

SUBJECT: AGRICULTURAL SCIENCE

WEEK: WEEK 4

CLASS: SS2

TOPIC: ANATOMY AND PHYSIOLOGY OF FARM ANIMALS

TERM: 3RD TERM

Anatomy is a branch of science that deals with the study of the form and structure of the body, while physiology is another branch that deals with the study of the functions of the various parts of the body. Animal anatomy is however the aspect of agriculture that deals with the study of the form and structures of the various parts of the body of farm animals, while animal physiology is the aspect of agriculture that studies the functions of the various parts of the body of farm animals.

Major parts of farm animals are:

1. Head: The head is the upper part of the body of a farm animal. The major organs found in the head region include, the brain, eye, ear, tongue, nose etc.
2. Thoracic cavity: The thoracic cavity refers to the thoracic region of the body of a farm animal. The major organ in the thoracic cavity includes the heart, lung, trachea etc.
3. Abdominal cavity: The abdominal cavity refers to the stomach region of the body. The major organs in abdominal cavity of a farm animal includes liver, uterus, stomach, oviducts, or fallopian tube, kidney, ovary, spleen, intestine, gall bladder, pancreas.
4. Limbs: The limbs includes the fore limbs(hand) and hind limbs(leg) they are used by farm animals for walking, running, jumping, holding etc.

The essential organs which make up the different system are:

1. DIGESTIVE SYSTEM

This is the process by which insoluble food substances are broken down into simple soluble and absorbable compounds. It occurs within the alimentary canal which consists of the mouth, oesophagus, stomach, duodenum, ileum, colon and the anus.

Farm animals are grouped into two main classes based on the nature of their alimentary canal or digestive tract. These are non-ruminant (monogastric) and ruminant animals (polygastric).

Monogastric or non-ruminant

These are animals with only one single stomach chamber. They do not ruminate. Examples of non-ruminant animals are rabbit, pig and poultry etc.

DIGESTION IN BIRDS: Birds are monogastric animals with simple stomach. Birds' digestion is slightly different from that observed in rabbits and pigs. Their alimentary canal consists of the mouth, esophagus, crop, proventriculus, gizzard, duodenum, ileum, colon, caecum and the anus.

COMPONENT OF BIRD ALIMENTARY CANAL

MOUTH: The bird has no teeth. It has a beak which it uses to pick up grains and swallow it with the aid of its tongue.

CROP: This is a sack-like structure which is used temporarily for the storage of food. Certain bacteria are present here and help in fermenting and moistening the food swallowed.

PROVENTRICULUS: This is the first part of the stomach. Here, the gastric juice containing an enzyme called pepsin which acts on protein and convert it into peptones is found.

GIZZARD: This acts as the teeth of birds and helps in the mastication and churning up of food substances. The gizzard is a tough, thick and muscular organ which contains pebbles or stones swallowed by birds.

CAECUM: This region harbours micro-organisms which help in breaking some cellulose into glucose.

CLOACA: This is a passage part for egestion of waste products. Birds do not urinate. Therefore their faeces are passed out with urine through the vent in the cloaca.

DIGESTION IN RUMINANT ANIMAL

Ruminants have the capacity to digest cellulose and their stomach is divided into four components or a chamber which includes rumen, reticulum, omasum, and abomasum.

DIGESTIVE SYSTEM OF RUMINANT ANIMAL

MOUTH: It consists of the teeth, tongue, and salivary gland. When a ruminant animal is feeding, it gathers a small quantity of grass with its tongue, grips it firmly in its mouth with the upper jaw and the teeth of the lower jaw. It then jerks its head, pulls off the grass, passes through the oesophagus and enters the first stomach or rumen.

RUMEN: This is the first stomach where digestion of cellulose by bacteria takes place. The bacteria act on the grasses and convert them into starch. The animal also stores a lot of undigested grass in this compartment when allowed to feed for a long time.

RETICULUM: When a ruminant animal has finished filling the rumen, it often lies down quietly. By anti-peristaltic movement of the stomach, the undigested grass or cud passes from the rumen to the reticulum from where it re-enters the oesophagus and finally to the mouth. The animal then chews the cud, sufficiently breaking it down.

OMASUM: This is also known as a place where the food stores for some time and later moves into the last or the fourth chamber, the abomasum.

ABOMASUM: In the abomasum, gastric juice is secreted into the semi-digested food called chyme. The gastric juice contains pepsin and rennin. Pepsin acts on protein and converts it to peptone while rennin curdles milk protein by converting casein into caseinogens. The chyme now moves to the duodenum.

INTESTINE: The intestine comprises the duodenum, ileum, and colon (large intestine).

- (a) **Duodenum:** this is the first part of the small intestine. It has u-shape. The duodenum receives the juice from the liver and pancreas. The liver secretes bile juice which helps in emulsifying fats; it converts fats into fat globules.
- (b) **ILEUM:** (small intestine): It is the longest part of digestive system. it is called the small intestine. The wall of the small intestine secretes many enzymes which complete the process of digestion.
- (c) **COLON OR LARGE INTESTINE:** This is where undigested food, dead cells, dead bacteria, surplus bile are passed out in animals as faeces through the anus.

DIFFERENCES BETWEEN MONOGASTRIC AND POLYGASTRIC ANIMALS

MONOGASTRIC OR NON-RUMINANT	POLYGASTRIC OR RUMINANT
1. Have only one simple stomach chamber	Have complex four chambered stomach
2. feed mostly on concentrates	Consume mostly roughages like grasses and legumes
3. they cannot digest cellulose because the necessary chambers are absent	They can digest cellulose because of the presence of necessary microbes
4. they have rumen	They have rumen
5. they do not chew cud	They chew the cud

NERVOUS SYSTEM

This is the ability that concerned with the ability of the animals to respond to stimuli or changes in their environment. The nervous system includes all the organs and tissues which enable animals to respond to changes in their environment.

The nervous system is of two parts:

The central nervous system

The peripheral nervous system

The central nervous system consists of the brain and spinal cord. Most of the cell bodies lie in the central nervous system since all impulses from and to the body pass through it. the brain is enclosed in a bony cage called cranium, the brain is divided into three :fore brain, mid brain and hind brain.

The fore brain: it consist the olfactory lobe, and the cerebrum. The olfactory lobe is responsible for smelling, the cerebrum is responsible for intelligence, memory, imagination, voluntary actions etc.

The mid brain: it consist the optic lobe and is responsible for sight.

The hind brain: it consist the cerebellum, pons varolli, and medulla oblongata. The cerebellum is responsible for body equilibrium and muscular control, the pons varolli helps to receive impulses from the mid brain into the hind brain and back, while the medulla oblongata is responsible for simple reflex actions like sneezing, coughing, digestive tract movement etc.

The spinal cord: this begins from the end of the medulla oblongata, passing through the vertebra column and ends at the caudal vertebra.

THE PERIPHERAL NERVOUS SYSTEM

The peripheral nervous system consists of cranial and spinal nerves and the automatic nervous system.

The cranial and spinal nerves of the peripheral nervous system together with the central nervous system mediate relations between the animals and its external environment.

TYPES OF NEURONS

1. Sensory or afferent neurons: they are attached to the sense organs like eyes, ears, skin, nose and tongue. They carry impulses from the receptor such as the sense organs to the central nervous system.
2. Motor or efferent neurons: they are attached to the muscle fibres and glands. They carry impulses from the central nervous system to effectors such as muscles and glands in the body of farm animals.
3. The intermediate or relay neurons: they are attached to the brain and spinal cord. They receive, transmit and interpret messages in the spinal cord and brain

REFLEX ACTION OR INVOLUNTARY ACTIONS

These are actions carried out by the animals in response to certain stimuli without first thinking or planning them. They are not control of brain. They are quick, automatic response and entirely stereotype in nature. Examples are:

1. Blinking of the eyes.
2. Heart beat
3. Sneezing
4. Sudden removal of hands, legs or skin from hot object.

VOLUNTARY ACTIONS

This involves the main portion of the central nervous system the brain. They comprise the reflex arc structures including the ascending and descending fibres of the spinal cord and conscious area of the brain.

GENERAL FUNCTIONS OF THE NERVOUS SYSTEM

- I. It coordinates body functions

- II. It is responsible for enabling locomotion or movement
- III. It enables the body to respond to external stimuli.