

# Unit A

## Basic Principles of Animal Husbandry

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### **Lesson 2**

Determining the Anatomy  
and Physiology of Animals

# Terms

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- Anatomy
  - Animal well-being
  - Cell
  - Cell specialization
  - Circulatory system
  - Digestion
  - Digestive system
  - Excretion
  - Excretory system
  - Gross anatomy
  - Integumentary system
  - Lymph
  - Lymphatic system
  - Mammal
  - Mammary system
  - Microscopic anatomy
  - Muscular system
  - Nervous system
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# What is the meaning of anatomy and physiology?

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- Animals are complex organisms with systems and processes that allow them to carry out activities to remain in the living condition.
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# Anatomy

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- Anatomy is the study of the form, shape, and appearance of an animal.
  - Since mammals are among the most common animals, most of the information on anatomy will focus on these animals.
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# Two Types of Anatomy

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- Gross anatomy deals with the features that can be seen with the unaided eye.
  - Examples include feet, horns, tails, tongues, and teeth.
- Microscopic anatomy deals with the features that can only be seen with magnification.
  - Examples include cells and sperm.

# Physiology

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- Physiology is the study of the functions of the cells, tissues, organs, and organ systems of the living organism.
  - Physiology includes relationships among functions by different systems of an organism, such as secretion to digestion.
  - Diseases can cause the systems to fail to work properly.

# Cell Specialization

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Cells are the building blocks of organisms.

- A cell is the basic structure of life.
- Cells have important structures that allow them to function.
- Protoplasm within a cell carries out important chemical activities.
- Multi-cellular organisms have many cells.
- These cells form specialized systems to carry out life processes.

# Cell Specialization

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- Cell specialization is different in each cell in order to perform unique activities for an organism.
  - Organisms could not exist if all cells were alike.
    - A tissue is a group of cells that is alike in activity and structure.
    - The functions tend to be specialized such as those in muscles or bones.
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# Cell Specialization

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- An organ is a group of tissues that work together to perform specific functions.
  - Each tissue job varies, but by working together the organ carries out its function.
  - Examples of organs include the heart, lungs, and liver.
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# Cell Specialization

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- An organ system is a collection of several organs that work together to perform an activity.
- Two examples are the respiratory system and digestive system.

# Why is cell specialization important?

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- Cell specialization is important because it makes multi-cellular organisms possible
    - Without specialization, all cells would be alike.
    - Tissues, organs, and organ systems would not exist.
    - Life processes in multi-cellular organisms would not occur.
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# What is the importance of anatomy and physiology in animal production?

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- People who care for animals need to understand the fundamentals of anatomy and physiology.

# What is the importance of anatomy and physiology in animal production?

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- Practicing the correct nature of anatomy and physiology of an organism promotes animal well-being.
  - Animal well-being is caring for animals so that their needs are met and they do not suffer.
  - Conditions for raising and keeping animals must be considered for their well-being.
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# What is the importance of anatomy and physiology in animal production?

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- Species have different environmental requirements.
  - Animal producers are more effective in meeting these requirements when they know the unique anatomy and physiology of a species.
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# What is the importance of anatomy and physiology in animal production?

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- For example, some breeds of cattle are more resistant to extreme temperatures than others.
- Producing a breed outside its preferred temperature range means that steps need to be taken to provide shade to protect from the heat or housing to protect from the cold.

# What is the importance of anatomy and physiology in animal production?

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These cattle have adapted to the climate we live in.

# What is the importance of anatomy and physiology in animal production?

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- The design of facilities can accommodate the unique anatomy needs of organisms.
  - The size, shape, and form influences facility arrangement and design.
    - For example, keeping dairy cattle housing clean requires a way to handle animal wastes, including feces and urine.
    - Facility design can help collect and remove wastes from the area.
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# What is the importance of anatomy and physiology in animal production?

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- Young animals require different care than older animals.
- Feed for young animals should be appropriate to its digestive system and nutrient needs.
  - For example, young animals typically require feed with a higher percentage of protein than older animals.

# What is the importance of anatomy and physiology in animal production?

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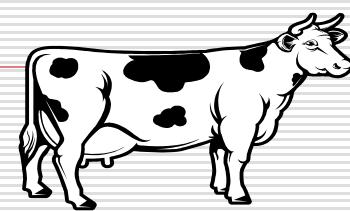
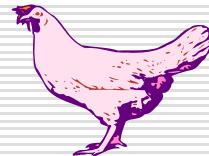
- Animal productivity is based on animal capacity.
- Meat animals are required to have muscling in areas that are used to make the higher-priced cuts.
  - Examples include the loin and leg of sheep.



# What is the importance of anatomy and physiology in animal production?

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- Dairy animals need to have the capacity for high milk production.
  - For example, a dairy cow needs a well-developed mammary system.
- Animals used for other products are required to have the capacity to produce those products, including egg-laying capacity of chickens and wool quality of sheep.



# What is the importance of anatomy and physiology in animal production?

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- Knowing how animals reproduce helps a producer provide conditions that promote reproduction.

# What are mammals?

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- A mammal is a vertebrate animal that is usually covered with hair.
  - The females give birth to live young and secrete milk as food for their babies.
    - Cattle, hogs, sheep, horses, dogs, cats, and many other common animals are mammals.
    - Each mammal species has unique organ systems that promote the life processes of the species.
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# The organ systems of mammals?

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- Mammal species are said to have eleven organ systems.
  - Some variation may exist, with the greatest being the presence of mammary glands on females.
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# Organ Systems and Structures

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## ORGAN SYSTEMS AND STRUCTURES

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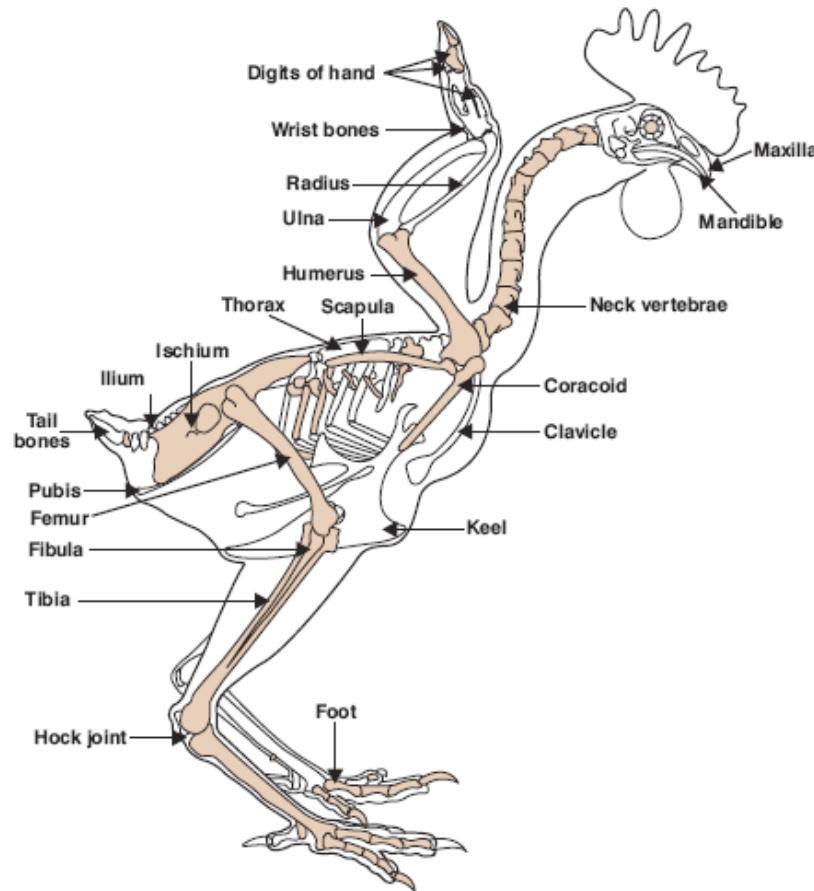
System	Chief Structures
Circulatory	Heart
Digestive	Stomach and intestines
Integumentary	Skin
Endocrine	Ductless glands
Excretory	Kidneys and bladder
Muscular	Muscles
Nervous	Brain, spinal cord, nerves
Reproductive	Ovaries and testes
Respiratory	Lungs
Skeletal	Bones, joints

# Skeletal System

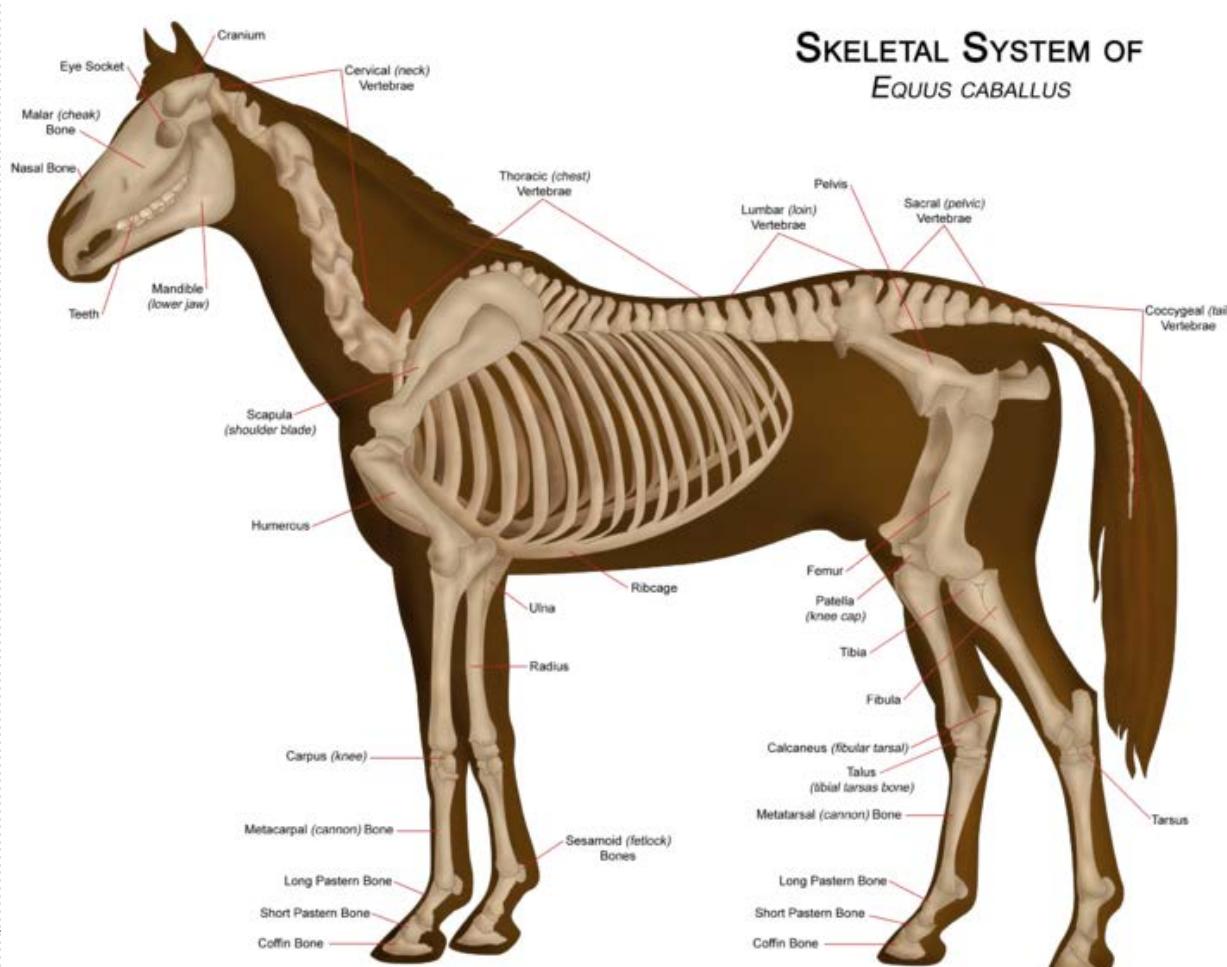
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- The skeletal system is the framework that gives shape to the body.
  - The skeleton is comprised of bones and cartilage.
  - The skeletal system protects the delicate internal organs and makes locomotion possible.
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# Skeletal System of Chicken

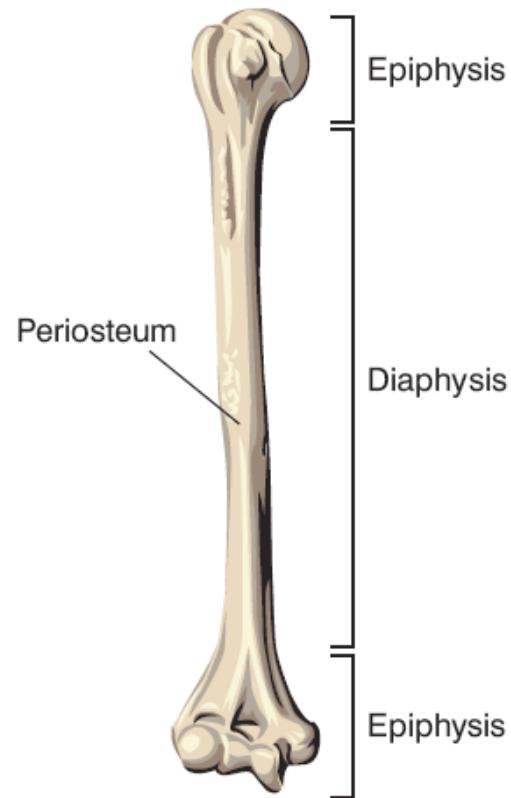


# Skeletal System of Horse



# Skeletal System

## STRUCTURE OF A TYPICAL LONG BONE



# Muscular System

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- The muscular system is the system that makes movement and locomotion possible.
  - Muscles form nearly half the weight of many animals such as hogs and cattle.
  - Without muscles, other organ systems would not function such as the respiratory and circulatory systems.
  - Locomotion would not be possible.

# Nervous System

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- The nervous system is the system that coordinates body activity.
  - It receives and responds to stimuli.
  - It controls activity, learning, and memory.
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# Circulatory System

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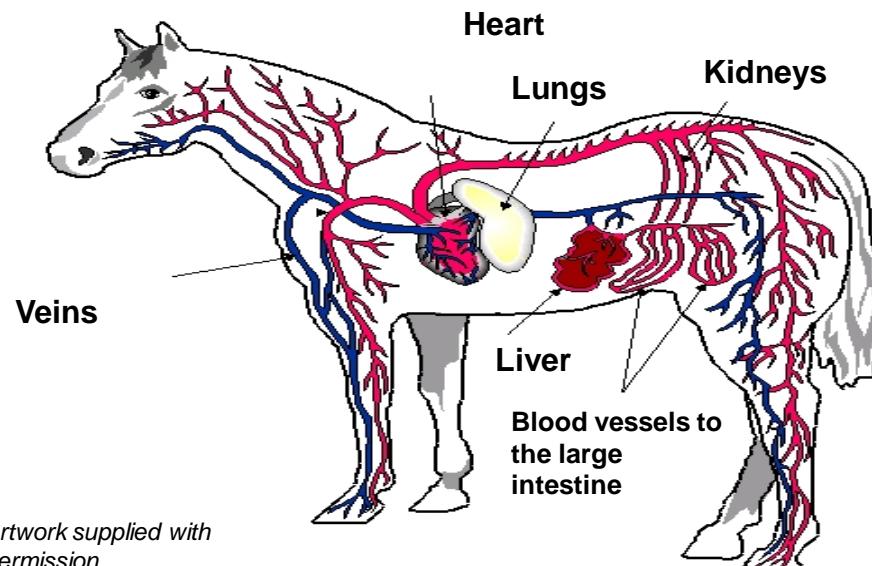
- The circulatory system is the system that moves blood, digested food, oxygen, wastes, and other materials around the body of an organism.

# Circulatory System

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- It includes the organs that move the blood.
  - The heart moves the blood throughout the body.
  - It goes by the lungs to gain oxygen and give off carbon dioxide acquired from cell respiration.
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# Circulatory System of a Horse



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# Respiratory System

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- The respiratory system is the system that moves gases to and from the circulatory system.
  - The purpose is to provide the blood with oxygen and remove carbon dioxide from the blood.

# Excretory System

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- The excretory system is the system that rids the body of wastes from cell activity
  - known as metabolic wastes
- The process of ridding the body of these wastes is known as excretion.

# Excretory System

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- Though associated with the elimination of undigested food, the excretory system is not the digestive system.
  - The major products excreted are carbon dioxide, water, and nitrogen compounds.
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# Digestive System

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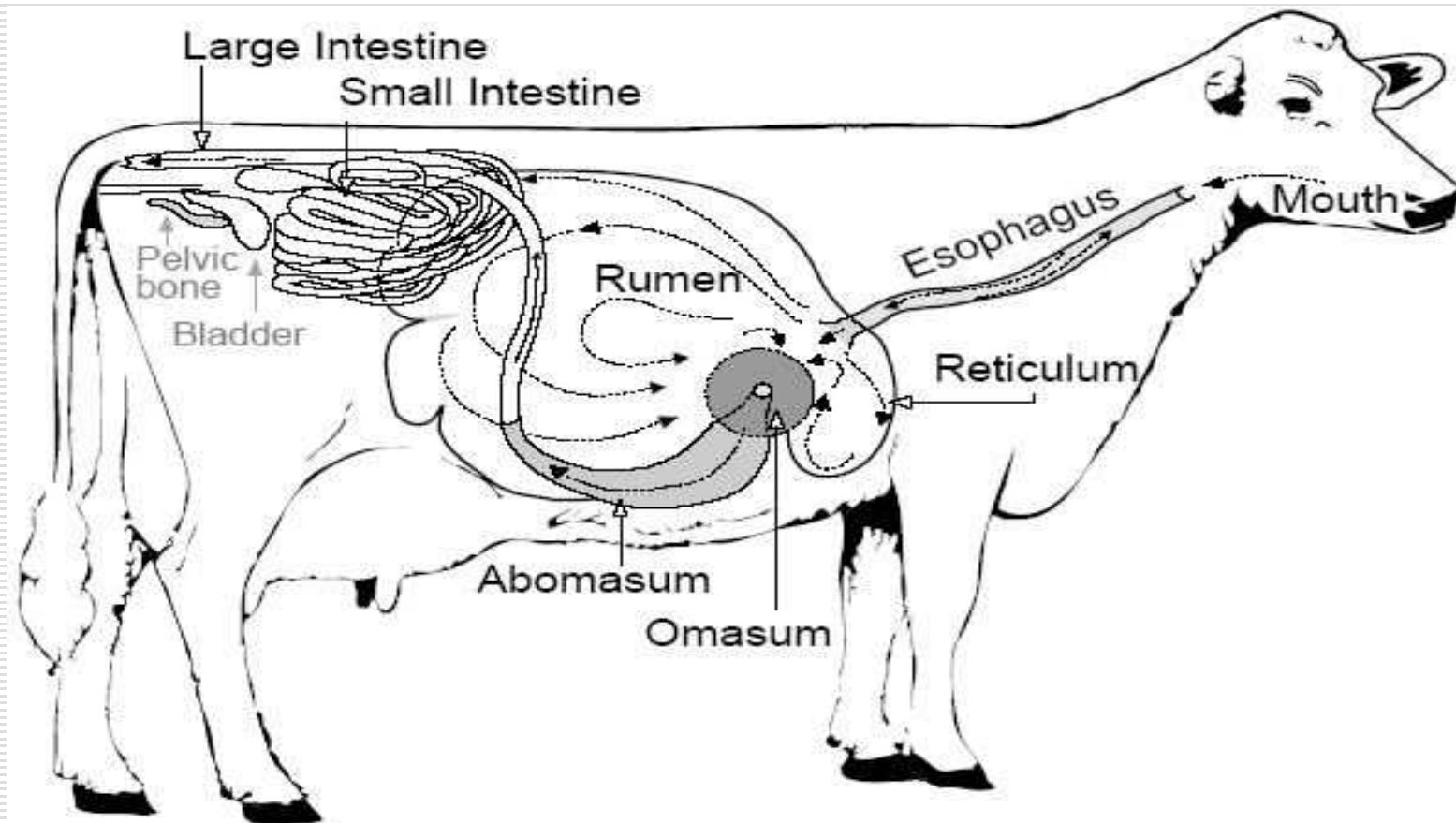
- The digestive system is the system that prepares food for use by the body.
  - Digestion is the process of breaking down food materials into molecules that the body can absorb.
  - The system varies depending on the species of organism.

# Digestive System

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- Some organisms, such as cattle, have digestive systems that will handle considerable roughage.
- Other organisms have simple stomachs that require food with higher percentages of protein and digestible materials.

# Digestive System



# Lymphatic System

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- The lymphatic system is the system that produces and circulates lymph throughout the body.
  - Lymph is a clear fluid that aids in circulation, excretion, and other body functions.
  - It also helps protect the body from disease.

# Integumentary System

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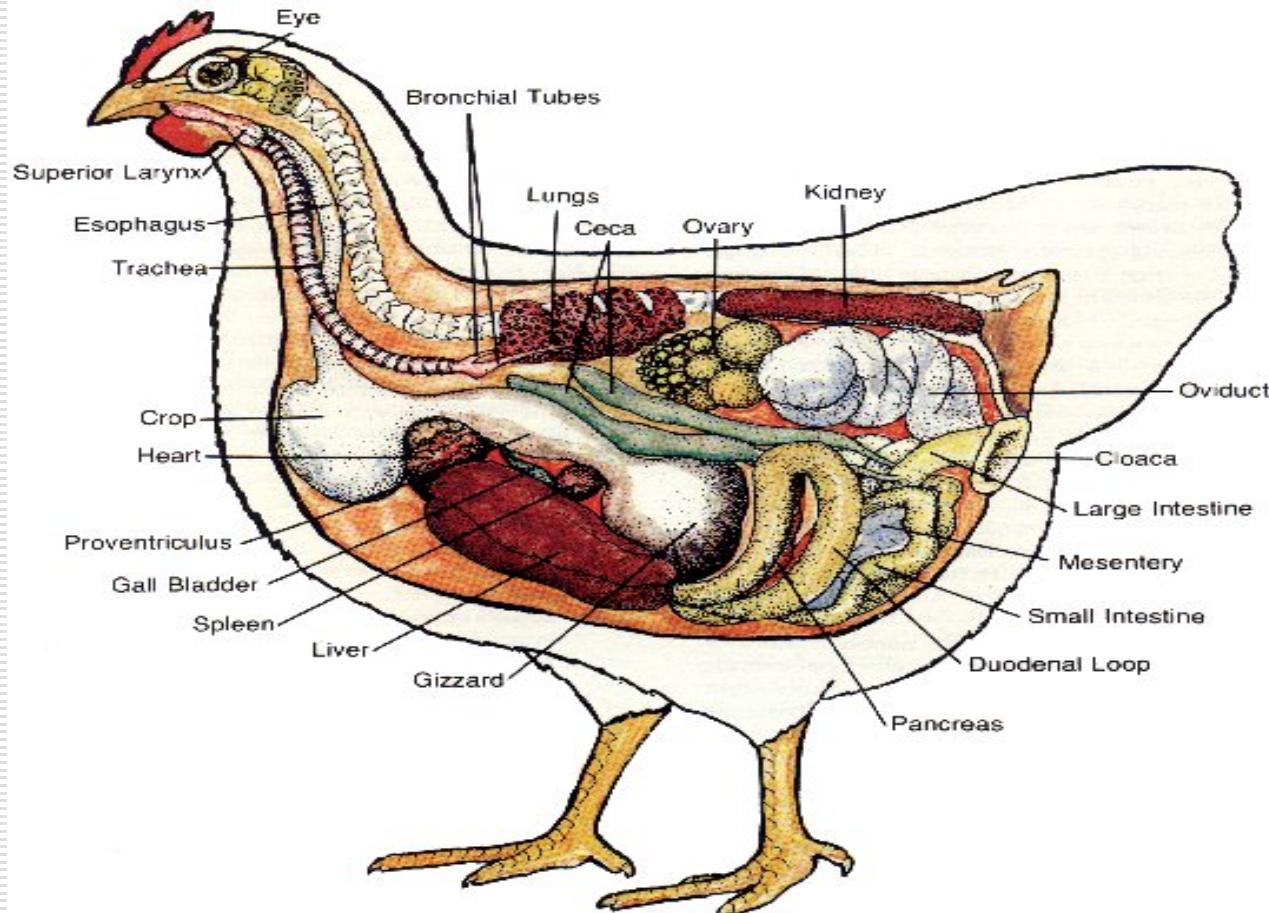
- The integumentary system is the skin and outer covering of the body of an organism.
  - It protects the internal organs, helps regulate temperature, and gives shape to the body.
  - The integumentary system keeps disease pathogens away from the internal organs.
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# Reproductive System

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- The reproductive system is the system that produces offspring and continues the existence of a species.
  - The system varies by gender (male and female).

# Reproductive System



# Mammary System

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- The mammary system is the system in female mammals that secretes milk as food for their babies.
  - Male mammals have undeveloped mammary systems

# The organ systems of animals?

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- Most animals tend to have the same organ systems except that mammals have mammary systems that are not found in non-mammals.

# Parts of the organ systems

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- The parts of the organ systems have been identified and studied by scientists in anatomy and physiology.
  - Drawings have been made that show the location and structure of the major parts of organ systems.
  - These were prepared by scientists who have studied the anatomy of animals in great detail.
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# Review/Summary

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- What is the meaning of anatomy and physiology?
- Explain the role of cell specialization in organisms.
- How is anatomy and physiology important in animal production?
- What are the organ systems of mammals and describe the functions, major parts, and locations of each?