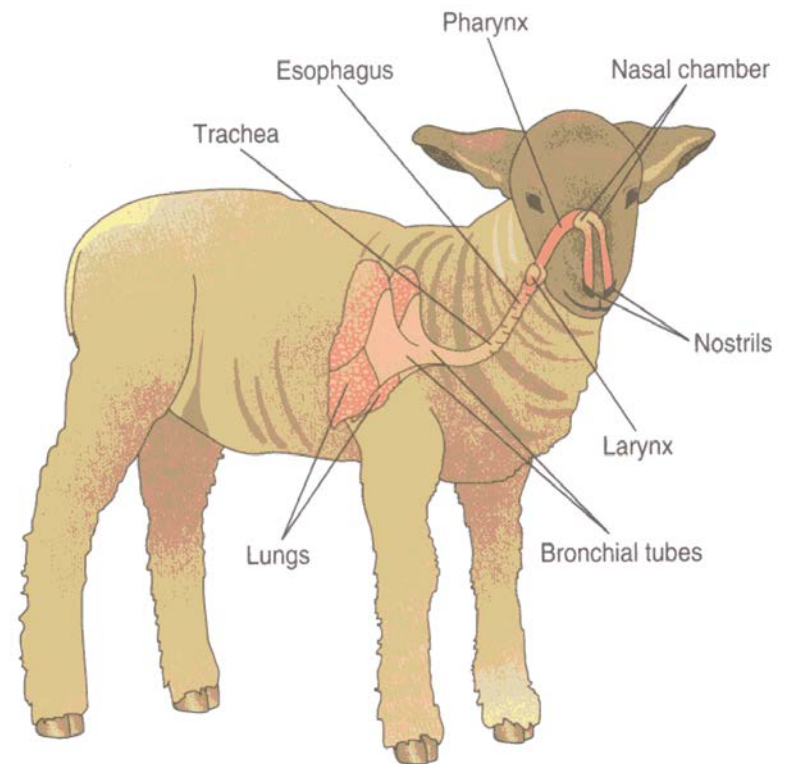
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Demonstrate knowledge of respiratory system of animals.

Respiratory System

- **Function:**

- Takes oxygen from the air
- Places it in the bloodstream
- Removes carbon dioxide



Respiratory System

- Structures
 - Nostrils
 - Large amounts of air
 - Nasal Chamber
 - Mouth
 - Brings in air

Respiratory System

- Structures
 - Pharynx
 - Passageway for
 - Food
 - Water
 - Air
 - Controlled by epiglottis

Respiratory System

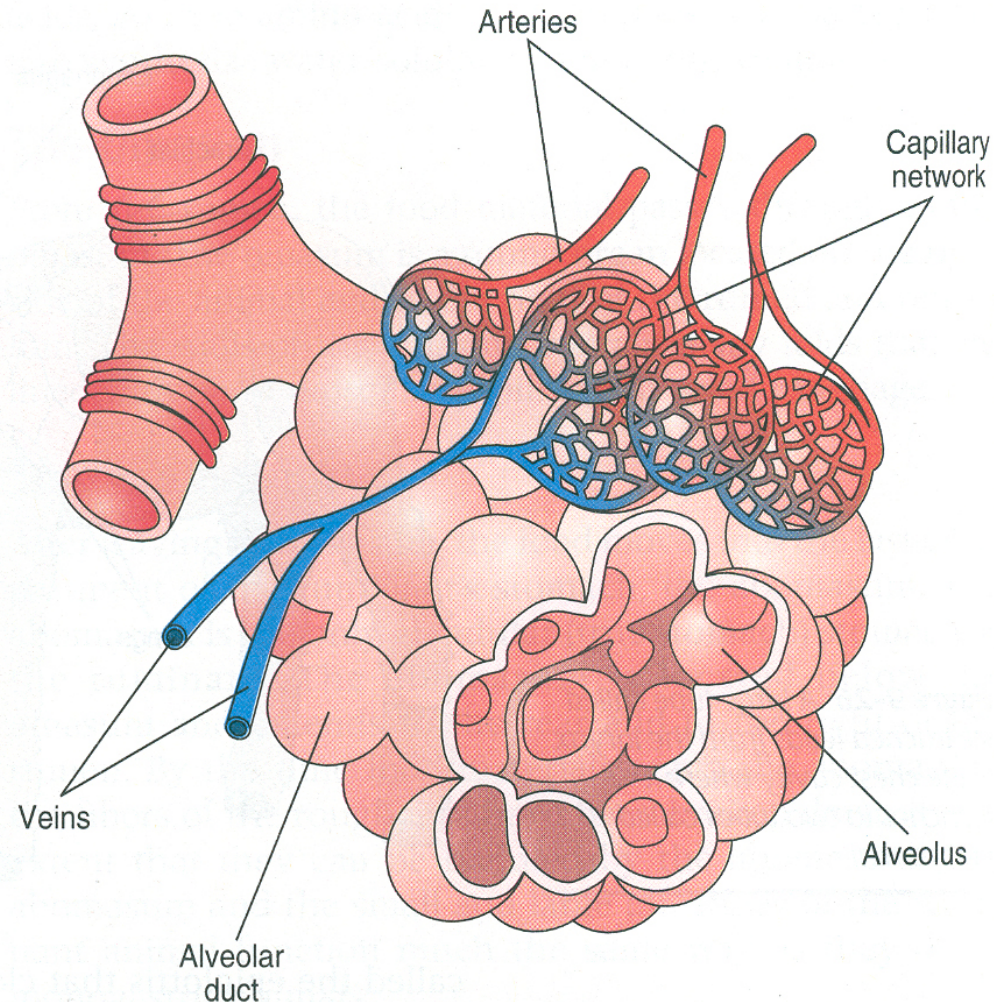
- Larynx
 - Voice box (Adam's apple)
 - Prevents material from entering lungs.
- Trachea
 - Large tube
 - Made of rigid cartilaginous rings

Respiratory System

- Bronchi
 - Branch out further
- Lungs
 - Gas exchange

Respiratory System

- Alveoli
 - Surrounded by blood vessels
 - Carbon dioxide is removed from blood
 - Oxygen is absorbed into blood



Respiratory System

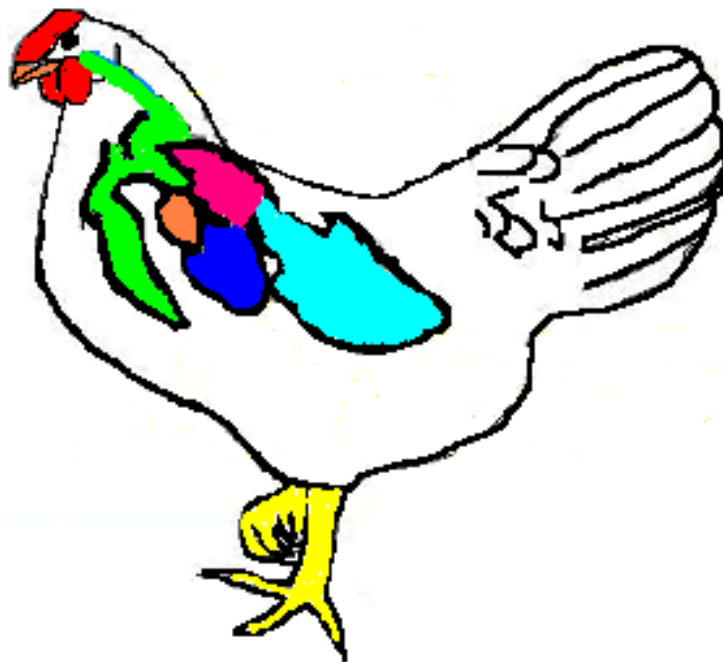
- **Diaphragm**

- Large muscle under the lungs
- When contracted, rib cage expands and air comes in
- When the diaphragm relaxes, air is forced out

Structure and Function

- Nostrils
 - Called nares
 - Paired, external openings
 - Dilatable (increases in size)
 - Species Differences
 - Horse—Very Pliable and Dilatable
 - Pig—Rigid
 - Advantageous
 - More air is required (e.g. Running)
- Nasal Cavities
- Pharynx
- Larynx
- Trachea
- Alveoli
- Lungs

Chicken Respiratory System



Lung

Cervical Sac

Abdominal Sac

Anterior Thoracic Sac

Posterior Thoracic Sac

Respiratory System of the Chicken

One adaptation to flight is the development of pneumatic bones.

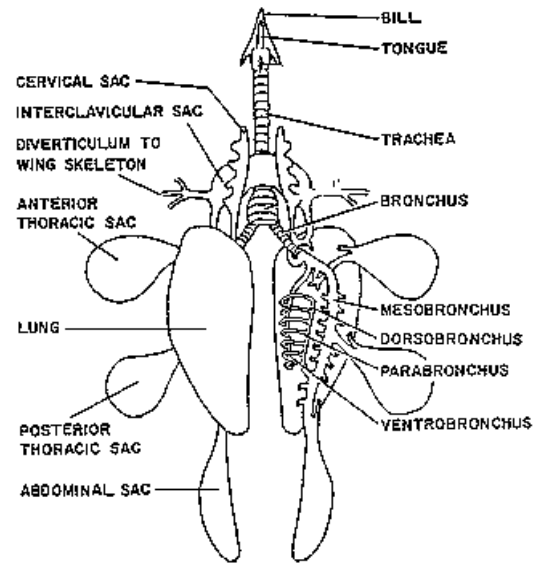
Instead of being filled with marrow, pneumatic bones are hollow and act as extensions of the respiratory system, which also includes the lungs, the tubes or bronchi leading to the lungs and the air sacs.

The lungs are rather rigid, attached to the ribs in the upper portion of the thorax, and do not expand or contract very much during breathing.

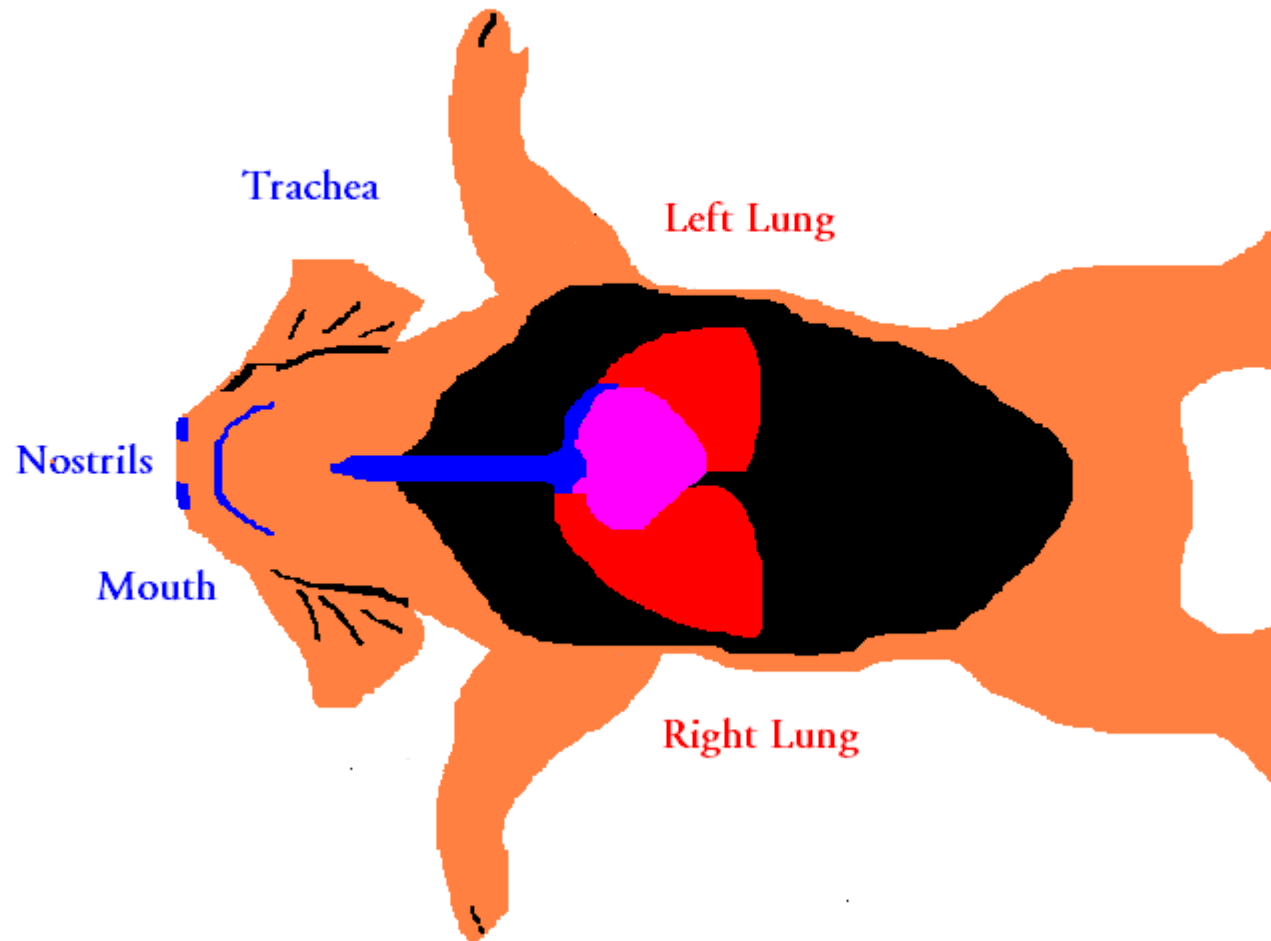
There are four pairs of air sacs which reach from the neck to the abdomen and open into the pneumatic bones.

The air sacs are delicate, thin walled and collapse when the chest is opened, so they may be difficult to see.

Poultry Respiratory System



Respiratory System



Trachea

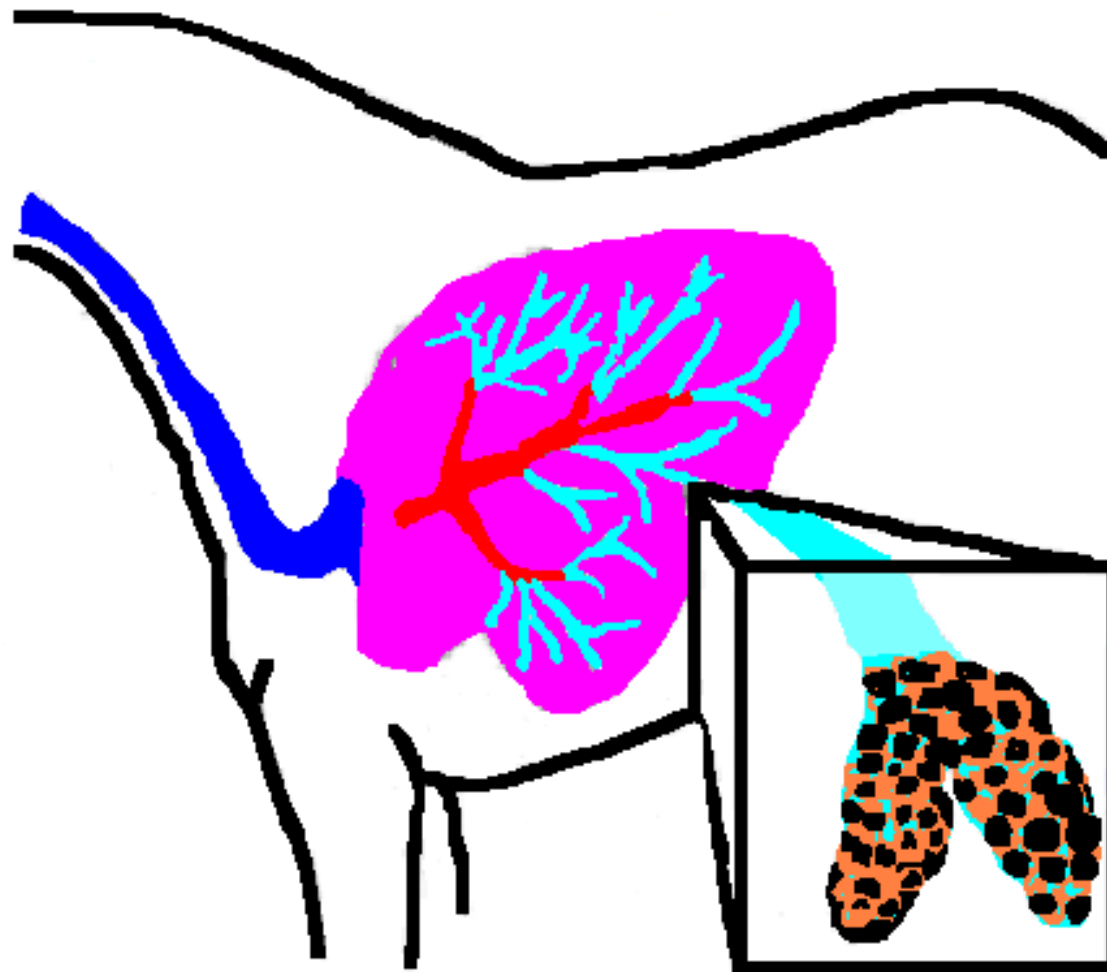
Main Bronchi

Right & Left Bronchi

Bronchiae

Capillaries

Alveolus



Horse Respiration

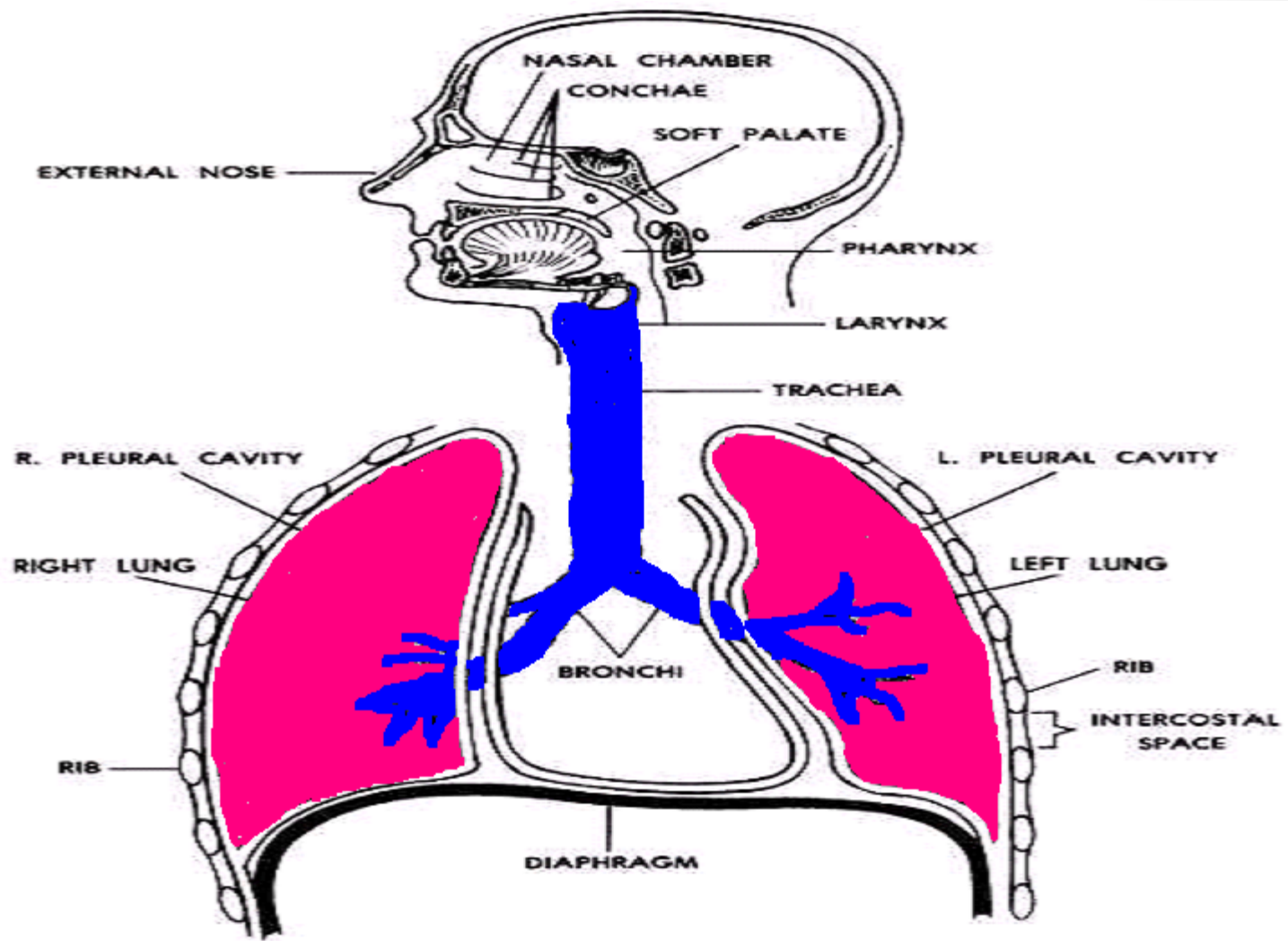


Figure 7-1. The human respiratory system.

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Respiratory Systems Test

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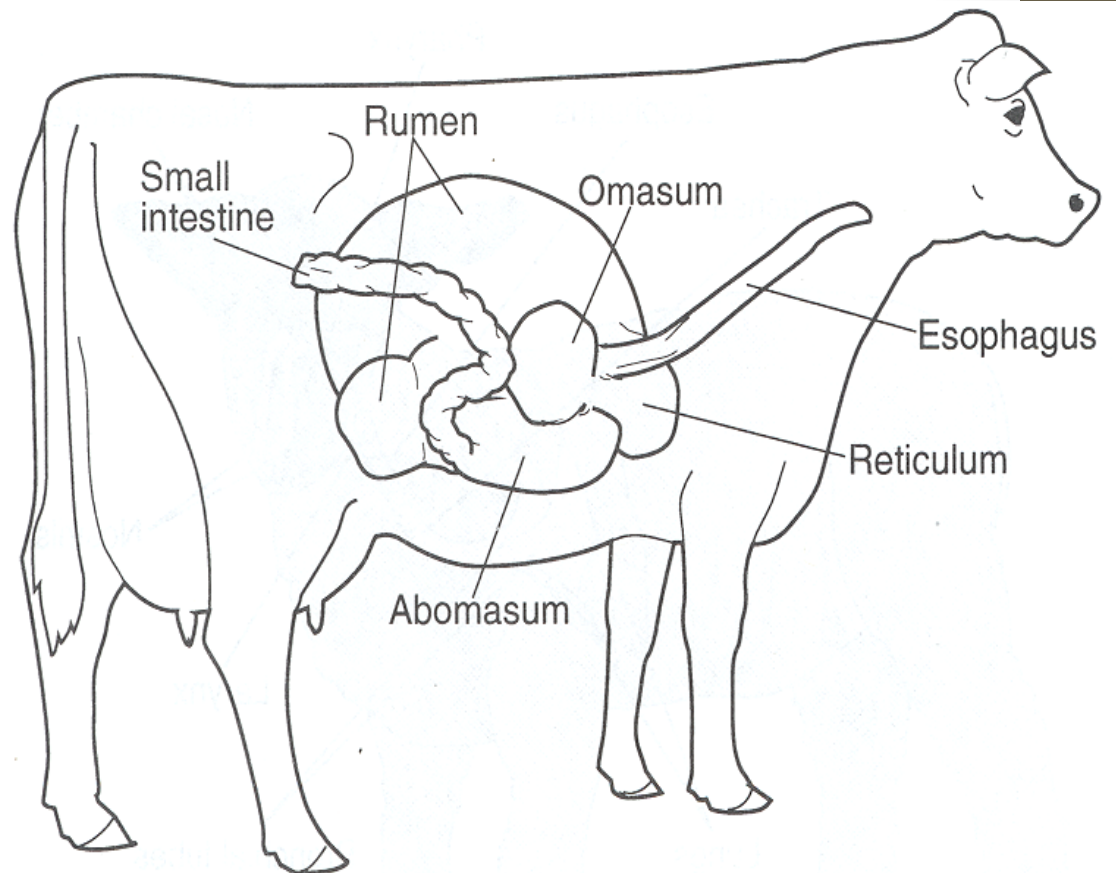
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Demonstrate knowledge of the Ruminant digestive system of animals.

Digestive System

- Ruminant System

- Cows
- Goats
- Sheep
- Deer
- Elk



Ruminant Digestive System

- ✓ Animals have a 4-compartment stomach
- ✓ Referred to as “Ruminants”
- ✓ Regurgitate their food and chew it again
- ✓ Chewing their food again is called “Chewing a Cud”
- ✓ Ruminants eat forages that other animals will not eat.
- ✓ Ruminants convert forages into protein

Digestive System

- Ruminant System
 - These eat large quantities of fibrous material.
 - Hay
 - Alfalfa
 - Etc...
 - Roughage – Fibrous Feed

Digestive System

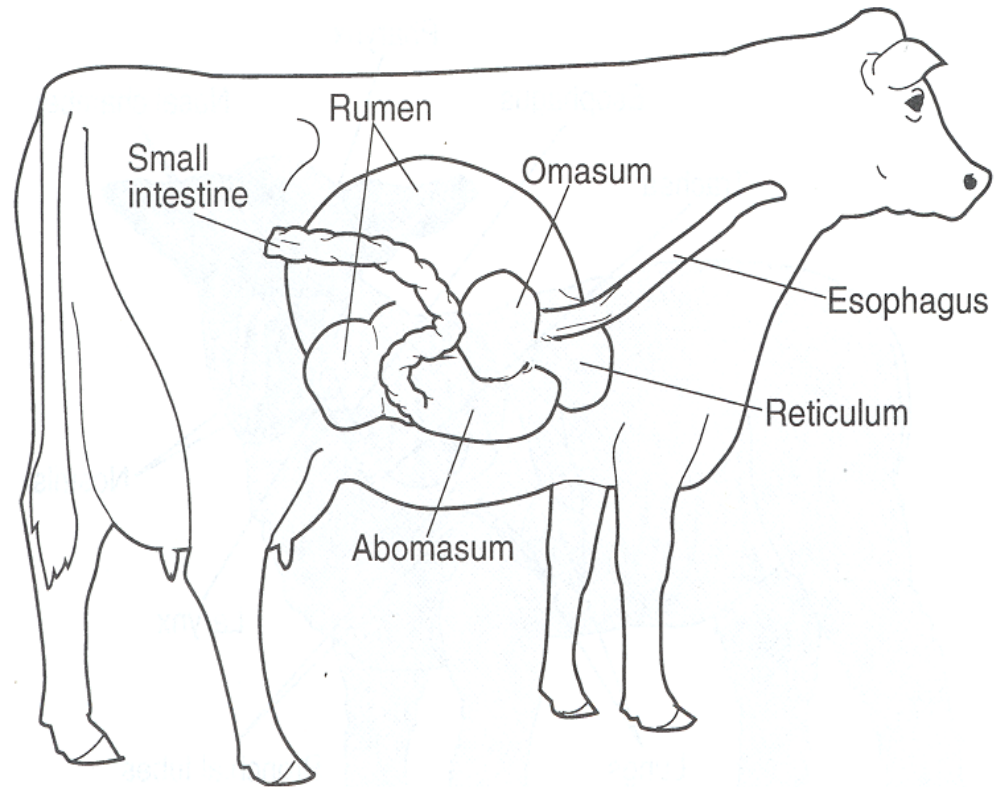
- Ruminant System
 - Multi compartment (4 main)
 - Breaks down the polysaccharides
 - They chew their (CUD)

Digestive System

- Ruminant System

- Mouth

- Food is ground down by teeth
- Also used to bring down the cud.



Digestive System

- Ruminant System
 - Teeth
 - Incisors – Lower front teeth
 - Dental pad – Upper part of mouth
 - Molars
 - Used to tear forages from ground

Digestive System

- Ruminant System
 - Must produce large amounts of saliva
 - Used to feed microorganisms in the rumen

Digestive System

- Ruminant System
 - Esophagus
 - Transport food to digestive tract
 - Transport CUD to mouth.

