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**BASIC ENTERPRENEURAL SKILLS FOR SENIOR SCEONDARY SCHOOLS 1**

**ANIMAL HUSBANDRY**

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**DEDICATION**

This book is dedicated to my children: Diamaka, Muna and Negwundo. For their patience and moral supports.

**ACKMOWLEDGEMENTS**

I am highly indebted to Almighty God for his wisdom and inspiration into writing this book.

My sincere gratitude goes to my good friend Dr Mrs. Ngozi .L. Chime, Mrs. Iyiama Nkechi .A. (Nee Ifo) of Post Primary School Management Board (PPSMB) Enugu; Dr [Mrs.] Nwarieji, Felistas and Dr [Mrs.} Okafor, O.E both of Alvan Ikoku Federal College of Education, Owerri and Azunku, Francis .N of Ebonyi State College of Education Ikwo.

To you all God Bless.

**PREFACE**

The inclusion of Entrepreneurship subject among which is Animal Husbandry in Senior Secondary School curriculum is for the acquisition of basic skill for optimum performance in animal production. These basic skills are in line with the objectives of the Federal Government of Nigeria and the Nigerian Education Research and Development Council (NERDC) which are geared towards achieving the Millennium Development Goals (MDGS).

The curriculum of Animal Husbandry in the Entrepreneurship Education for Senior Secondary Schools reflects these objectives and it is to equip the students with saleable skills that will instill in them the right values, the right attitude and the right of independent thinking. These will not only make them responsible but skilled individuals capable of surviving in the world of work.

This Basic Entrepreneurial skills for Senior Secondary Schools 1 is written to cover those needed long life skills in animal production. This book is organized in chapters with the corresponding workbook for the teachers and students ‘activities.

This textural material is therefore recommended for students and other people who are in need of these saleable skills and or in search of knowledge for excellence in the SSCE Examinations.

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**CHAPTER ONE**

**INTRODUCTION**

Entrepreneurship Education is a skill acquisition education that is capable of guiding an entrepreneur (Person) into making profits through adding value to the scarce resources available. Entrepreneurship Education opens ways for acquisition of manipulative skills, creates jobs, opens up business activities and acts as an instrument that empowers youth to be in control of their vision in life. This type of education leads to a sustainable society or individual that could be useful or functional in the society. Some of the benefits of entrepreneurship education include:

1. It helps one to recognize his or her potential that could make him or her productive person in the society where he/she lives.
2. It helps an individual to resist failures and challenges in life.
3. It develops manipulative skills in individuals which makes him/her an acceptable person in the society.
4. It helps one to develop the skills necessary for pulling up resources, labor, materials and other resources to succeed in the challenging word of work.
5. It helps one to develop the skills of adding value to the existing materials/resources based on his/her initiatives.
6. It helps one to develop psychomotor, cognitive and affective skills in one’s life.

Animal Husbandry as an entrepreneurship subject is the scientific method of breeding, feeding, managing and keeping farm animals for agricultural purposes such as meat production, milk production, eggs production and for research purposes.

A farm animal is an animal that is fed, housed and maintained by a farmer. There are two types of animals and these are domestic animals and wild animals.

Domestic animals are animals that can be reared or live with man. Examples of domestic animals are Cow, Dog, Goat, Cat, Sheep, Horse, Pig, Rabbit, Fowl etc. Wild animals are those animals that live in natural conditions, and are not kept in the homes or in the farms. Examples are Tiger, Lion, Leopard, Cheetah, Snakes, Bear, Deer etc. These wild animals fend for themselves and are dangerous to man.

**CLASSIFICATION OF FARM ANIMALS**

Farm animals are classified based on their:

1. Reproductive System
2. Nutritional System
3. Size of Farm Animal
4. Types of Farm Animal
5. Habitat

**A. CLASSIFICATION BASED ON REPRODUCTIVE SYSTEM.**

Farm animals are classified on the basis of their reproductive system. For instance, some farm animals are called mammals while others are called Aves (non-mammals)

**Mammals:**

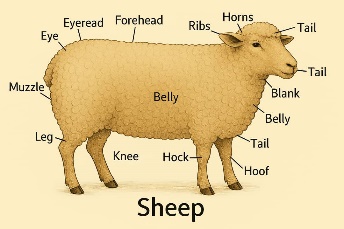
Mammals are those farm animals whose egg/ova are fertilized inside the female farm animal. The fertilized eggs/ova develop inside the womb of the female farm animal that carries the fertilized egg/ova (embryo) until it is fully developed. The period between the fertilization of the egg/ova and period of delivering is called pregnancy period. When the embryo is fully developed, it is delivered by the female animal of the same species. The delivering period is called Parturition period. The young farm animal is fed with milk from the female animal’s mammalian glands called breasts. Therefore, those farm animals whose young ones go through this process is called mammals.

Examples of mammals are Goats, Sheep, Pigs, Rabbits, Horses and Donkey etc.

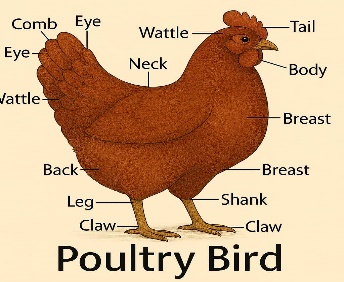
Fertilization

Development

Parturition



**Aves (Poultry Birds) Non-mammals**

The Aves (poultry Birds) or non-mammals are those farm animals that lay their fertilized eggs outside. The fertilized eggs are then hatched to produce animals of the same species. Examples are Fowl, Turkey, Goose, Duck, Guinea fowl etc. These group of farm animals are reared mainly for meat and egg production.

**B. CLASSIFICATION BASED ON NUTRITION**

Farm animals can be classified as:

1. Ruminant (Polygastric) Animals
2. Non-Ruminant (Monogastric) Animals

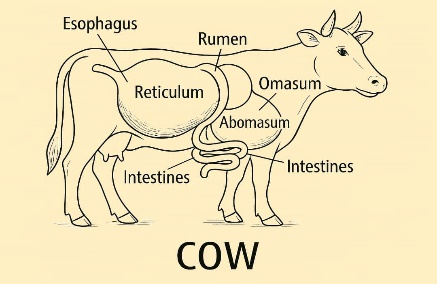
**The Ruminant (Polygastric) Animals**

Ruminant animals are those farm animals that chew their cud after eating the forages because these animals have complex stomach system.

The complex stomach has four apartments namely: Rumen, Reticulum, Omasum and Abomasum. The complex stomach helps this group of animals to feed mainly on forage/roughages. The feed stored is processed during chewing of the cud into digestible form in order to release more nutritional value and products.

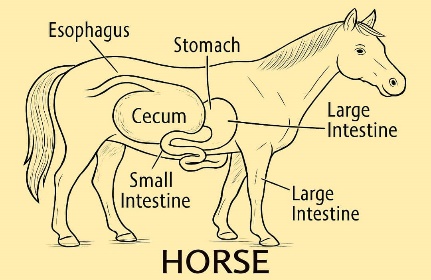
The ruminant animals have large stomach which helps them feed on large quantity of forage at a time and chew them later. The ruminants do not have upper incisors and canine type of teeth. The absence of these two sets of teeth helps them grind roughage/ forages for the extraction of needed nutrients.

**Digestive System of a Ruminant Animal**



**THE NON-RUMINANT (Monogastric) ANIMALS**

The non-ruminant (Monogastric) animals are those animals that have simple stomach or one stomach apartment. The nature of the simple stomach does not allow this group of animals to eat more forages, grasses or fibers as these animals cannot digest cellulose and fibers.

The simple stomach farm animals eat mainly cereal crops and the examples are: Fowl, Turkey, Goose, Guinea fowl, Duck, Pig, Rabbit, Horse, Donkey, Grass cutters, Bees etc.

**C. CLASSIFICATION BASED ON SIZE**

Farm animals are classified based on their sizes. There are macro-farm animals and micro-farm animals. The classification based on size helps the farmer determine the farm animal’s; Feed/Water intake, Products Expected, By-products Expected, Space/ Accommodation Needed, Waste Products Expected, Resource Allocation, etc.

**Feed/ Water Intake**

The size of the farm animal helps the farmer determine the amount of feed/water to be given to the farm animals. The macro farm animals need more water/ feed than the micro farm animal. The quantity of feed/ water intake must be maintained so as to enable the farm animals maintain 5% of their body weight per day as required.

**Animal Products Expected**

Macro farm animals produce more products than the micro farm animals. For example, the slaughtered macro farm animal will produce more carcass weight (meat). The live macro farm animals will equally produce more milk, fur, eggs etc. than the micro farm animals. The size of the farm animal also enables the farmer know the expectations of both the macro and micro farm animals.

**Animal By-Product Expected**

Farm animal by-products such as bones, hides and skin, blood, manure etc. are more from the macro farm animals because of their size and weight. The micro farm animals on the other hand produce these byproducts in smaller quantities when compared to that of the macro farm animals.

**Space/ Accommodation Needed**

The size of the farm animals helps the farmer to determine the space to be provided for the farm animals. This is because farm animals need enough space for feeding, exercising, parturition etc.

The macro farm animals will therefore need more space than the micro farm animals.

**Animal Waste Products Expected**

Animal waste product expected is correlated with the size of the animal. Waste products such as excretion, waste from slaughter houses, etc. are more in macro farm animals like cattle etc. than in small farm animals like rats and rabbits.

**Resource Allocation**

Resource allocation is the way available resources like energy, nutrients and time are distributed among different animals for proper maintenance, growth, production, and reproduction. The knowledge of the resources is important for maximizing productivity and animal well-being, and it is influenced by factors such as genetics, feeding regimes and rearing systems.

**Macro-Farm Animals**

The macro-farm animals are those farm animals that are big in size and are reared for agricultural purposes. Examples are Cattle, Sheep, Goat, Poultry birds, Pigs, Horses, Camels etc.

**Micro-Farm Animals**

The micro farm animals are those farm animals that are small in size and these are Snail, Bee, Rabbits, Grass cutter etc.

**SOME BASIC DIFFERENCES BETWEEN MACRO AND MICRO FARM ANIMALS**

1. The macro farm animals require large amount of money to rare them than the micro farm animal
2. The macro farm animals produce more waste products than the micro farm animals
3. The macro farm animals consume much feeds/ water than the micro farm animals.
4. The macro farm animals require much more space for accommodation than micro farm animals.
5. The macro farm animals yield more products than the micro farm animals.

**ECONOMIC IMPORTANCE OF FARM ANIMALS**

Farm animals are of economic importance and as such help the farmers to have enough for his/ her daily activities. Some of the economic importance of farm animals include:

1. Source of protein.
2. Provision of hides and skin.
3. Provision of farm power/ transport.
4. Provision of organic manure.
5. Provision of income.
6. Provision of foreign exchange.
7. Provision of employment opportunities.
8. For entertainment.
9. For companionship.

**Source of Protein**

Farm animals provide protein to both man and animals. The meat from farm animals contains amino acid which is needed for growth, repairing of worn-out tissues and psychological functioning of both man and animals. Eggs and milks from farm animals also give protein to man and animals.

**Hides and Skin**

Hide and skin are raw materials from farm animals. These raw materials are used for clothing and leather, for bags, shoes, drums (used in dancing), blanket etc.

**Farm Power/Transportation**

Some farm animals like horses, donkeys and bulls provide power or transportation to farmers. Some of them are used in drawing tillage operation equipment especially in the northern states of Nigeria.

**Organic Manure**

Wastes from farm animals provide good source of organic manure for plant nutrient and also help to maintain the soil structure. Farm animals therefore help to maintain the soil structure through their waste products.

**Income**

Farmers make money from the sale of the animals’ products like eggs from poultry birds, meat from cows (beef), Pigs (beacon), Sheep (mutton), Goat (chevon), etc.

**Foreign Exchange**

Some farm animal products are exported to some other countries like hides and skin. Farm animals like sheep are sold during the El-del Fitir or Kabiri festivals. The sale of these products and animals help the country to earn foreign exchange.

**Employment**

People engage in businesses connected to farm animals. For instance animal husbandry, Poultry production and other ruminant animal production businesses. These people may employ some people or are self-employed in these farm animal businesses. This helps to reduce the problem of unemployment and its consequences.

**Entertainment**

Some animals are kept for prestige, ceremonies or for other social activities. Examples horses

**Companionship**

There are animals reared for companionship because of their friendly nature. Examples are dogs, cats, parrots etc.

**CHAPTER TWO**

**PARTS, ORGANS AND THEIR FUNCTIONS IN FARM ANIMALS**

Farm animals are made up of different parts and organs and each part or organ functions differently. These parts and organs help farm animals to adapt to their surroundings and produce economic yield as expected. The Parts of the Farm Animals are: Head, Neck, Trunk (thorax and abdomen), Hind limb, fore limb, Tail.

**The Head**

The head of a farm animal is the part that is on the neck. It bears the eyes, nostrils, muzzle, forehead, poll, horns, mouth and the brain.

**The Neck**

The neck of the farm animal is the portion of their body that is between the head and the shoulder. The neck allows the passage of the trachea or the wind pipe, throat, esophagus and other organs used in swallowing or breathing.

**The Trunk**

The trunk is the main part of farm animal’s body apart from the head and limbs. This part of the body includes the reproductive organs, the stomach, the large and small intestines, the pancreas, the gall bladder, the rump/withers, back, loin and hip joint.

**The Hind limbs**

The hind limb is the part of the farm animal that starts from the back immediately after the trunk. It includes the Thigh, hock, rear flank, pin bone, rump, knee, shark, pastern, femur, patella and tibia.

**The Forelimbs**

The forelimbs or forelegs are the two front legs of farm animal. They are made up of hooves and claws.

**The Tail**

The tail is the part of the animal that sticks out from the back. The tail serves different functions for the animals such as: balancing, protection, communication and display feature for mating. Tails may be docked to prevent tail biting in pigs, flies in sheep, cleanliness in dairy cattle and other functions. Tail docking may also cause pains, discomfort, stress and reduce the animal’s ability to defend itself against attacks.

**ORGANS OF FARM ANIMALS**

These are groups of cells that form the different organs of the farm animals. Some of these organs are: the tongue, the lungs, the nose, the liver etc. When these organs come together, they form the different systems such as: Digestive System, Respiratory System, Nervous System, Circulatory System, Skeletal System, etc.

These systems have different functions that help the farm animal live and perform as expected.

**1. Digestive System**

The digestive system of the farm animal is a long pipe that starts from the mouth through the intestines to the anus. These organs help the digestive system to function properly and include: The Mouth, Tongue, Gullet (esophagus), Stomach, Intestine (Large and Small intestine), etc.

**The Mouth**

The mouth is the opening in the face of the farm animal with which the farm animals eat or drink water and it helps in the digestion of the feed/ food taken by the farm animal. Inside this organ are the lips, the teeth and the tongue.

The lips are the soft edges round the mouth with which the farm animals use to pick up grasses or food. Some farm animals have immovable lips like the cattle and the pigs while others have movable lips. The feeds fed to both the ruminant and non-ruminant animals are chewed and mixes up with the saliva which is produced by the salivary gland in the mouth.

The teeth are found in the lower and upper jaws. A tooth is divided into the crown, the neck and the root regions. Farm animals use the teeth to cut grasses with the help of the incisors.

The saliva contains ptyalin which helps to digest carbohydrates and converts the starch to maltose. The food is then swallowed down to the stomach where the alkaline in the saliva is neutralized by the hydrochloric acid secreted by the walls of the stomach. The hydrochloric acid helps to prevent decay of the feed/ food in the stomach.

**The Tongue**

The tongue is a soft tissue inside the mouth with which the farm animals use to pick feed and it has the taste buds.

**The Esophagus**

The esophagus is the long tube through which feed/ food passes down from the mouth to the stomach. The esophagus is also called the gullet and it allows the movement of the food by peristaltic movement which is the contraction and expansion movements which force the feeds/ foods down the stomach.

**The Stomach**

The stomach is the organ inside the body where the feeds/ food is pushed down into from the esophagus and it is where the digestion starts in farm animals. Some farm animals have simple stomach while others have complex stomach. The farm animals with simple stomach are called Monogastric or non-ruminant farm animals. Examples are poultry birds, pigs, rabbits etc. This group of animals do not digest fibrous feeds easily and should be fed with cereals. Farm animals with complex stomach are called Polygastric or ruminant animals and have four stomach chambers; rumen, reticulum, omasum and abomasum. Examples of these animals are the cattle, the sheep and the goats etc. These animals can be fed with grasses or fibrous feeds because they can digest them. There are enzymes produced in the stomach, renin and pepsin which helps to convert milk to casein and convert protein to peptones respectively. Through the active movements of the stomach walls, the feed/ food is chimed before moving down to the duodenum (small intestine).

**The Small and Large Intestines**

In the small intestine (duodenum) there are enzymes like amylase, maltase, sucrase, lipase, protease, lactase, pepsin. The amylase converts starch to maltose while trypsin converts protein and peptones to polypeptides. Lipase helps to convert fats and oil into fatty acid and glycerol.

In the large intestine, water and other electrolyte are reabsorbed and the indigestible substances are removed through the anus.

**DIGESTION IN NON-RUMINANT ANIMALS**

Non-ruminant animals are those animals that has one chamber (simple) stomach. Examples are pigs, poultry bird, rabbits, horse, grass cutters etc. The digestive system of the non-ruminants is different from the ruminant animals that have 4 chamber (complex) stomach. Feeds/ foods taken in by the non-ruminant animals is first chewed in the mouth, with the help of the teeth. The chewed feed/ food is mixed with saliva which is produced by the salivary gland behind the jaw. The saliva contains an enzyme called ptyalin which digests carbohydrates and converts starch to maltose. The food is then moved down to the stomach through the gullet (esophagus) with the peristaltic movement of the stomach. At the stomach, the hydrochloric acid helps to neutralize the alkaline of the saliva and secrets two enzymes example rennin which converts milk to casein and pepsin which covert protein to peptones. The chyme which is the properly mixed food is passed on to the duodenum (small intestine). The absorption/ digestion of food substances take place in the small intestine through the help of finger-like structure called villi. The undigested food materials are moved down to the large intestine where it stays for a while before it is passed outside the body through the anus.

**DIGESTION IN RUMINAT ANIMALS**

Ruminant animals are animals with four chamber (complex) stomach; rumen, reticulum, omasum, abomasum. The digestion in ruminant animals starts with chewing and swallowing of forages and fibers which is done with the help of the enzyme ptyalin in the mouth. These materials are swallowed down to the rumen, to the reticulum, to omasum and finally to the abomasum. This process involves regurgitating partially digested food for re-chewing which enhancing digestion. The chewed food is mixed with saliva in the mouth before swallowing it to the rumen and reticulum, where microbial fermentation begins, breaking down cellulose and other plant components into smaller, digestible forms. The solid parts of the food form a "cud," which is regurgitated back to the mouth for further chewing and mixing with saliva. This is to enhance digestion and the digested food passes into the omasum, where water is absorbed. The digested food enters the abomasum, the "true stomach" where digestive enzymes break down proteins and further digest the food. This digested food moves through the small intestine where the remaining nutrients are absorbed with the finger-like structure called villi to the large intestine where the waste products are eliminated through the anus.

**BASIC DIFFERENCES IN THE DIGESTIVE SYSTEM OF RUMINANT AND NON-RUMINANT ANIMALS**

|  |  |  |
| --- | --- | --- |
|  | NON-RUMINANT ANIMALS | RUMINANT ANIMALS |
| 1 | Non-ruminant animals have one chamber (simple) stomach | Ruminant animals have four chambers (complex) stomach |
| 2 | Non-Ruminant animals do not chew cud or ruminate | Ruminant animals chew their cud or ruminate |
| 3 | Non-ruminant animals cannot digest fiber or cellulose easily | Ruminant animals can digest cellulose or fiber |
| 4 | Non-ruminant animals feed mainly on basal or concentrates | Ruminant animals feed on grasses and legumes |
| 5 | Non-Ruminant animals do not regurgitate ingested food | Ruminant animals can regurgitate ingested food |

**2. Respiratory System**

Respiratory system is a system that is involved in the exchange of oxygen and carbon dioxide between an organism and its environment. The organs that are involved in respiration are lungs, nostrils, trachea, bronchi, alveolus, and diaphragm. The respiratory system helps to supply oxygen and remove carbon dioxide from the blood. It also helps to regulate the body temperature, extra cellular fluid, water level in the body etc. The respiratory system is divided into two main components; upper respiratory tract and lower respiratory tract.

The upper respiratory tract is made up of nose, pharynx, and larynx which are located outside the chest cavity. The lower respiratory tract consists of trachea, lungs, bronchial parts etc. which are found inside the chest cavity.

There are two types of respiration; Aerobic Respiration and Anaerobic Respiration.

**The Aerobic Respiration**

Aerobic respiration is a type of respiration that takes place in the presence of oxygen that helps to break down glucose with carbon dioxide, water and other form of energy like ATP. The aerobic respiration can be represented thus:

C6H12O6 +6O2  6CO2 + 6H2O + ATP

Where C6H12O6 = Glucose, O2 = Oxygen, CO2 = Carbon dioxide, H2O = Water, ATP (Energy)

**The Anaerobic Respiration**

Anaerobic respiration is the type of respiration that takes place in the absence of oxygen to breakdown the glucose into alcohol, carbon dioxide, water and ATP (energy). This type of respiration can be represented thus:

C6H12O6 2C2H5OH + 2CO2 + ATP

Where C6H12O6 = Glucose, C2H5OH = Alcohol, CO2 = Carbon dioxide, ATP = Energy

The gaseous exchange takes place in the alveoli when inhaled oxygen diffuses from the lungs to the blood stream and form oxyhemoglobin. The oxyhemoglobin is further oxidized to release energy for the body activities. The breathing out of the carbon dioxide is called exhalation and the percentage of oxygen and carbon dioxide exhaled/inhaled are as follows:

|  |  |
| --- | --- |
| % Inhaled | % Exhaled |
| Oxygen 21% | 16% |
| Carbon dioxide 0.03% | 4% |

**Organs of Respiration and their Functions**

1. **The lungs:** The lung is the main organ of the respiratory system. It is a large cone shaped structure that lies before the diaphragm in the thoracic region of the farm animals.

**Functions of the Lungs in Farm Animals**

1. The lungs help the oxygen to enter the red blood cells.
2. The lungs help the body to get rid of the CO2 (Carbon dioxide) gas.
3. The lungs help to change the pH of the blood by increasing or decreasing the amount of CO2 in the body.
4. The lungs help to filter out small blood clots and small gas bubbles that may occur in the blood stream.
5. The lungs help to convert chemicals in the blood called Angiotensin I to Angiotensin II and these chemicals help to control blood pressure.
6. The lungs help to receive deoxygenated blood (blood that has no oxygen) from the heart through the blood vessels (pulmonary arteries) and send it to the alveoli.
7. The lungs help to return the oxygenated blood (blood that has oxygen) to the heart through the pulmonary vein.
8. **The Nostrils**: The nostrils are two holes at the end of the nose that helps farm animals to breathe and to smell things around the environment.

**Functions of the Nostrils in Farm Animals**

1. The nostrils help to bring in air into the body.
2. Nostrils protect the nasal passage and other regions of the respiratory tract.
3. The nostrils filter out dust and other particles present in the air that the farm animals breathe.
4. **The Trachea:** The trachea (wind pipe) is located below the larynx. The trachea divides the loops of the bronchi which forms the smaller bronchioles.

**Functions of the Trachea in Farm Animals**

1. The trachea filters the air and pushes them into the bronchi.
2. The trachea allows air rich in oxygen into the body and carbon dioxide out of the body.
3. The trachea protects the lungs from microbes and other harmful substances by its sticky mucus.
4. The trachea helps the farm animals in swallowing food and other important substances.
5. The trachea warms or cools the air that enters or leaves the body (thermoregulation) helping the farm animal to maintain a normal body temperature.
6. The trachea connects the larynx to the bronchi and allows air into the thorax through the neck.
7. The trachea remains open for air because of the rings around it.
8. **The Bronchi:** The bronchi are two air tubes that break off from the trachea and carry atmospheric air directly into the lungs.

**Functions of the Bronchi in Farm Animals**

1. The bronchi break off from the trachea into each lung which helps to supply air to the lungs.
2. The smooth muscle tissue in the walls of the bronchi helps to regulate air flow into the lungs of the farm animals.
3. The smooth muscle fiber can contract during rest to prevent hyper ventilation.
4. The bronchi use the mucus and ciliated structures to trap in dust and other contaminated substances out of the lungs.
5. **The Alveolus:** The alveolus is the tiny air sac like structure found in the lungs.

**Functions of the Alveolus in Farm Animals**

1. The Alveolus helps in the gaseous exchange that takes place in the lungs.
2. Oxygen from the air passes from the alveoli into the capillaries.
3. Carbon dioxide is also passed out from the capillaries to the atmosphere through the alveoli.
4. **The Diaphragm**: The diaphragm is a dome shaped muscle found after the lungs. It separates the thoracic region and the abdomen.

**Functions of the Diaphragm in Farm Animals**

1. The diaphragm contracts when the farm animals breathe in air (inhale) and flattens out when the farm animals breathe out (exhale).
2. The movement of the diaphragm helps the lungs to increase and pull air into it or reduce the amount of space for the lungs and force air out.
3. **The Pharynx:** The pharynx is a muscular funnel from the posterior end of the nasal cavity to the anterior end of the esophagus. It is also known as the throat and is divided into nasopharynx, oropharynx and laryngopharynx.

**Functions of the Pharynx in Farm Animals**

1. The pharynx helps in swallowing food.
2. The pharynx helps in the movement of air from the nasal cavity through the epiglottis to the lungs of the farm animals. The epiglottis acts as the switch between the trachea and the esophagus.
3. **The Larynx**: The Larynx is the voice box of the farm animals and is located in the anterior portion of the neck. It is a short air way that connects laryngopharynx and the trachea.

**Functions of Larynx in Farm Animals**

1. It helps in swallowing through the epiglottis which covers it during swallowing
2. The thyroid found in the larynx protects the vocal folds of the animals
3. The larynx through its vocal fold helps the farm animals to produce their different sounds.

**3. Nervous System**

The nervous system is the part of the farm animal that helps it to feel pains, heat and control their movement. The nervous system coordinates the voluntary and involuntary activities and helps in the transmission of signals to different parts of the body.

There are two main parts of the nervous system namely: The Central Nervous System (CNS) and Peripheral Nervous System (PNS).

**A: The Central Nervous System (CNS)**

The central nervous system contains the brain and the spinal cord which connects other parts of the body, sends and receives signals from all the parts of the body.

1. **The Brain:** The brain is the main center of the nervous system and is located in the head. It is responsible for vision, Hearing, tasting and smelling.

**Functions of the Brain in Farm Animals**

1. The brain controls other organs of the body.
2. The brain directs the secretion of chemicals called hormones.
3. The brain coordinates responses or changes in the environment.
4. The brain interprets information.
5. **The Spinal Cord**: The spinal Cord is a long thin tube extending from the medullar oblongata in the brain stem to the lumber region of the vertebral column. The spinal cord begins at the occipital bone down to the lumber vertebrae.

**Functions of the Spinal Cord in Farm Animals**

1. The spinal cord transmits neural signals between the brain and other parts of the body.
2. The spinal cord controls reflexes through its neural circuits.
3. The spinal cord is the conduit for motor information.
4. The spinal cord is the conduit for sensory information.
5. The spinal cord is the center for coordinating certain reflexes.

**B: The Peripheral Nervous System (PNS)**

The peripheral nervous system (PNS) are nerves which are enclosed in a long fiber or axons. These fibers connect from the central nervous system to every part of the farm animals. The peripheral nervous system includes: motor neurons for voluntary movement, autonomic nervous system for regulation of involuntary functions, enteric nervous system which controls the gastrointestinal system in farm animals.

The nervous system has a special type of cell called the neuron or the nerve cell. These neurons have special structures that help them to send signals rapidly and at the needed cells. These signals are sent through a special wave line (electrochemical wave) called axons. The axons cause a chemical know as neurotransmitters to be released at junctions called synapse.

**Functions of the Peripheral Nervous System (PNS) in Farm Animals**

1. The peripheral nervous system collects information from the sensory receptors of the body and sends signals to the central nervous system.
2. The peripheral nervous system collects signals that are passed into the central nervous system which is used in making decisions at the gray matter of the brain and the spinal cord.
3. The peripheral nervous system passes information from the efferent neuron from the grey matter to the effector cells. The effector cells then release a hormone or send out signal for the movement of the body to respond to the stimulus.

**4. Circulatory System**

The circulatory system is the system in farm animals that is responsible for transporting nutrients, water, oxygen etc. to different parts of the body and carries away carbon dioxide from the body.

**Parts of the Circulatory System**

The circulatory system is divided into three major parts; the heart, the blood and the blood vessels.

1. **The Heart:** The heart is located at the center of the chest and it is responsible for the pumping of blood throughout the body. The heart is divided into the right auricles, left auricle, right ventricle and left ventricle.
2. **The Blood:** The blood is the red liquid substance that is pumped by the heart to all the parts of the body. It carries water, oxygen, nutrients and other waste products to and fro the body cells.
3. **The Blood Vessels**: The blood vessels are made up of red blood cells, white blood cells, platelets and plasma.

There are 3 types of blood vessels and these are; the arteries, the capillaries and the veins.

The arteries are the blood vessels that carry away blood from the heart to the other parts of the farm animal’s body. The blood in the arteries are rich in oxygen and are called oxygenated blood. The capillaries are those tiny blood vessels that connect the arteries to the veins. Capillaries help to carry out food substances.

The veins are the tiny pipes through which blood is carried back to the heart. The blood carried by the veins to the heart is deoxygenated blood except the pulmonary vein. The deoxygenated blood does not contain oxygen because the blood is coming from the other parts of the body.

The red blood cells allow the blood to carry oxygen from the lungs to the body and carbon dioxide out through the lungs when the animals breathe out.

The white blood cells (leucocytes) helps the body to fight off germs especially during infections and sicknesses. The white blood cells are produced by the lymphatic tissue and are of irregular shapes.

The blood also contains platelets (thrombocytes) which helps the body to stop bleeding whenever there is a cut or a broken blood vessels or blood leakage. The platelets are found in the red bone marrow of the animal and are tiny and non-nucleated.

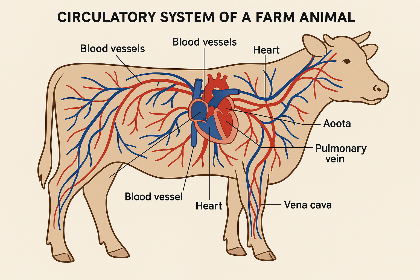
The blood also contain plasma which is made in the liver and it carries blood cells and other components throughout the body.

**Functions of the Blood in Farm Animals**

1. The blood helps to transport nutrients, water and oxygen to the body and removes waste (carbon dioxide) out of the body cells.
2. The blood helps to regulate the body temperature.
3. The blood carries away oxygen to the other parts of the body.
4. The blood help the white blood cells fights diseases and Germs.
5. The blood helps to transport other metabolic waste products like urea, water and salts to the kidney or to the skin.
6. The blood helps to carry hormones to the active sites in the body.
7. The blood protects the body against blood loss by clotting when there is a cut.

**DIFFERECES BETWEEN THE ARTERY AND THE VEIN**

|  |  |  |
| --- | --- | --- |
|  | **THE ARTERY** | **THE VEIN** |
| 1 | The artery carries blood from the heart to other parts of the body. | The vein carries blood from the other parts of the body to the heart |
| 2 | The artery carries oxygenated blood except pulmonary artery. | The vein carries deoxygenated blood except pulmonary vein |
| 3 | The artery has thick muscular walls. | The vein has thin, flexible walls. |
| 4 | Valves are not present in arteries | Valves are present in the veins to prevent back flow of blood. |
| 5 | In the arteries, blood moves under high pressure. | In the veins, blood moves with low pressure. |



**5. Skeletal System**

The skeletal system is the frame work of the body that consist of the bones, joints and other connective tissues. The skeletal system protects the internal organs, supports the tissues and provides attachment points for easy movements of the joint. The skeletal system consists of Axial skeleton and appendicular skeleton.

1. **The Axial Skeleton**: The axial skeleton runs along the vertebral column and consists of skull, hyoid, auditory ossicles, ribs, sternum and vertebral column.
2. **The Appendicular Skeleton:** The appendicular skeleton consists of the upper limb, lower limbs, the pelvic girdle and the pectoral girdle (shoulder). The pectoral girdle consists of the left and right clavicles and right scapulae. The pelvic girdle is formed by the left and right hips bones and it consists of the lower limb (leg) bones.

**The Skull:** The skull is made up of two types of bones Cranium and Facial bone. The bones of the skull fuse together to give the skull the strength and the protection. The Cranium is the superior portion of the skull and it helps protect the brain from damages and it includes; the interparietal bones, temporary bones, frontal bones, ethanoid bones and sphenoid bones.

The facial bones are the inferior and anterior portion of the skull and supports the eyes, the nose and the mouth and also the lacrimal, nasal, turbinate, hybrids, mandible etc.

**The Hypoid**: The hypoid is a small u-shaped bone found close to the mandible. It is a floating bone but helps to keep the trachea open and connects to the tongue muscles.

**The Auditory Ossicles**: The auditory ossicles are the smallest bone in the body of farm animals that helps to bring out sound from the ear drum to the inner ears.

**The Ribs**: The ribs are bones that come together with the sternum to form the ribcage of the thoracic region.

**The Vertebral Column:** The vertebral column is formed by the vertebrae bones and these include: cervical (neck) vertebrae, thoracic vertebrae, lumber (lower back) vertebrae, sacrum vertebrae, coccyx (tail bone).

The Vertebral column protects the spinal cord and differs in number according to the specie of the farm animals.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **C** | **T** | **L** | **S** | **Cd** |
| **Cattle** | 7 | 13 | 6 | 5 | 18 - 20 |
| **Poultry** | 14 | 7 | 14 | 6 | - |
| **Pig** | 7 | 15 | 7 | 4 | 20 – 23 |
| **Goat** | 7 | 13 | 7 | 4 | 12 |
| **Sheep** | 7 | 13 | 7 | 4 | 16 - 18 |

Where **C** = Number of Cervical Bones, **T** = Number of Thoracic Bones, **L** = Number of Lumbar Bones, **S** = Number of Sacral Bones, **Cd** = Number of Caudal Bones

**IMPORTANCE OF THE SKELETAL SYSTEM**

1. The skeletal system acts as the point of attachment for the muscles which help in movement.
2. The skeletal system protects the organs such as the brain and the heart.
3. The skeletal system supports the muscles and gives them their different shapes.
4. The bones of the skeletal system produce red and white blood cells (hematopoiesis). The red bone marrow is found in the medullary cavity of the bones.
5. The skeletal system stores different types of essential substances that help the body to grow and repair worn out tissues. The yellow bone marrow inside is used to store energy in the form of lipids while the red bone marrow helps to produce and store ion for hemoglobin in red blood cells.
6. Skeletal system gives shape and sizes to different farm animals.

**CHAPTER FIVE**

**MANAGEMENT PRACTICES IN LIVESTOCK PRODUCTION**

Management practices in livestock production are those activities that are carried out by the farmer to ensure that the animals are healthy and are producing at maximum production level. Some of the management practices for ruminant and non-ruminant animals are: Housing, Feeding, Proper Sanitation, Castration, Dehorning/ Disbudding, Tattooing, Ear Notching, De-Worming, Culling, Vaccination, Weaning, Colostrum Feeding, Insurance, Disposal of carcass, Record Maintenance etc.

**A. HOUSING**

The reason for housing the farm animals is to enable these animals produce profitably although there are other reasons such as to grow, to develop and to produce as expected.

**Conditions Necessary for Sitting a Livestock House**

1. **Water Supply**: There should be adequate supply of water for easy cleaning and washing of equipment in livestock houses. This helps to prevents diseases.
2. **Proper Drainage System**: The construction and designing of livestock houses should be such that there should be proper drainage system. Poor drainage causes moisture which increases the growth of some harmful bacteria, nematodes and some viral diseases. Livestock houses should therefore be constructed to ensure good drainage system.
3. **Clean Environment**: Livestock houses should be designed and constructed for easy cleaning and clearing of refuse in the houses/ pens. Floors and walls of the house could be cemented while the roofs should be with iron corrugated sheets. Windows should be constructed and covered with wire mesh and iron protectors to prevent thieves.
4. **Wind**: Farm animals should be protected from severe winds which could cause pneumonia or other diseases to young and old farm animals. Livestock houses/ pens should be constructed against the direction of the wind using a wind vane.
5. **Heat Regulator**: Most of the livestock are endotherms and maintain relatively constant internal body temperature. The heat and the moisture produced by these animals could be removed by good ventilation which helps to remove moisture produced.
6. **Humidity**: Some livestock do not have sweat glands, so all evaporated heat loss is from their respiratory tract (example the poultry bird). Therefore, low humidity in the air will cause irritation of the mucus membrane while very high humidity may promote growth of fungal infections. The relative humidity in livestock houses should be adequately maintained.

**Advantages of Livestock Houses/ Pens**

1. To protect farm animals from bad weather conditions.
2. To prevent farm animals from predators.
3. To facilitate easy management of the farm animals.
4. To prevent indiscriminate mating among the animals.
5. For proper utilization of feeds among animals.
6. For record keeping.

**B. FEEDING**

Feeding is the act of giving food(s) to livestock in order to help them meet up their metabolic activities and to carry out their activities. Some of the reasons for feeding livestock include: To supply energy to the livestock, for growth and development, to fight diseases and other harmful germs, for maximum production, etc.

**C. SANITATION**

Sanitation is the hygienic means of promoting healthy environment through prevention of human contact and proper disposal of sewage or waste water. Poor sanitation has some hazards which could either be physical, microbiological, and biological harbor of diseases. Some products such as waste, human and animal excreta, solid wastes, domestic waste water, industrial wastes and agricultural wastes could post a great threat to the animal health. Proper sanitation as a management practice in livestock production is needed to prevent disease infections and other pests from attacking the livestock.

**Ways of keeping Proper Sanitation:**

1. Culling off or separating the sick animals from the healthy ones.
2. Clearing of the environment and houses around using chemicals like pesticides to keep off pests from the surroundings.
3. Keeping foot dip in the front of the farm animal houses which should contain water and other disinfectants to prevent disease outbreak.
4. Cleaning of litter and the bedding regularly to prevent the growth of microorganisms.
5. Cleaning of equipment such as water troughs, feeding troughs, etc.
6. Dead animals/ carcass must be checked for and removed if found to prevent contamination and possible outbreak of diseases.

**D. CASTRATION**

Castration is a procedure of removing testicles of a male animal. Castration is done for the desired development of animal and to stop breeding in male animals. Castration when carried out makes the animal to grow faster and fatter than the uncastrated male animals.

**Advantages of Castration**

1. It helps the farmer to control breeding of his livestock.
2. Castrated animals grow faster
3. Castrated animals grow fatter
4. Castration helps to reduce odors in animals like pigs(boar)

**Disadvantages of Castration**

1. Castrated animals do not produce gametes for reproduction
2. Castrated animals may be wild or uncontrollable

**E. DEHORNING/ DISBUDDING**

Dehorning is the practice of removal the fully grown horns of animals while disbudding is the removal of horn producing cells of animals to prevent horn growth. Disbudding is done when the horns have not been attached to the skull and when the animals are still young. Dehorning/disbudding at any stage is usually painful.

**Methods of Dehorning/ Disbudding**

1. Use of hot iron cutlery to burn the horn producing tissue and cell around the horn bud
2. Sodium hydroxide base paste can be applied to the horn buds to destroy the cells
3. A scooping instrument can be used to physical remove the horn bud.
4. Proper timing around 8weeks for disbudding is usually accepted.
5. Use of local anesthesia to reduce pains.
6. Proper dehorning/ disbudding tools are necessary to ensure total removal and to reduce other complications.
7. Veterinary doctors or animal health agents should be consulted.

**Advantages of Dehorning/ Disbudding**

1. For easy control of the animals by the farmer
2. Animals with horns may be caught in fences which prevent them from feeding.
3. Dehorning reduces aggressiveness in animals.
4. It helps in transportation and handling of animals.
5. It reduces the risk of injuries to animals, farmers and farm families.
6. It reduces the cost of treatment of injuries cause by the horns.

**Disadvantages of Dehorning/ Disbudding**

1. It can cause injuries to the handlers or the animals.
2. Dehorning/ Disbudding may require skilled personnel
3. Dehorning/ Disbudding may require specialized equipment which may increase the cost of production
4. Injuries caused by Dehorning/ Disbudding may lead to blood loss or anemia or even infections at some cases
5. Dehorned/Disbudded animals may not be able to defend themselves in the case of fights among themselves.

**F. TATTOOING**

Tattooing is the act of making a permanent mark on the body of an animal. Tattooing as a management tool in livestock identification may be done at birth or when the animal has grown. Tattooing helps to keep accurate records in farm animal productions.

**Advantages of Tattooing**

1. It helps to establish ownership of livestock among the farmers.
2. It helps in differentiating animals for different purposes (breeding, meat animal or even for sale).
3. It helps in record keeping.
4. It is quicker than branding and requires less preparation and infrastructure.
5. The animal’s skin is not badly damaged as in branding.
6. It is legally acceptable.

**Disadvantages of Tattooing**

1. Animals with dark pigment may not be easily tattooed.
2. There are chances of infection as some instruments are used for more than one animal.

**G. EAR NOTCHING**

Ear notching is one of the simple or handy method of identifying animals even at a distance. Ear notching is the practice of removing V-shaped or U-shaped portions of the ear of the animals. This helps the farmer to keep accurate records of his stock. Ear notching is done using ear notching pair of pliers or sharp knives although knives do not give predicted results. In ear notching, no two animals will have the same combination of notches although other marking system may be used in combination with the ear notches.

**Advantages of Ear Notching**

1. Ear notching gives a permanent mark
2. Ear notching is relatively quick to carry out.
3. A large number of animals can be notched at a time.

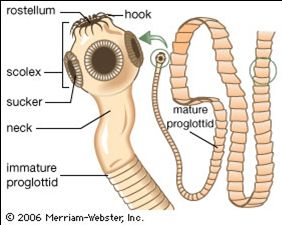
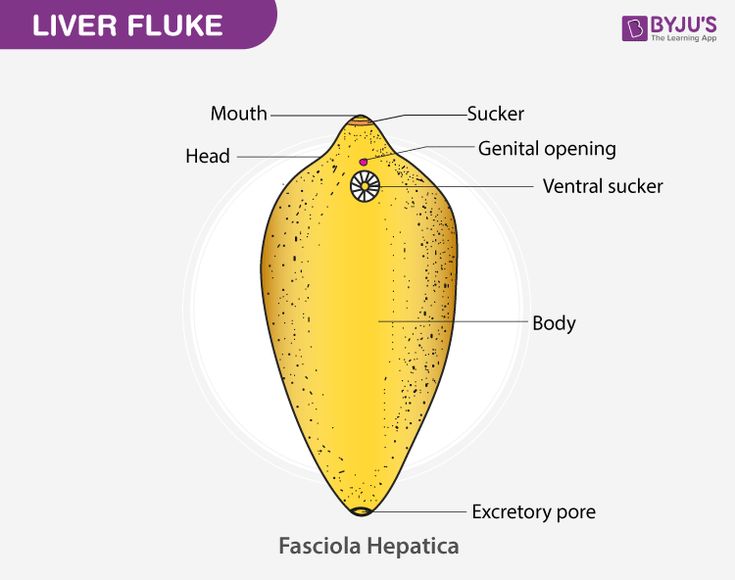
**Disadvantages of Ear Notching**

1. A large area of the ear could be removed.
2. Use of inexperienced personnel may lead to mismarking or misreading.
3. Stolen animals may be deliberately defaced causing more injuries.

**H. DEWORMING**

De-worming is the practice of using drugs to expel or to reduce endoparasites such as worms from worm infected animals. This is because worms cause weakness, anemia (loss of blood) and general body weakness in animals. Examples of the disease-causing worms are Tapeworm, Round worm, Liver fluke, Ring worm etc. Drugs/de-wormers should be given to the farm animals to kill-off these worms.

**Diagrams of Liver fluke, Roundworm and Tapeworm**

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**Advantages of De-worming in Livestock Production**

1. De-worming helps to reduce body weakness in farm animals.
2. De-worming helps to reduce mortality rates in young animals.
3. De-worming helps to prevent loss of weight in farm animals.
4. De-worming helps to prevent loos of blood (anemia).
5. De-worming helps to improve the animal health status.

**I. CULLING**

Culling is the elimination of animals with undesirable traits such as diseased animals, unproductive animals, animals with some deformities etc.

**Advantages of Culling in Livestock Production**

1. Culling helps to eliminate the undesirable traits in farm animals.
2. Culling helps to eliminate diseases in farm animals.
3. Culling helps to reduce pest infestation.
4. Culling helps to reduce unproductive animals.
5. Culling helps to reduce excess consumption/ waste of feeds.
6. Culling helps to reduce cannibalism among animals.
7. Culling helps to reduce over weight due to excess fat.
8. Culling helps to reduce extremely light body weight animals.

**J. VACCINATION**

Vaccination is the act of giving drugs or injections to farm animals to prevent them from contacting diseases such as Fowl pox, Newcastle disease, Anthrax, Mastitis, Cow pox, Foot rot, Warts, Coccidiosis etc. Farm animals should be vaccinated at the right time to enable them acquire immunity against these diseases and other infections.

**Advantages of Vaccination in Livestock Production**

1. Vaccination helps animals to develop immunity against diseases.
2. Vaccination helps to improve the health status of animals.

**K. WEANING**

Weaning is a practice of separating young farm animals from their mother in order to introduce the young animal to adult feeds. It also helps to reduce the mother’s stress in breastfeeding these young animals and health problems from the mother. The time and method of weaning depends on the specie of the animal, health conditions, developmental rate and the specific needs of the farmer.

**Advantages of Weaning in Livestock Production**

1. It enables the mother to regain the lost energy and to prepare for next breeding season.
2. It helps to manage the animals especially during the period of food scarcity/ drought.
3. As a gradual process, it allows the young farm animals to transmit from breast milk to solid food with less stress.
4. The introduction of the solid feed helps the young animals to meet the nutritional needs both before and after weaning.
5. It helps the young animals adapt to a new environment, new diet and new handlers.
6. It helps the mother to regain her body condition.
7. It improves the mother’s fertility by reducing the nutritional demand of lactation.

**L. COLOSTRUM FEEDING**

Colostrum feeding is the feeding of the young animals with the first milk produced by the mother after giving birth. Colostrum milk is rich in antibodies, essential nutrients, provides immunity and aid in development of digestive tract. It is crucial for newborn survival farm animals as it improves health and survival rate.

**Advantages of Colostrum Feeding in Livestock Production**

1. It contains antibodies that prevents infection of gastrointestinal tract till the young animals develop their own immune system.
2. It contains nutrients such as protein, carbohydrate, vitamins necessary for growth and development.
3. It helps in excretion of meconium (first stool) and thermoregulation that aids in the resistance of environmental pathogens.
4. It helps in the development and function of the neonatal digestive system.
5. It helps in future growth, production and reproduction abilities of young animals

**M. INSURANCE**

Insurance according Wikipedia is protection from financial loss… Livestock insurance provides financial protection to farmers through the covering of losses due to death of the animals by fire outbreak, disease outbreak, accidents and other natural disasters. The insurance enables the farmer to continue the farming activities.

**Advantages of Insurance in Livestock Production**

1. It provides compensation for losses thereby reducing financial burdens on farmers.
2. It helps the farmers to continue farming operations even after unexpected losses.
3. It gives farmers peace of mind as they are assured of the protection of their investments.

**N. DISPOSAL OF CARCASS**

A carcass according to Longman contemporary dictionary is the body of a dead animal. Carcass in animal husbandry is the body of a slaughtered animal intended for human consumption. The carcass of an animal may be prepared for meat, for market value and other confectionaries. Proper disposal of farm animal carcass is important to prevent disease outbreak and other environmental contaminations. Some common methods of carcass disposal include burial, incineration, rendering and compositing through any method adopted depending on the circumstances such as death, type of animals and local regulations.

**Methods of Carcass Disposal**

1. **Burial:** Disease carriers could be deep buried in a pit with 6ft deep away from water and other sensitive areas. A carcass can also be buried by simply constructing a mound over the carcass with soil.
2. **Incineration:** This is the use of high heat to destroy the carcass especially if the animal is infected with disease.
3. **Rendering:** This is the process of converting the carcass into valuable products like feed protein and other useful materials.
4. **Natural Decomposition:** This is the method of mixing the carcass with other organic materials for natural decomposition to occur.
5. **Burning:** Burning may be used though it is not effective in controlling diseases and as such poses threat to environmental risks and pollution.

**O. RECORD MAINTENANCE**

Record maintenance is crucial as it encompasses both production and financial aspects. Record maintenance helps in evaluating animals, designing breeding plans, tracking disease outbreaks, managing of herds for better profitability.

**Advantages of Record Maintenance in Livestock Production**

1. It helps in better breeding plans through animal histories and identification of desirable traits.
2. It helps in monitoring diseases outbreak, vaccination histories to prevent and control diseases.
3. It helps in decision making as it helps to track the animal’s characteristics, health, performance, culling, selection and plan matting.
4. It helps to keep track of income, expenses for better budgeting and other informed decisions about investments.
5. It helps to track production metrics such as: milk production, growth rates, feed consumption rates thereby identifying areas of improvement and optimization.
6. It helps to keep track of the pregnancy rates, calving/ birth rates and weight gain.
7. It helps to provide information on income from sales, expenses, medication and other inputs.

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