

COURSE GUIDE

ANP 407 ANIMAL HEALTH MANAGEMENT

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**COURSE
GUIDE**

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MODULE 1

Unit 1 Basic Livestock Hygienic/Sanitary Practices on the Farm

UNIT 1 BASIC LIVESTOCK HYGIENIC/SANITARY PRACTICES ON THE FARM**CONTENTS**

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1.0 INTRODUCTION

Hygienic/sanitary practices are those measures carried out on the farm which nullify the factors of health deterioration and create conditions to secure health for optimal performance of animals and consequently production of good quality yield/products. Various problems in practical implementation for prevention of diseases are due to the fact that the majority of livestock is managed by illiterate and ignorant persons who ignore the basic principles of hygiene and sanitation. Majority of causes for spread of diseases could be ascribed to improper sanitation which gives shelter to carriers of germs. Proper cleaning and sanitation removes most of germs and parasites along with dirt, thereby remaining germs are few in number and possibly in weakened condition so as to be harmless under ordinary conditions.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- discover various forms of sanitary measures employed on livestock farms
- identify common disinfectants and how to use them on farm premises.

3.0 MAIN CONTENT

To achieve good sanitation of farm premises the following general procedure should be adhered to:

1. Provision of adequate ventilation in pens and store rooms.
2. Ensure proper lighting on the farm premises.
3. Provision of adequate good drainage/sewage system for water wastes.
4. Proper cleaning of pens and barns.
5. Constant disinfection of floors and walls.

3.1 Sanitation of Different Apartments on Livestock Farm

Sanitation in calf pens:

Having observed all precautions to ensure a healthy calf at birth, the animal can best be raised by housing it in sanitary, dry, well-ventilated quarters with provisions of sunshine, fresh air, exercise and by feeding it to induce better growth and development.

Sanitation in stalls and other quarters

Cow stalls and other quarters should be thoroughly cleaned particularly where milking takes place. Plenty of bedding should be on the floor to minimise the danger of udder injuries when cow lies down. Barn must be kept dry and plenty of sunshine must be permitted to enter. It is quite desirable to practice good sanitation for care of milking utensils.

Sanitation in milking parlours

Cows to be milked must be arranged according to health of udders such as healthy, suspicious and infected groups and milked in this order to prevent infected cows from spreading diseases. Teats should be handled with dry hands to prevent cracking of skin.

NB: Sanitising agents are solution which will hold the number of bacteria below four bacteria/cm³ on the surface of utensils, milk containers or dairy equipment. In general, half the strength of a disinfectant is needed for sanitising purposes. Example: Disinfectant

consisting of quaternary ammonium compounds may be diluted with 60% water for sanitising purpose.

3.2 Conventionally Approved Concentration of the Active Ingredient in Some Sanitising Solutions

1. Hypochlorites and chlorinated TSP chlorine. Organic sources of chlorine solution	100-200 ppm of available chlorine.
2. Mixed halogen compounds (expressed as available chlorine)	25 ppm of available halogens.
3. Quaternary ammonium compounds	200 ppm of the cation.
4. Iodophors and atomic iodine	25 ppm of available chlorine.
5. Acid-wetting agent compounds sulphonic acid	200 ppm of dodecylbenzen.

3.3 Preventing Losses among Livestock from Infectious Diseases and Parasites

The following essential features of adequate sanitation are adopted in the living quarters to prevent unnecessary loss:

1. Proper ventilation without drafts and without accumulation of moisture on walls and ceiling.
2. Proper disposal of manure, feed wastes and other excreta twice daily and keeping manure pit covered with straw to prevent breeding place of flies.
3. Proper construction of smooth and wide enough gutter for holding accumulated dropping and with proper slope to facilitate drainage of liquid excreta.
4. Watering and feeding utensils so constructed that may be easily cleaned and thoroughly disinfected.
5. Good lighting programme through doors, windows, ventilation and artificial lights to facilitate proper cleaning and keeping floor dry.
6. Smooth inside walls with corners rounded to facilitate cleaning and disinfection.
7. Use of proper and clean bedding material (e.g. saw-dust, wheat bhusa, paddy straw etc.) and removed at least once daily.
8. Avoiding use of permanent pastures where internal parasites or their intermediate hosts are found.
9. Judicious use of such insecticides that have no adverse physiological effects on the animal body, e.g. marathion dust.
10. Adequate cleaning prior to effective disinfection.
11. Sweeping and scrubbing all feed racks, troughs and passages and disinfecting with lye solution.
12. Burning of all sweeping and scrapings.

13. Application of heavy coating of white-wash containing a reliable disinfectant to the floors, walls and partitions, mangers etc. (half kg of lime in one gallon of water + disinfectant).
14. In case of mud floor, a top of 12 to 15 cm soil is removed and replaced with clean soil.
15. Providing plenty of shade in hot weather.
16. Routine programme of deforming specially on pasture.
17. Judicious spraying for lice control.
18. Segregating the sick animals.
19. Protecting feed and water from being contaminated with sewage disposals.
20. Proper disposal of infected litter and carcass.
21. Proper cleaning and disinfection of calving pens.
22. Abundant supply of clean water with good pressure for easy and effective cleaning of milking parlors, etc.
23. Barns and stalls must be constructed with concrete metal stanchion which are easier to clean than wood.
24. Cleaning should be followed by the use of a disinfectant over all surfaces.

3.4 Use of Disinfectants in Livestock Sanitary Programs

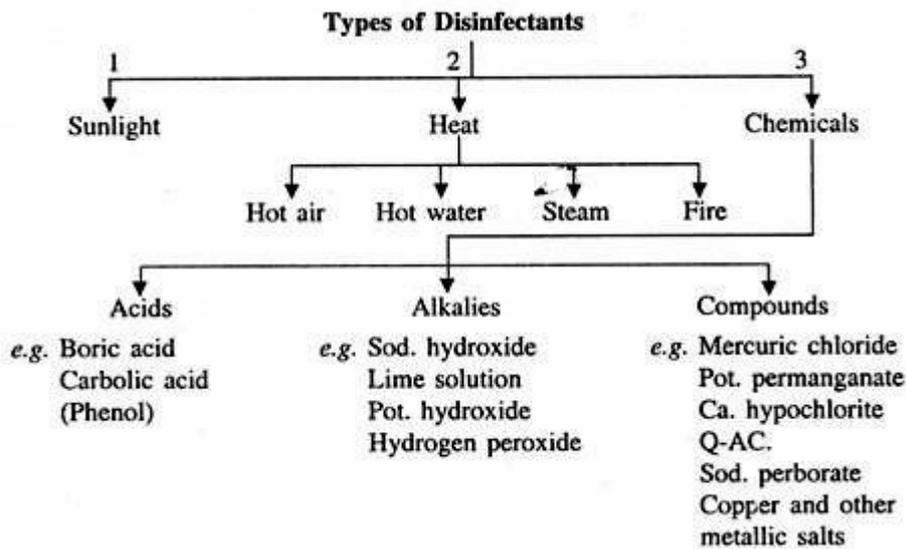
Compounds used to kill bacteria and parasites are called disinfectants. The terms disinfectant, germicides, bactericidal agents, etc., are based upon the effects of the commonly used concentration on the vegetative cells of pathogenic bacteria.

3.4.1 Methods of Action by Disinfectants

These are grouped into three:

1. Destruction of bacterial cell or disruption of its organisation.
2. Interference with energy utilisation.
3. Interference with synthesis and growth.

3.4.2 Type of Disinfectants



1. Sunlight

It is often a valuable disinfectant if surfaces are exposed directly for a sufficient duration. It loses power to kill germs after it passes through thin film of water, dust or ordinary glass. Nevertheless well lighted houses for animals are of great importance. The disinfecting action of it is due to ultraviolet rays.

2. Heat

(a) Hot air

It is an effective means of disinfection but often an expensive one, hence is limited to laboratories.

(b) Hot water

Almost all utensils can be disinfected by immersion in boiling water for a little more than five minutes. It is not satisfactory way for disinfecting floors as it loses its heat soon.

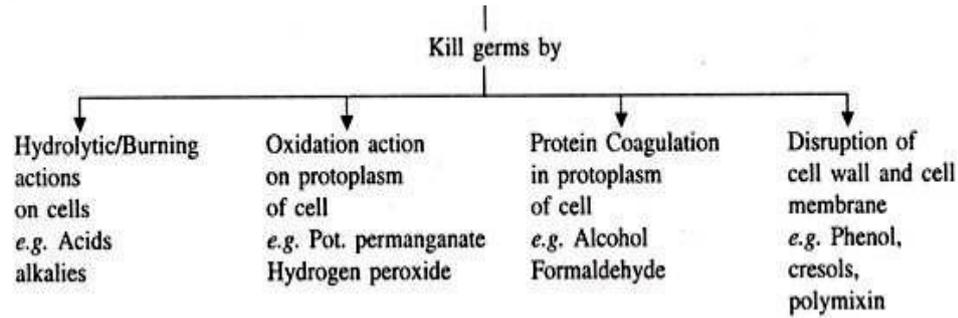
(c) Stream

It is a satisfactory means of disinfection but being expensive, its use as disinfectant is chiefly limited to dairies for milking utensils. It is used under 15 lbs pressure.

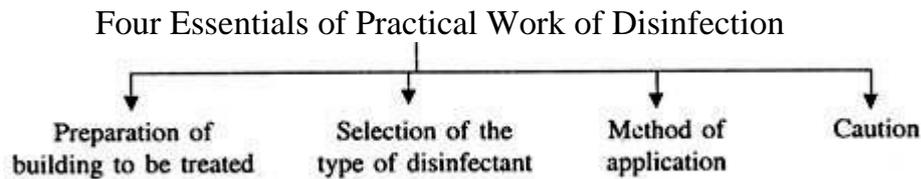
(d) Fire

Almost all utensils can be sterilised with fire. It adds to the total destruction of bacteria and spores, therefore a best means of disposing infected carcass and litter.

Chemicals as disinfectants



Essentials of practical work of disinfection:



() **Preparation of buildings**

The various surfaces, such as ceiling, walls, partitions, and floors should be swept free of cob webs, dust and dung. Any accumulation of filth must be removed by scraping, scrubbing with a wire brush and warm water.

(b) **Selection of disinfectant**

All factors for evaluation of any disinfectant before a given compound is recommended are as follows:

1. Effectiveness—specific or general.
2. Properties of solubility.
3. Availability.
4. Cost.
5. Any additional preparation before use.
6. Toxicity to tissues.
7. Actions on metals, wood, cement floor etc. (e.g., corrosive).
8. Effects if taken internally by animals.
9. Stability of solutions.
10. Odour, color, and action on fabrics, etc.

TABLE 49.1 : COMMON DISINFECTANTS, CONCENTRATION, METHOD OF USE

Name	Concentration	Method of Use	Appropriate Surface for Use	Remarks
1. Washing Soda (Sodium carbonate)	3% soln. in boiling water	Splashing, Rinsing Utensils	Utensils and Floors	Little disinfection powder but effective cleaning agent.
2. Lime	½ kg lime/gallon of water as white wash + 5% phenol	Sprinkling, dusting of powder of lime alone	Floors, walls and grounds	Use freshly prepared solution.
3. Potassium permanganate	1 : 10,000 solution in water	Splashing	Floors, gutters and troughs	Disinfecting action is due to oxidising powder.
4. Mercuric Chloride (Corrosive sublimate)	1 in 10,000 parts of water	Splashing	Floors, stanchions gutteres	Extremely poisonous, corrode metal, strong disinfectant.
5. Phenol (Carbolic acid)	2 to 5% solution in water	Splashing	Metalic objects and clothings	Good disinfectant.
6. Formalin (40% formaldehyde)	5% solution in water 15 to 20 ml. formalin +15 g of KMnO ₄ /m ² space	Splashing and Fumigation	Houses' internal atmosphere	Door and window must be opened before housing stock.
7. Silver nitrate	1% solution in water	Drops	Eye infections	Too expensive to use in large amount.
8. Copper sulphate	28 g in 8000 gallons of water	Dissolution Sprinkling	Lakes, reservoirs, wells ponds, plants	Useful to control fungus growth.
9. Lye solution (NaOH)	2% for general use and 5% for killing spores	Splashing	Floors, gutters equipments	Corrosive nature on metal, good and cheaper disinfectant.
10. Creosote	2 to 4% hot solution	Splashing	Floors, gutters stanchions, wood troughs	Less toxic and cheaper.
11. Ethyl alcohol	70% solution in water	Wiping	Skin : hands etc.	Protect from flame
12. Iodine	2 to 5% solution in alcohol	Wiping	Skin wounds, cuts etc.	Very effective, poisonous and irritating.
13. Bleaching powder (Calcium hypochlorite)	30% available chlorine	Dusting	Floors, gutters passages	Protect it from sunlight.
14. Sodium hypochlorite	200 ppm available chlorine	Rinsing, wiping	Utensils, udder	Don't use hot solution.
15. Crystal violet	2% solution	Wiping	Wounds, skin cuts	Protects clothes from staining.
16. Quaternary ammonium salts (QAC)	1% solution	Wiping/washing	Udders, hands	Bactericidal, more effective against gram +ive than gram -ive bacteria.
17. Boric acid	5-6% solution	Splashing	Skin, floors, walls equipments, wounds.	—
18. Sulphonamide	—	Dusting powder	Wounds	Effective against streptococci.

(c) Method of application of disinfectant

The solution should be applied rapidly in such a manner to cover entire surface requiring disinfection. On a limited surface it may be used with brush. For a large surface area we may use sprayers with a spraying at the end. Methods of use, concentration and disinfectants are summarised in Table 49.1.

(d) Cautions

All disinfectants whether in the form of dust or solutions are more or less poisonous and irritating to eyes, skin and respiratory passages. Persons applying these must be careful to avoid ingestion of these. Eyes, nose and mouth must be protected particularly from dust. Goggles, gloves, respirator etc. must be used.

4.0 CONCLUSION

Livestock production premises (e.g. barns, and pens for lambing, calving, weaning and holding animals) frequently encounter disease problems mainly associated with the housing of new-born and young animals, pregnant females and suckling mothers. Thus, constant disinfection is necessary to prevent disease occurrence or outbreak.

5.0 SUMMARY

In this unit, you have learnt the various forms of sanitary measures employed on livestock farms and also how to identify common disinfectants and how to use them on farm premises.

6.0 TUTOR-MARKED ASSIGNMENT

1. Any regular hygienic/sanitary practices carried out on the farm?
Yes [] No []
2. If yes, state the hygienic/sanitary measures regularly carried out on;
 - (a) Livestock
 - (b) Farms

7.0 REFERENCES/FURTHER READING

Fotheringham V.J. (1995). "Disinfection of Livestock Production Premises." *Rev. Sci. Tech. Off. Int. Epiz.*, **14** (1), 191-205

UNIT 2 DISEASE CONDITIONS AND DIAGNOSES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Recognition of Sick Animals
 - 3.2 Factors Affecting the Health Status of Animals
 - 3.3 Classification of Livestock Diseases
 - 3.4 Disease Diagnosis
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Disease is a deviation from the normal and is revealed by changes in the animal. Any animal that has a disease will show some abnormality. This change in the animal can be observed from the behaviour, structure or function of the animal in question. A sick animal will look dull and weak (lethargy), stay on its own and will refuse to feed (anorexia). A dairy animal that produces milk will have a drop in the quantity of milk produced. You can also notice a change in shape in areas of the body structure of a sick animal depending on the part or organ of the body that is affected. These changes can be major or minor depending on the severity of the disease condition and it can also be qualitative or quantitative.

The observable changes seen or noticed when an animal is sick is known as symptoms or clinical signs. There are symptoms or clinical signs that are common to most diseases while some are specific to particular diseases. Some of the common symptoms seen in most diseases include: refusal to eat, fever or pyrexia (increase in body temperature), dullness etc. The changes observed when an animal is sick is a basis for diagnosis or determining what is causing the sickness in the animal, and diagnosis can be defined as the art and science of determining the nature and causes of diseases and differentiating between diseases.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- ascertain what to look out for when animals are sick
- highlight how diseases are classified or grouped
- explain how diagnosis are arrived at.

3.0 MAIN CONTENT

- To begin with, the first thing is to observe the clinical signs presented by sick animal(s) in question
- Further to this, conduct laboratory tests to arrive at definitive diagnosis.

3.1 Recognition of Sick Animals

Diseases result in a disturbance in the normal behaviour, activity or performance of the animal or animals. In most cases you can observe this change in behaviour, activity or performance. General signs or symptoms of sick animals are:

- Anorexia (inappetence): The animal goes off feed or refuses to eat.
- Fever (pyrexia): This increase in body temperature of the animal above normal.
- Weakness (lethargy)
- Depression

These symptoms or clinical signs may not all be present in all diseases all the times. For example an animal suffering from helminthosis (worm infestation) may not show fever unless this condition has another concurrent infection.

3.2 Factors Affecting the Health Status of Animals

1. Environmental factors

These factors which are physical in nature influence the health status of animals to varying degrees and they cannot be controlled on the field. They can however, be controlled in an animal facility depending on the sophistication of the facility and the species of livestock. These factors are:

- **Temperature:** Animals have the ability to withstand severe temperatures but this will significantly affect productivity if the exposure is for a long period. This is because the animal will become stressed and stress increases susceptibility to disease.
- **Humidity:** High humidity will promote the growth of certain microorganisms like fungus whereas too low a humidity will result in irritation of the mucous membrane. Humidity is important in poultry since they do not have sweat glands and heat is lost through the respiratory tract.

- **Solar radiation:** This also plays a role in increasing the heat load on an animal. This takes on special importance in hot humid zones especially in Nigeria with the importation of exotic animals or use of exotic semen from temperate countries to upgrade indigenous livestock breeds. Solar radiation can be a problem in animals without pigmentation. However, the effect of radiation can be minimized by the shaded areas or pens.
- **Air movement** – The extent of air movement can help in heat loss through evaporation and conduction/convection. Air circulation assists in the supply of fresh air and removal of toxic air.
- **Rain:** Heavy rainfall can result in excessive cooling for animals and/or marshy conditions where animals are kept. This can predispose animals to conditions such as foot rot in ruminants. Provision of shelter and good flooring with drainage is the method to guide against this problem.
- **Climate/Season:** In addition to the environmental factors mentioned above, the climate or season the year can influence the health status of an animal by having a bearing on the infectious agents or parasites that predominate at any particular time. For example, helminth infections are common during the rainy season. This is because temperature and moisture to large extent determines the ability of a parasite to survive outside the host.

2. Management factors

- **Hygiene:** Good hygienic practices are good means of reducing disease risk within a herd or flock. Simple procedures such as cleaning of where the animals stay or changing of bedding/flooring can help reduce the degree of contamination or parasitism. Cleaning removes faeces and thus disturbs the normal environment of disease-causing agents such as gastrointestinal parasites by preventing them from completing their life cycle. It is important that feed/water sources are not contaminated.
- **Nutrition:** Adequate feeding of all classes of livestock is important in order to increase disease resistance and achieve maximum production. Poor nutrition leads to poor health. Because of the poor feed resource base for livestock in Nigeria occasioned by the seasonal feed shortage, grazing livestock in Nigeria experience exacerbated condition when exposed to infectious agents. It is therefore necessary to provide supplemental feeding to livestock especially during the dry season. For poultry and other classes of livestock, the high cost of feed ingredients can lead to the compounding of feeds low in nutrients.
- **Type of housing:** Different categories of people use different housing types and different methods to raise livestock depending on the species, resource availability and level of education. The

particular housing system and method of raising the animals can influence the rate and severity of an infection especially with parasitic infections. For ruminants, animals that are housed or confined where pasture growth is suppressed or flooring is intact, and feeding/watering troughs are kept above the floor will be at lower risk of diseases of gastrointestinal parasitism. Here, absence of pasture makes the environment not conducive for parasite multiplication. For animals on pasture, the level of pasture contamination depends on factors like concentration of animals, duration of time spent by animals on the pasture, climate or weather condition among others. It is important that the choice of housing and method of raising livestock be such that it decreases the risk of infection or enhances the health status of animals.

- **Ecology/Pest and wildlife**

Most parasites that transmit diseases utilise intermediate host to complete their life cycle. This intermediate host can be a pest or wildlife. It is therefore essential not to unnecessarily expose livestock to pest and wildlife. This is the problem with ruminant owned by nomads as close contact between these animals and wildlife leads to exchange of parasites.

- **Introduction of new animals/animal number**

There always exists the risk of introducing new parasites into a herd or flock when adding new animals to a herd. This can be problem where replacement animals are bought from the open market or neighbours farm. Any new animal to be added to an existing stock should be quarantined and treated appropriately before addition. The ease and risk disease transmission increases with increase in animal numbers. Increase in animal numbers increases contact between animals and consequently ease of transmission. An increase in animal numbers can also lead to an increase in accumulation of faeces within confined areas and this is not good for endoparasitism except where insecticidal ear tags are used. In poultry, it is advisable to always clean and disinfect houses before bringing new birds or allowing the house/pen to be empty for some time.

3.3 Classification of Livestock Diseases

Livestock diseases can be classified using different criteria depending on what best satisfies the situation under consideration. Consequently, diseases can be classified based on species of animals (Avian Diseases, bovine diseases, equine diseases, caprine diseases etc.); system of the body affected (Cardiovascular diseases, respiratory diseases, reproductive diseases etc.) and the causative organism. However, the

etiology or causative organism is the most widely used method of classification. Here they are classified as:

- Bacterial diseases: example, Anthrax, Mastitis, Salmonellosis, Fowl typhoid, etc.
- Viral diseases: example, foot and mouth disease, rinderpest, African swine fever etc.
- Protozoan diseases: example, Coccidiosis, Trypanosomoses, Babesiosis etc.
- Rickettsial diseases: example, Anaplasmosis, Cowdriosis, Infectious keratoconjunctivitis
- Fungal diseases - example, Aspergillosis, Ringworm, Epizootic lymphangitis
- Endoparasitic diseases (caused by worms): example, Fascioliosis, Haemonchosis etc.
- Ectoparasitic diseases (caused by ticks, lice, fleas): example, Mange, fleabite dermatitis, etc.
- Deficiency diseases: Vitamin deficiencies, pregnancy, toxoemia, etc.
- Toxicoses: examples – Nitrate poisoning.

Livestock diseases can also be classified on the basis of disease prevention into six categories which are:

- Neonatal diseases: diseases that affect very young animals, mainly diarrhea in nature.
- Vector-borne diseases: diseases transmitted by a living vector such as trypanosomosis
- Soil-borne diseases: disease mostly caused by aerobic and anaerobic spore-forming bacteria (e.g. botulism)
- Contact diseases: usually responsible for serious epidemic diseases in livestock in the tropics such as Rinderpest, Foot and Mouth disease etc.
- Parasitic diseases: similar to contact diseases examples include haemonchosis, fascioliosis etc.
- Nutritional and metabolic diseases.

3.4 Disease Diagnosis

To arrive at a diagnosis, you have to get some information or facts about the animal. The information you gather or collect should be as comprehensive as possible and these can be regarded as components of diagnosis. These include:

- History taking: This is gathering some information about the animal such as identity of the animal (specie, name or tag no.,

age, sex, breed, colour of the animal etc.), when the animal was first noticed to have changed in behaviour or performance, how long this condition has been on etc.

- **Physical examination:** This is done by observing the animal itself for any sign of abnormality, taking the temperature, pulse rate, respiratory rate. If this done on a farm, it can include looking at the housing and environment where the animal is kept, the type of feed given to the animal or animals etc.
- **Laboratory examination:** This is carried out on samples or materials collected from the animal or the environment where the animal is kept. The sample collected is subjected to several laboratory procedures to detect the presence or absence some disease-causing agents or substances. Examples of samples collected from a sick animal include blood, faeces, skin scrapings, urine or even organs of a dead animal (especially, where there are many animals on a farm) etc. Also, some part feed of the given to the animal can be collected for laboratory examination. Laboratory examination of samples collected from sick animals is important in arriving at a definitive diagnosis.

4.0 CONCLUSION

Animal disease diagnosis is to improve animal health not only for production purposes but for the entire area they serve including that of human wellbeing, as some of these animal diseases may be zoonotic in nature. The practical components of this guide requires that students identify diseases commonly encountered in various livestock animals on the farm they are currently serving and seek for a systematic means of diagnosing disease conditions in them; as well as proffer appropriate treatment/control measures.

5.0 SUMMARY

In this unit, you have learnt about how to recognise disease animals, Factors affecting the health status of animals and classifications of livestock diseases.

6.0 TUTOR-MARKED ASSIGNMENT

1. Give a proper classification of the common disease conditions encountered on the farm and the animals affected during your practical year.
2. (i) Was any animal diagnosed of any disease during the period of the practical year? Yes [] No []
(ii) If yes, were they infectious or non-infectious in origin?

Specify and describe a typical example.

3.
 - i. How are sick or unhealthy animals identified and handled?
 - ii. List the general signs or symptoms you observed on a sick animal.
4. What were the contributions of environmental and/or managerial factors to the occurrence of these diseases, if any?
5. What are the basic diagnostic tools or techniques used to detect disease conditions in animals?

7.0 REFERENCE/FURTHER READING

Hassan, A.Z. & Hassan, F.B. (2003). *An Introduction to Veterinary Practice*.

UNIT 3 TREATMENT AND GENERAL DRUG ADMINISTRATION TECHNIQUES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Routes of Drug Administration in Livestock Animals
 - 3.2 Drug Administration Techniques in Livestock Animals and Their Limitations
 - 3.3 Veterinary Preparations
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

After a successful disease diagnosis, obviously the next step is to cure the disease discovered via appropriate treatment regime. The treatment recommended will be according to the type and severity of the disease afflicting the animal. In most cases, major symptoms seen will be treated alongside the disease agents itself which is a more comprehensive approach to quick recovery. However, different diseases present with different clinical manifestations which have to be managed using different treatments approaches and medications. In more critical conditions, fluid and/or blood transfusion have to be given before recovery can be attained.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- determine appropriate treatment regime for common diseases of livestock
- recognise drug administration techniques and routes in animals.

3.0 MAN CONTENT

3.1 Routes of Drug Administration in Livestock Animals

Several routes are used for the administration of veterinary drugs. The choice of route and the technique of drug administration are based on a number of factors which include the species of animal, the physicochemical properties of the drug, the formulation and the disease in question. However, the recommendations of the manufacturer should always be followed.

I. Oral route

This is administration of drugs through the oral cavity or mouth and it is a natural route for drug administration. This route is suitable for drugs like antidiarrheals, anthelmintics, supplements etc. When using this route, care must be taken to avoid drugs getting into the trachea. Drugs administered through this route are however, exposed to the action digestive enzymes and microorganisms that inhabit the digestive tract may affect the drug activity. Also, onset of drug action may be slower when compared with other routes. Administration of drugs in feed and water is also through the oral route. Drug formulations or preparations administered using the oral route are tablets, boluses, suspensions, syrups and the like.

I. Parenteral route

This route of drug administration involves using a hypodermic needle and syringe to introduce the medication between the skin and the enterical canal. The drug formulation or preparation is usually a stable aqueous solution or sometimes in oil base when delayed and prolonged absorption of the drug is desired. The most frequently used parenteral routes are intramuscular (IM), intravenous (IV) and subcutaneous (SC). Other less frequently used parenteral routes are intraperitoneal (IP), intrathoracic, intracardiac, intradermal and epidural.

II. Topical route

Topical route of administration simply describes application of drugs locally to the skin and its adnexa or to any of the mucous membranes. Also included in this route are intrauterine, intravaginal, ocular, rectal, preputial, sublingual and intranasal. Topical drug preparations include ointments, creams, pastes, dusting powders, lotions and sprays.

III. Pulmonary route (inhalation)

This route is used for drugs in the gaseous state or volatile agents. They are absorbed rapidly from the airways and alveoli into pulmonary circulation. They are usually applied using a nebulizer or by standard anesthetic machines.

3.2 Drug Administration Techniques in Livestock Animals and their Limitations

There are a number of drug administration techniques including oral, intravenous, intramuscular, subcutaneous etc. Each of these techniques will depend on the type of drugs and manufacturers specification. However, dosage will depend mostly on Veterinarian's advice based on symptoms seen and severity of condition.

Oral administration

Oral dosing includes administration in feed or water as well as tablets, boluses, pastes and liquids (drenches).

- In ruminants, orally administered drugs are often given as a bolus or as a drench.
- In-feed administration is a simple method for administration of a drug.
 - Absorption is relatively slow and a long time (an hour or more) may be required for the drug to have the desired effect.
 - If medicated feed is refused or only partially eaten then the required dose will not have been administered.
- In-feed administration may be the most appropriate method for long-term administration of NSAIDs such as aspirin and phenylbutazone in ruminants.
 - Such use is not likely to be appropriate for food-producing domestic ruminants; however it may be of use for example in treatment of chronic arthritis in non-domestic ruminants in zoos, or in pet ruminants which will not enter the human food chain.
 - Palatable drugs should be used if they are to be concealed in food.
- Absorption of drugs following oral administration is generally considerably less than 100% and may be very variable between species and even between individuals.
 - The time to effect following oral administration is delayed by minutes to hours.
 - In ruminants the rate of absorption may be markedly affected if closure of the oesophageal groove takes drugs directly to the abomasum, bypassing the rumen.
 - Absorption may also be affected by administration with food although this effect may be less variable in ruminants than in monogastric species such as horses.

- Drugs may be destroyed in the digestive tract, or may pass through without being absorbed.

Dose rates for oral administration are generally higher than those for parenteral administration of the same drug, to allow for the reduced absorption and/or the first-pass effect (metabolisation of drugs as they travel through the hepatic portal system).

Parenteral administration

A. Intravenous injections

Intravenous injections introduce drugs directly into the systemic circulation. This provides the fastest distribution of the drug and ensures that 100% of the drug reaches the systemic circulation.

- Intravenous administration of drugs in ruminants is usually into the jugular vein.
- This route of administration is not suitable in circumstances where restraint of the patient is either not possible or not appropriate, which may occur with non-domestic ruminants.
- Injection can be painful and involves a risk of infection.
- As well as giving the fastest onset of action, this route also results in the fastest elimination from the system, therefore repeated injections are required if plasma concentrations of a drug are to be maintained.

B. Intramuscular injection

- This is usually the second fastest route for drugs to reach the systemic circulation.
- This route also allows the administration of "depo" injections which are absorbed slowly to give a prolonged period of action.
- Intramuscular injection can be painful. Injection involves a risk of infection.
- Absorption following intramuscular injection may be variable.
- Intramuscular injection results in peaks and troughs in the blood concentration of the drug.
- Muscle damage may occur following injection of drugs; the amount of damage varies with the drug preparation injected. Repeated injections of some drugs may result in tissue necrosis.

Intramuscular administration in non-domestic ruminants may be carried out by hand injection if circumstances allow but may also be carried out using a pole syringe, in which the operator only has to approach within a couple of metres of the animal, and by remote injection (darting).

Hand injection

- This is the usual means of administering an intramuscular injection in domestic ruminants.

Limitations

- Requires close approach and that the animal stays reasonably still for the period of time during which the drug is administered.
- This may be stressful for non-domesticated individuals including semi-free-range individuals of domesticated species.
- There is a risk of injury to animal and administrator during restraint of non-domesticated individuals.
- This is often not practical for non-domestic ruminants, except in particularly docile individuals.

Pole syringe

- A pole syringe is basically a syringe attached to a long pole, designed so that the contents of the syringe can be injected while the operator remains at a distance (the length of the pole, e.g. two metres) from the animal.
- This method may be safer and more practical than hand injection when dealing with non-domestic animals or animals which are not used to being handled.

Limitations

- This method is only appropriate if the animal can be reached, e.g. if it is within a confined space (or is held by a trap or by entanglement in a stationary object) and cannot retreat further away than the pole can reach.
- It is usually only possible to administer about 10 ml or less of a drug, since animals will generally not stay still for long enough to inject larger volumes.
- If the animal jumps away before the total dose has been administered then a second injection is required.

Remote injection (darting)

- Remote injection is not commonly used for drug administration to fully domesticated ruminants; however this is an important method of drug administration for non-domesticated animals, both captive and free-living.
- Smaller species should be injected into the rump or the back of the hind leg. For larger species these sites may be used also, but the neck or shoulder is possible as alternatives.)
- The main advantage of remote injection is that it allows injection at a distance.
- Handling and restraint are not required, and the stress associated with these is avoided.

Limitations

- Limitations of remote injection include all the normal limitations for intramuscular injection, as well as the points listed below.
- There is always a risk of injuring the animal.
- Small antelope and deer have thin skin which is easily penetrated by a dart; care is required to avoid excessive impact force of the dart hitting the animal.
- This method is only suitable for relatively small volumes due to limits in the capacity of individual darts.
- When darting small individuals there are also limitations on size of dart and volume related to the trauma associated with impact of darts, which is greater with larger, heavier darts and with higher impact velocity.
- This method has limited applicability for injection of viscous drugs, particularly when using gas-pressurised syringes, as there is an increased risk of incomplete injection.
- An animal may be stressed by being hit by a dart.
- An animal may react badly to being hit by a dart and injure itself e.g. by running into an obstacle, or aggravate an injury such as a foot or leg problem by running.

C. Subcutaneous injection

Subcutaneous injection may be employed for injection of relatively large volumes.

- Absorption is generally slower than with intramuscular administration and the time to effect after subcutaneous injection is relatively long.
- Absorption from the injection site is variable.
- Absorption from subcutaneous sites may be greatly decreased in individuals in shock.
- Injection can be painful and involves a risk of infection.
- This route is not suitable for the injection of irritating drugs.

Administration by needleless injector

- Administration of drugs using a needleless injector could provide an effective method for administration of local anesthetics prior to management procedures such as lamb castration and tail docking, without the risks (e.g. of introduction of infection) associated with injection by needle and syringe.
- Local anesthetic has been administered using a high-pressure needleless injector in experimental conditions for reduction of pain associated with castration and tail docking of lambs.
- It was noted that there were considerable limitations in the volume of drug which could be held in the injector, requiring frequent, time-consuming reloading with relatively expensive

drug ampoules, and in the maximum volume which could be injected at one time (0.03 ml with this applicator).

Topical administration

Topical treatment includes direct application to the skin but also to mucous membranes.

- Topical administration is commonly used with local anesthetic drugs to provide surface anesthesia of the nose, mouth, ear, bronchial tree (by spray), cornea (by drops), urinary tract or rectal mucosa.
- Intramammary infusion is a special case of topical treatment. It is used mainly for administration of antibiotics in the prevention (dry cow therapy) and treatment of mucosa, but is also used for administration of corticosteroids, usually together with antibiotics, in mastitis treatment.
 - Intramammary infusion of local anesthetic solution can be used for analgesia of the mucosa of the teat cistern.
- Intranasal administration has been used experimentally in sheep for the administration of [buprenorphine](#). It gave a high bioavailability and rapid absorption.

Local and regional administration

Local and regional administration is commonly used for administration of local anesthetic drugs. This may be used in assessment of conditions such as lameness, and while carrying out painful procedures such as toe amputation, teat surgery or caesarean section.

- One form of regional anesthesia/analgesia is epidural anesthesia. This involves injection into the epidural space just outside the spinal cord.
 - This is a technically difficult technique requiring practice for correct use.
 - Strict asepsis must be employed when this technique is used in order to avoid infection of the epidural space.

3.3 Veterinary Preparations

Pharmaceutical preparation intended for use in animals come in different forms depending on the species of animals and the disease for which the preparation is targeted towards. The various forms in which these preparations come included but not limited to tablets, capsules, creams, emulsions, ointments, injections, powders, gels, sprays, boluses and drops. For the desired effect to be obtained, the drug must be administered using the appropriate route and in accordance with the manufacturer's recommendation.

3.3.1 Classes of Selected Veterinary Drugs and Examples

Veterinary drugs can be classed based on the organism on which the drug acts or the organ of the body where the drug action is desired. For the purpose of this lecture, the drugs are classified based on the disease-causing agent or aetiology. The classes of the drugs and their examples are given below.

Class of drug	Examples of drug preparation
Antibacterial	Oxytetracycline, Streptomycin and Procaine Penicillin
Antiprotozoans	Dimanazene aceturate, Amprolium and Homidium bromide
Anthelmintics	Levamisole, Albendazole and Pyrantel pamoate
Antifungal agents	Ketaconazole, Griseofulvin and Nystatin
Antidiarrheals	Methoscopolamine, Diphenoxylate and Kaopectate
Antiinflammatory/analgesics	Dexamethasone, Phenybutazone and acetyl salicylate

3.3.2 Ethno-Veterinary Medicine/Practices

Pastoralists and other livestock farmers in Nigeria like their counterparts in others parts of Africa and the world at large have relied on locally available plants and herbal preparations for treatment of their animals before the advent of western (orthodox) veterinary medicine. This indigenous knowledge system is referred to as ethno-veterinary medicine or practices. Ethno-veterinary medicine includes indigenous beliefs, knowledge, skills, methods and practices pertaining to the health care of animals. Ethno-veterinary medicine is largely used effectively by local farmers for keeping animals healthy and productive. Some advantages of ethno-veterinary medicine are that it is cheaper and based on local resources. However, some difficulties associated with ethno-veterinary medicine include, lack of proper documentation and validation, difficulty in standardisation and non-availability of plant parts all year round. The use of several medical plants in the treatment of animals has been documented but the absence of standard dosages and preparations hampers their inclusion in normal animal health care delivery systems.

3.3.3 A Comparison between Ethno-Veterinary Medicine and Orthodox (Western) Veterinary Medicine

Ethno-veterinary Medicine	Orthodox (Western) medicine
Indigenous, evolved by farmer and farmer oriented	Developed by researchers and science oriented
Passed on from generation to generation or farmer to farmer	Communicated from researchers to veterinarians
Compatible with local situation and low dependency on external inputs	May or may not compatible with local situation and more dependent on external inputs
Not well researched and not well documented	Very well researched and well documented
Takes longer to show effects	Effects/results are quicker
Usually specific to local situation since as it is dependent on locally available inputs	Usually general recommendation not tied to any locality

4.0 CONCLUSION

In this practical session, we have analysed the various techniques and routes of drug administration in animals and the various forms or preparations in which veterinary drugs are supplied. We have also stated the classes of drugs used in treatment of animal diseases. We have equally looked at ethno-veterinary medicine and compared it with orthodox (western) veterinary medicine.

5.0 SUMMARY

In this unit, you have learnt how to determine appropriate treatment regime for common diseases of livestock and the various drug administration techniques and routes in disease animals' treatment.

6.0 TUTOR-MARKED ASSIGNMENT

1. What treatment regimes are provided to handle specific disease conditions in animals on the farm during your practical session?
2. Identify drug administration techniques and routes employed for treating specific livestock diseases in the course of your practical year.
3. How are the animals handled in terms of restraint during treatment? Describe it.

7.0 REFERENCES/FURTHER READING

The Merck Veterinary Manual (10th ed).

Radostits, O.M., Gay, C.C., Blood, D.C., & Hinchcliff, K.W. (2000). *Veterinary Medicine: A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*. (9th ed). Philadelphia: W.B. Saunders.

Hassan, A.Z. & Hassan, F.B. (2003). *An Introduction to Veterinary Practice*.

McCorkle, C.M. & Mathias-Mundy, E. (1992). "Ethno-veterinary Medicine in Africa." *African*, 62: 59-93.

MODULE 2

- Unit 1 Vaccination Programs for Different Classes of Livestock and Other Preventive Measures
- Unit 2 Ante-Mortem and Post-Mortem Inspection of Food Animals

UNIT 1 VACCINATION PROGRAMS FOR DIFFERENT CLASSES OF LIVESTOCK AND OTHER PREVENTIVE MEASURES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
- 3.1 Principle of Animal Immunity in Disease Control
- 3.2 Diseases to be Vaccinated Against in Some Livestock Animals
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Vaccination is an immunisation process using biological agents to induce protective effect against known disease agents in animals in order to prevent disease occurrence in the induced animals. However, the administration of these biologicals varies from oral to parenteral methods as well from one livestock species to another. The purpose of a vaccination is to provide exposure to a non-virulent (non-infective) form of a disease agent before the animal is exposed to a natural infection. This vaccination causes the animal to develop antibodies and cellular resistance that protect against disease or infection. Note that vaccination is not a simple process that automatically produces immunity. You will get to know the principles involved in inducing immunity in animals in the course of your practical year program.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- explain the principle of animal immunity in disease control

- discuss common diseases to be vaccinated against in livestock animals
- highlight vaccination programs for different livestock.

3.0 MAIN CONTENT

- Keep vaccines refrigerated (not frozen).
- Keep vaccine out of direct sunlight.
- Be sure to use vaccines before expiration date.
- Vaccinate healthy animals; avoid vaccination of stressed livestock animals.
- Follow all label directions on proper routes of administration.
- Follow all label directions for vaccination of pregnant animals, and observe age of animals at vaccination.
- Ensure that booster injections are given as at when due if indicated on the label directions.
- Avoid stress of newly vaccinated animals.

3.1 Principle of Animal Immunity in Disease Control

The immune system

The function of the immune system of the animal is to protect the body against pathogenic agents. The immune of the animal is innate and is composed of two parts, humoral and cellular. The humoral part produces substances like antibodies found in the blood. These substances are able to prevent growth and development of pathogens or make them stick together to facilitate their removal from the body. The cellular part produces cells (like T-lymphocytes, Natural Killer cells) that ingest and destroy pathogens. Both the humoral and cellular immunity are not directed against particular pathogens and therefore are said to be non-specific.

Types of immunity

Immunity can be classed as either natural or acquired. Natural immunity is an innate or inborn ability to resist certain types of diseases and this immunity does not involve production of antibodies. Acquired immunity on the other hand is immunity that animal develops to resist specific infectious agents either passively or actively. Passive immunity involves the transfer of pre-formed antibodies from an immune animal to a susceptible animal to provide protection against a pathogen as obtained when a calf suckles the dam soon after calving or by injection of antiserum into another animal. This type of immunity last for a short period. Active immunity is obtained when animal develops antibodies following exposure to an infectious agent or pathogen either natural infection or by vaccination. This type of immunity last longer in the animal.

Vaccine failure

Vaccines can fail for a variety of reasons which include:

- i. Failure of the animal to respond. A certain percentage of animals will not respond and build an immune response to a vaccination. This is more likely in stressed or debilitated animals.
- ii. Insufficient resistance if the animal is faced with overwhelming exposure.
- iii. For younger animals there are blocking maternal antibodies (from colostrum) present that interfere with the ability of the animal to build immunity. This is the result of vaccinating animals that are too young.
- iv. There is a lag time of up to three to four weeks before sufficient immunity can develop in a properly vaccinated animal.
- v. A booster dose is not given to generate an adequate immune response. This is applicable on vaccines with label recommendations that specifically recommend a booster.
- vi. Improper handling of the vaccine such as, exposing to sunlight, improper storage temperature or mixing problems. This is the most common cause of vaccine failure.

Note: You can minimise the chance of vaccine failure by carefully handling and administering the product.

3.2 Diseases to be Vaccinated Against in Some Livestock Animals

Beef

Vaccines recommended as essential for these common diseases.

- 1) The vaccines for **clostridial** diseases are available in various combinations from two to eight agents. These diseases are common and usually cause sudden death with little time for treatment. Because treatment success is rare, emphasis is properly placed on preventative measures. Select at least four to seven ways bacterin:

Blackleg	<i>C. chauvoei</i>
Malignant edema	<i>C. septicum</i>
Black's disease	<i>C. novyi</i>
Enterotoxemia	<i>C. perfringens</i>
Type C & D	<i>C. sordellii</i>
Redwater	<i>C. haemolyticum</i>
Lockjaw	<i>C. tetani</i>

- 2) **IBR** (Infectious Bovine Rhinotracheitis): Also known as rednose. It causes inflammation of the upper respiratory tract.
- 3) **PI3**, (Parainfluenza Type 3). Upper respiratory infection, suppresses the animal's immune system, allowing other diseases to develop.
- 4) **BVD**, (Bovine Virus Diarrhea). A complicated disease, it can result in a wide variety of disease problems from very mild to very severe
- 5) **Brucellosis**. Vaccination **MUST** be provided by accredited veterinarian and the heifer must be of a specific age. Vaccination for Brucellosis is highly recommended for cattle that may be involved in interstate movement (such as shows or fairs) or animals that may be marketed interstate.

Other diseases less vaccinated against include:

- 1) **Leptospirosis**: Bacterial infection that typically causes abortion in last half of gestation or still birth.
- 2) **Pasteurella**: Commonly causes pneumonia.
- 3) **Hemophilus**: Has the capacity to attack many different organs in the body interrupting blood flow.
- 4) **Vibriosis**: A bacterial disease transmitted through natural breeding. It may result in infertility and abortion.

Sheep and goats

It is recommended as essential to vaccinate sheep and goats for two main diseases:

- 1) **Tetanus** (lockjaw) caused by *Clostridium tetani*.
- 2) **Enterotoxemia** (overeating disease) caused by *Clostridium perfringens* types C and D.

Swine

It is expected to vaccinate against the following swine diseases.

- 1) **African Swine Fever** (ASF) is a major infectious disease of swine caused by African swine virus producing signs such as loss of appetite, pigs huddling together, small purplish blotches on the skin, incoordination and laboured breathing which often result to death
- 2) **Atrophic rhinitis** is a bacterial disease that causes inflammation of tissue inside the nose. Nasal passages damaged are not effective filtering the air the pig breathes, allowing more bacteria access to the lungs. (For use in young pigs if the disease is known to be present in the herd)

- 3) **Erysipelas** is an infectious swine disease that can cause fever, sudden death, diamond shaped skin lesions, stiffness, and abortion. (A good practice in all pigs)
- 5) **Parvovirus** is a reproductive disease that may result in embryonic deaths, mummified fetuses and stillborn pigs. (Breeding animals only)

Often, even more important than the vaccination program for swine is good animal care. It is important to keep pigs either on a frequently cleaned concrete pen or new dirt pens that have not previously had pigs on them. Keeping pigs on the same dirt on a long term basis is not advised for proper care of swine. Vaccination programs are an important part of successfully raising livestock. There are many different products available for use. Consider all factors in selecting what products to use. Consulting with a veterinarian is a good way to help establish a personalized vaccination program for the species and area.

General prevention measures

Preventing diseases entering and spreading in livestock populations is the most efficient and cost-effective way of managing disease. While many approaches to management are disease specific, improved regulation of movements of livestock can provide broader protection. A standard disease prevention programme that can apply in all contexts does not exist. But there are some basic principles that should always be observed.

The following practices aid in disease prevention:

- i. Elaboration of an animal health programme.
 - ii. Select a well-known, reliable source from which to purchase animals, one that can supply healthy stock, inherently vigorous and developed for a specific purpose. New animals should be monitored for disease before being introduced into the main flock.
 - iii. Good hygiene including clean water and feed supplies.
 - iv. Precise vaccination schedule for each herd or flock.
 - v. Observe animals frequently for signs of disease, and if a disease problem develops, obtain an early, reliable diagnosis and apply the best treatment, control, and eradication measures for that specific disease.
- Dispose of all dead animals by burning, deep burying, or disposal pit.
 - Maintain good records relative to flock or herd health. These should include vaccination history, disease problems and medication.

Surveillance and control measures

Disease surveillance allows the identification of new infections and changes to existing ones. This involves disease reporting and specimen submission by livestock owners, village veterinary staff, district and provincial veterinary officers. The method used to combat a disease outbreak depends on the severity of the outbreak. In the event of a disease outbreak the precise location of all livestock is essential for effective measures to control and eradicate contagious viruses. Restrictions on animal movements may be required as well as quarantine and, in extreme cases, slaughter.

Control of disease outbreak

Control of disease outbreak is simplified by observing the following recommendations:

1. Segregation of sick animals.
2. Change of pastures.
3. Vaccination of healthy animals.
4. Proper disposal of litter material by burning.
5. Bury/burn infected carcass for proper disposal.
6. Clean and disinfection of premises-contaminated by diseased animals.
7. Consult qualified veterinarian for diagnosis.
8. Do not rely on untrained persons for the diagnosis of diseases.
9. Prompt report to district livestock authorities about the outbreak.
10. Quarantine.
11. While waiting for the diagnosis, put a disinfectant in the drinking water to prevent transmission of germs through water.
12. Use only proper approved methods of sanitation and treatments.
13. Make regular use of foot bath for animals and employees.

4.0 CONCLUSION

Livestock are susceptible to a variety of diseases. One key to keeping livestock healthy is by implementing a proper vaccination program. Having a valid veterinary-client-patient relationship is a key first step to understanding what is involved in developing a vaccination program and in getting guidance if an animal becomes ill. Veterinarians can provide useful advice in dealing with specific production practices.

5.0 SUMMARY

In this unit, you have learnt about principle of animal immunity in disease control, common diseases to be vaccinated against in livestock animals and vaccination programs for different livestock.

6.0 TUTOR-MARKED ASSIGNMENT

- A. Are there any vaccination records of animals on the farm you visited? Yes [] No []
- B. If yes, provide in tabular form the list of the vaccines routinely given to the different classes of livestock available on the farm and how often they are given.

S/N	Type of Vaccine	Species of Animal	How often?
1			
2			
3			
4			
5			
6			

7.0 REFERENCES/FURTHER READING

Janeway, T. *Immunobiology - The Immune System in Health and Disease*. (4 & 5th eds). Walport and Capra.

Radostits, O.M., Gay, C.C., Blood, D.C., & Hinchcliff, K.W. (2000). *Veterinary Medicine: A Textbook of the Diseases of Cattle, Sheep, Pigs, Goats and Horses*. (9th ed.). Philadelphia: W.B. Saunders.

d'Ieteren, G., Authié, E., Wissocq, N. & Murray, M. (1998). "Trypanotolerance, an Option for Sustainable Livestock Production in Areas at Risk from Trypanosomiasis." *Rev Sci Tech* 17:154–175.

UNIT 2 ANTE-MORTEM AND POST-MORTEM INSPECTION OF FOOD ANIMALS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

1.0 INTRODUCTION

Ante-mortem inspection is the examination of food animals prior to slaughter to assess their suitability as a source of product fit for human consumption while post-mortem inspection is the examination of carcasses and organs to assess whether these products are fit for human consumption. It is important to carry out meat inspection so as to eliminate the possible transfer of zoonotic diseases (diseases transmissible from animal to man) such as rabies, tetanus, tuberculous meningitis, salmonellosis etc. Both ante- and post-mortem inspections should be conducted in the abattoir, slaughter hall or in the cooling hall, as the case may be. While inspecting animals and their product to certify them fit for human consumption, it is equally important to ensure that the facilities and equipment used to process these animal products are equally clean and the environment germ free.

2.0 OBJECTIVES

By the end of this unit, you will be able to:

- describe in detail the process involved in ante-mortem and post-mortem inspection of animals.

3.0 MAIN CONTENT

Ante-mortem inspection

- Examine both sides of the animal at rest and in motion.
- Observe clinical signs of diseases and pathological conditions by noting the general disposition of the animal, condition of hair coat, feces, and urine colour.
- Check mucous membrane, pulse rate and temperature.

- Note emaciated animals for special inspection during post-mortem
- Crippled, immature and pregnant animals are to be exempted from slaughter.
- Dead or dying animals from unknown causes should not be processed for human consumption.
- As a rule, animals are examined in a round-about fashion i.e. from face – left or right – the rear or anus – right to left and the back to the face.

Inspection of head region of animal

- Examination of the conjunctivae of eyes
- Examination of the mucous membrane of the mouth and tongue
- Examination of jaws for swellings (abscesses)
- Examination of nostrils and external ear for abnormal discharges including pus, blood or serous fluid

Inspection of both sides of animal

- Watch if the precapular lymph nodes are enlarged by being markedly visible
- Inspect if the rib bones are conspicuous i.e. emaciation. Watch the eating rate of the animal by noting the abdominal and thoracic movement
- Watch for prefemoral lymph node if enlarged or not
- Watch for the hides and skin e.g. in cattle for streptotrichosis, sores and bruises

Inspection of the rear and anal region of the animal

- Watch the consistency of the droppings (faeces)
- Inspect for any enlargement of the external genitalia
- Consider taking the rectal temperature (e.g. pigs with rectal temperature above 41⁰C and cattle, sheep and goat with temperature above 40⁰C should be detained for further investigation)

Outcome of ante-mortem inspection

Following thorough ante-mortem inspection, animals may be judged as:

- Animals physically fit for straight slaughter
- Animals suspected to be diseased needing more careful inspection at post-mortem before passing for consumption
- Animals unfit for slaughter which need treatment or rest before slaughter e.g. pregnant animals should be preserved and animals with high fever should have rest and treatment

- Animals examined to suffer from the following conditions should **NOT** be slaughtered: Rabies, anthrax, blackleg, tetanus, tuberculous meningitis, rinderpest, hog cholera or swine fever.

Post-mortem inspection

The carcass

Detailed post-mortem examination should be carried out by:

1. Visual inspection
2. Palpation
3. Incision
4. Olfaction
5. Laboratory

Cattle

- Examine visually for evidence of bruising, bleeding efficiency as well as nutritional status and conformation.
- Inspect the thoracic and abdominal cavities for evidence of inflammation, abscess or tuberculous adhesions.
- Loosen the kidneys and examine as outlined above.
- Be careful to incise the following lymph nodes: the iliac, prescapular, precrural, superficial inguinal/supramammary as well as popliteal lymph nodes.
- Incise the shoulder and the adductor muscles for evidence of *Cysticercus bovis*.

Sheep and goat

- Visual examination is most crucial.
- Evidence of bleeding efficiency and carcass setting is significant.
- Examine the lungs by palpation for hydatid cysts.
- Examine the bronchi for nematode worms.
- Inspect the liver for fascioliasis.
- Check the thoracic cavity for septic pleurisy.
- Check for cysticercus tenuicollis worm.
- Watch out for abscesses in both the head and carcass lymph nodes

Pigs

- Carcass appearance for good bleeding is essential.
- Incise both submaxillary lymph nodes, for evidence of jaw abscess as well as retropharyngeal and paratid lymph nodes for evidence of tuberculosis.
- Examine the tonsils as they frequently show lesions of tuberculosis and abscess.
- Enlargement of spleen could be due to torsion or tuberculous nodules.

Head region**Cattle**

- The tongue should loosen but not detached and the surface and substance inspected.
- The roof of the mouth should be inspected.
- The retropharyngeal, sub maxillary, and parotid lymph glands should be examined in detail.
- The masseter muscles should be examined by incisions parallel to the lower jaw.
- The eyes should be examined by close observation.

Pig

- The lips, gums, tongue should be examined wherever practicable.
- The submaxillary lymph glands should be examined in detail.

Horses

- The head should be examined in the same manner as the head of the bovine animal, except that the muscles of the horse need not be incised unless if considered necessary.

Sheep and goats

- The lips, gums and tongue and nasal cavities should be examined wherever possible.

The abdominal cavity**Stomach, intestines and spleen**

- The outer, and when necessary, the inner surface of the stomach and intestine, the surface and substance of the spleen and the surfaces of the omentum should be well examined.
- The gastro-splenic and mesenteric glands in cattle, pigs and horses should be examined in detail.

Liver

- The surface and substance of the liver should be examined and the bile incised when necessary.
- The thick end of the cattle liver should be incised.
- The hepatic lymph glands of cattle, pigs and horses should be examined in detail.

Kidneys

- The renal lymph glands and the adrenal glands should be examined and when necessary the kidneys should be exposed and incised.
- The surface of the kidneys must be observed after removing the capsules.

Uterus and ovaries

- The substance of the uterus, its surface and, if necessary, its inner surface should be examined.

The thoracic region**Lungs**

- The lungs should be examined by both observation and by palpation, and unless obviously diseased, they should be incised at the base.
- The bronchial and mediastinal lymph nodes of cattle, pigs and horses, unless obviously diseased should be examined in detail.

Heart

- The pericardium should be opened and the heart examined, and if necessary incised.

Udder**Cow and Sows**

- The udder should be incised and examined by observation and palpation.
- The associated supramammary lymph glands should be examined in detail.

Testicles and Penis

- The substance and surface of the testicle and penis should be examined in detail.
- The superficial inguinal lymph glands of bulls and boars should be examined in detail.

4.0 CONCLUSION

Under this practical session, it can be seen that both ante-mortem and post-mortem inspection of food animals are critically essential to certify meat fit for human consumption and to eliminate any possibility of transmission of diseases from animal origin to human. Also, detailed procedure has been provided to properly inspect carcass in various regions of animal bodies as well as in different species of animals.

5.0 SUMMARY

In this unit, you have learnt in detail the process involved in ante-mortem and post-mortem inspection of animals.

6.0 TUTOR-MARKED ASSIGNMENT

Visit an animal slaughter house to answer these questions:

1. What are the ante-mortem procedures regularly carried out on the animals before slaughter?
2. What are the systematic ways of carrying out post-mortem inspection after slaughter?
3. (i) Were there any condemned animals during your practical year following inspection?
Yes [] No []
(ii) If yes, what disease conditions were discovered leading to carcass condemnation?
(iii) How are the animals to be slaughtered, disposed of?

7.0 REFERENCE/FURTHER READING

Alonge, D. O (2001). *Meat and Milk Hygiene*. (2nd ed.).