

VCH 501: MEAT, MILK AND FISH HYGIENE (3 UNITS)

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IMPORTANCE OF MEAT, MILK AND FISH HYGIENE

Definition of Meat Hygiene Terms

Public Health

This is the total practice of human community medicine resulting in extending life expectancy and delaying the inevitability of death through the promotion of healthful conditions and habits; the prevention of illnesses and the co-ordination of community approaches to medical care.

Veterinary Public Health

Veterinary Public Health is a component of Public Health devoted to the application of Veterinary skills, knowledge and resources to the protection and improvement of human health. It includes:

- i. The Zoonoses. These deal with diseases that can be transmitted from animals to man and from man to animals. It includes surveillance, prevention and control of such diseases.
- ii. Hygiene of food of animal origin. This involves the safe processing and handling of foods of animal origin in manners fit for human consumption and these include meat, milk, eggs and fish products.
- iii. Environmental hazards and protection. Including waste disposal and management and pest control.

- iv. Occupational hazards, trauma, allergies and control of animal population which may serve as disease reservoirs.

Human health problems become Public Health problems when they affect more than an individual in a community and cannot be solved by the unaided effort of the individual. Measures taken to control such disease or conditions will not completely eliminate the problems but will substantially reduce the effect of the disease on the population.

Veterinary Public Health can thus be seen as the bridge between human medicine and the practice of Veterinary Medicine. Efforts in Veterinary Public Health are geared towards the production of safe and wholesome foods of animal origin for the purpose safeguarding the health of the consuming populace.

Meat Hygiene

This is the scientific concepts and procedures applicable to the processing of food animals in such a way that the meat and meat products derived thereof are safe and wholesome for human and animal use.

General Principles of Food Hygiene

Food Hygiene is the efforts made to safeguard food from becoming health hazard and to prevent early spoilage and contamination caused by handling of the foods. It is the procedures applicable to the processing of food in such a way that the products derived thereof are safe and wholesome for human use. The general principle of food hygiene is to ensure that food products are safe, wholesome and fit for human consumption.

Fit for Human Consumption: Food which has been passed and appropriately branded by an inspector and in which no subsequent changes have been found due to disease, decomposition or contamination.

It is important to note that there are three key elements in the above definition. In order for food to be classed as fit for human consumption, it must be safe, wholesome and processed in a hygienic manner.

a) *Safe*: Food products must be free from any substance which may be harmful to man. Such include both infectious agents and toxic substances or either endogenous or exogenous origin.

b) Wholesome: Food products must be free from defects which may be either endogenous diseases or exogenous non-microbial contamination and adulterations.

Whereas the primary aim in a safe food product is to exclude harmful microbes from the food chain, wholesomeness is much broader in that it implies that the food products must be generally free from both microbial organisms, non-microbial contaminants and even religiously and aesthetically acceptable to the consumer.

The criteria governing the wholesomeness of food products can be grouped as follows:

- i) Such food products must be free from obvious defects including contamination with seemingly harmless extraneous materials.
- ii) Microbial contamination of such food products must not exceed levels which could adversely affect the shelf-life of the products. The effect of microbial contamination on the keeping quality of food will depend on the type of products and the storage methods.
- iii) The attributes of such food products must conform to expected standards such as colour, taste and smell.

c) Hygienic processing: Food products processed in the manner to ensure compliance with the above requirements and to protect those involved in the process from occupational hazards such as tuberculosis, brucellosis, salmonellosis, leptospirosis among others.

Hygienic processing also implies that a production system is in place which does not create environmental hazards to the public.

There are a number of other terms used in meat hygiene and many of these are defined in the legislation:

Edible products are defined as products that are fit for human consumption. This would include meat, certain offal, casings, etc. from animals which have been examined and passed by an inspector:

Inedible products are defined as "meat products which are not fit for human consumption" and would include such products as hoofs, horn hair, bone, bristle, blood, dew claws, hide and skin.

Condemned meat is defined as "meat and meat products which have been found by an inspector not to be fit for human consumption". All diseased and defective carcasses or part of

carcasses will be declared condemned material by the inspector and severely contaminated products may also be included in this category.

Purposes of Food Inspection

Meat inspection is the sanitary control of slaughter animals and meat. The aim of meat inspection is to provide safe and wholesome meat for human consumption. The responsibility for achieving this objective lies primarily with the relevant public health authorities who are represented by veterinarians and meat inspectors at the abattoir stage.

The Objectives of meat inspection programme can be broadly classified into two:

- i) To ensure that only apparently healthy, physiologically normal animals are slaughtered for human consumption and that abnormal animals are separated and dealt with accordingly.
- ii) To ensure that meat from animals is free from disease, wholesome and of no risk to human health

Specifically, the purposes include:

- i) To prevent unsanitary meat (i.e. self-dead animals, diseased meat, foetus etc.) from being released for human consumption.
- ii) To prevent post-mortem contamination of meat through unhygienic dressing of carcass, contamination during washing with polluted water, contamination from human carriers of infectious diseases etc.
- iii) To prevent the addition of dangerous drugs and chemicals to meat e.g. in canning.
- iv) To prevent false or fraudulent practices with meat e.g. soaking of meat and rubbing of pale carcasses with blood by butchers.
- v) To detect outbreaks of infectious diseases among food animals.

To fulfil National and International regulations and laws on the meat trade i.e. meat edicts and decrees and other international regulations. E.g. Codex Alimentarius Commission on the acceptable levels of chemical residues in food animals EU (96/446/EU) requirements for

the imports from Third World Countries of bone and bone products, horn and horn products, hoof and hoof products.

Biological and Chemical Bases of Meat and Milk Hygiene

The basic need for meat and milk hygiene stems from the need to produce wholesome products that will nourish and benefit the consumers rather than make them sick. The general belief is that in the developing countries (Nigeria inclusive) the consumption of animal protein is far below the FAO recommended, premised on low production of livestock and poultry for the teeming populace. It is then important that the "little" available animal protein is fit for human consumption.

Several factors are responsible for the unwholesomeness of animal products amongst which are microbial and chemical contaminants.

Microbial contamination

Bacteria are everywhere and can be regarded as common contaminants. The most common ways by which bacteria and other micro-organisms contaminate meat and milk are usually from processing (slaughtering and processing of meat and milk collection and processing) and post-abattoir handling of the products. This includes transportation and storage of meat prior to and during sale.

Efforts must then be put in place for proper slaughtering and processing of food animals to limit the spread of micro-organisms to the edible parts of the carcass (care must be taken to separate clean operations from dirty operations) and also to avoid cross-contamination of the carcass (water, slaughtering surface, meat handlers, containers, vehicles etc).

Assurance of microbiological quality of foods relies on control of the fate of organisms in the food and its environment.

Chemical Contamination

Drugs are the major chemical contaminants of meat and milk. In Nigeria as in some other developing countries, veterinary drugs can be easily purchased over the counter thereby subjecting them to abuse. These drugs may ultimately end up in the food chain for human consumption as residues at undesirable levels constituting health risks to the consumers.

Ante-mortem Inspection of Food Animals

Meat Inspection

This is “Expert supervision of the whole process of producing meat products with the object of providing wholesome meat for human consumption and preventing danger to public health”.

There are 3 steps in Meat Inspection:

Ante-mortem Inspection is the examination of animals prior to slaughter to assess their suitability as a source of products fit for human consumption (animals may be passed as being fit for slaughter for human consumption).

Post-mortem Inspection is the examination of carcasses and organs after slaughter to assess whether these products are fit for human consumption.

Hygiene and Sanitation Inspection is the inspection of facilities, equipment and processes to assess whether the production system is hygienic.

Meat inspection may be performed by various groups of people including Veterinarians, trained inspectors and company quality control personnel.

The methods of meat inspection and the extent to which it is pursued in different countries depend on a number of factors.

Meat Quality: can be defined as “A combination of traits that provides for an edible product that loses a minimum of constituent, is free of spoilage and other abnormalities after processing and storage, is attractive and appetising, nutritious and palatable after cooking”.

PURPOSES OF MEAT INSPECTION

- i) To prevent unsanitary meat from being released for human consumption i.e. self-dead animals, diseased meat, foetus, etc.
- ii) To prevent post-mortem contamination of meat through unhygienic dressing of carcass, contamination during washing with polluted water, contamination from human carriers of infectious diseases etc.
- iii) To prevent the addition of dangerous drugs and chemicals to meat e.g. in canning, Sodium nitrate is now prohibited while Sodium nitrite is recommended as the correct non-toxic level can be determined.

- iv) To prevent false or fraudulent practices with meat e.g. soaking of meat and rubbing of pale carcasses with blood by butchers.
- v) To detect outbreaks of infectious Diseases among food animals. The number of a certain disease detected passing through the abattoir can indicate the incidence of the disease on the field. High incidence of a scheduled disease must be reported to the Animal Health Division.
- vi) To fulfil National and International regulations and laws on the meat trade. i.e. Meat edicts and decrees; Meat for the USA and EEC markets have acceptable limits of chemical residues and nil tolerance for antibiotics and cortisones.

The Objectives of Meat Inspection Procedure

- a. To ensure that only apparently healthy, physiologically normal animals are slaughtered for human consumption and that abnormal animals are separated and dealt with accordingly.
- b. To ensure that meat from animals is free from disease, wholesome and of no risk to human health.

The objectives are achieved by ante-mortem and post-mortem inspection procedures and by hygienic dressing with minimum contamination.

Pre-slaughter care, Handling and Transport of Meat Animals

It is not enough to produce healthy meat animals, it is equally important to ensure that these animals reach the point of slaughter in sound condition. Pre-slaughter care and handling can markedly influence the quality and quantity of meat. Ways of loading and unloading, means of transportation and average distance covered by the animals from the point of product to the point of slaughter has a definite bearing on the keeping quality of meat. Excited, stressed, fatigued, suffocated, bruised and injured animals are not expected to yield wholesome meat.

The underlying principles for pre-slaughter care, handling and transport of meat animals re:

- i. To avoid unnecessary suffering of animals during transport
- ii. To ensure minimum hygienic standards
- iii. To prevent spread of diseases.

Handling of animals should conform to human standards at every stage. It will safeguard the animal welfare as well as meat quality. Rough handling of animals before slaughter can result in

several physiological stress. Loading and unloading operations have to be prompt. It is particularly important in hot weather when heat builds up in stationary trucks.

Transport of slaughter animals

Transport of animals by rail, truck or on the hoof must be carried out carefully to ensure the quality of the meat. Prevention of damage during transport, ante-mortem inspection and rest before slaughter are therefore essential. The main requirements are that:

- i. The owner should be in possession of a movement permit
- ii. During transportation care must be taken to guard the animals against fractures, bruises, lacerations, lack of water and food.

Driving on Hoof

Cattle in developing countries are often driven over 800km, of about 48km per day, to reach consumer area. In these circumstance, holding grounds are essential, to provide a daily intake of water, rest and fodder for the animals in transit.

Road transport

Single-decked lorries are used for large animals, whilst sheep, goat and pigs can be transported in double-deckers. Use of the same vehicles for large and small animals is not recommended. The lorries should have non-slip floors. The landing platform should be fitted with batons to prevent slippage. Where animals are transported on winding roads, it is essential to round off the corners inside the vehicle as very often animals suffocate due to persistent pressure from other animals. For long distance transport under tropical conditions, it is essential that the lorry have a roof or a tarpaulin.

Rail transport

The floors of the rail wagons should be fitted with baton to prevent slippage and should have a roof. Adequate ventilation is essential. The division of the wagon into several compartments is advisable. Entrance should be by a loaded ramp or collapsible door.

Air transport

Expensive, hence limited to small animals like pigs and possible poultry

Sea transport

This means of transportation is very useful in international cattle trade preferably within a limited geographical area.

Minimum Requirements of Transporting Food Animals

The adverse effects of transport could be minimised with the following amenities and practices:

- a) Loading must be done not more than one hour before departure time
- b) Provision of adequate ramp to facilitate loading and unloading and prevent fractures and bruising.
- c) The wagon or lorry should be properly ventilated and provided with roofing to protect animals from rain and heat of the sun. The floor and sides must not be damaged, there should be no nail or sharp obstructions projecting from the floor or wall.
- d) Adequate bedding must be provided.
- e) Avoid overcrowding by providing adequate space for each animal. The floor space for each animal depends on size.
- f) Provide adequate food and water when journey involves extremely long periods
- g) Provide rest during journey, at least every 24hrs for cattle.
- h) The vehicle must be kept clean and disinfected with any of steam or hot water, freshly prepared quicklime, Lysol (2.5%), phenol (3%) formalin (1%).

Lairaging of Animals

Lairage serves as a resting ground for the tired and stressed animals. Resting period depends on the length and mode of journey, animal species, age, condition. Undue holding is also not advised.

Lairages are pens for animals for immediate slaughter and should have direct access to the slaughter hall. They serve the purposes of providing rest for animals while waiting for slaughter for at least 24hrs and not exceeding 72hrs, and also to provide place and facility to inspect the animals prior to slaughter.

Lairage should have adequate space to contain 3days supply of cattle and 2days supply of sheep, goats and pigs. Provided with litter and drainage, provided with watering and feeding troughs, the feed of animals should be however be withheld for 12-18 hours before slaughter, but ample supply of drinking water should be made available during this period. This lowers the bacteria load in the intestine and facilitates easy removal of the hide or skin during dressing of carcass. Stunning is made more effective and brightness of the carcass is also improved. The lairage should also have facilities whereby diseased animals could be isolated. Between the lairage and slaughterhouse, there should be facility to wash dirty animals before slaughter.

Effect of Transport on Meat Animals

- a) *Stress and Fatigue*: These conditions are inevitable sequel to transportation and do have a bearing on meat quality. These conditions may at times lead to shipping fever (pasteurella) and transient tetany.
- b) *Loss of weight or shrinkage*: Shrinkage takes place due to dehydration and depletion of muscle glycogen during the period of journey. In general, it ranges from 3 to 10 percent depending on the conditions and duration of transport.
- c) *Bruises, torn skin and broken bones*: Bruises are noticed in most of the species due to transportation. Muscular bleeding may occur especially in pigs.
- d) *Death*: This may occur during long transportation especially where animals are not properly packed and provided for.

Rest prior to slaughter

Animals transported by rail, road or hoof should not be slaughtered on the day of arrival but should be allowed to rest in the lairage. The transporting vehicle, whether lorry or rail wagon should be subjected to thorough cleaning with disinfectant immediately after discharging the animals.

The quality and condition of the carcass and its storage depend greatly on the care taken prior to slaughter. Nervous, tired and excited animals could have a raised temperature causing imperfect bleeding. Muscular fatigue reduces glycogen content in the blood, which after slaughter changes into lactic acid, thus causing favourable conditions for the growth of spoilage

and food-borne bacteria. Tiredness and excitement also cause penetration of bacteria from the intestinal tract to the meat.

The beating of animals, or brutal pulling and dragging prior to slaughter must be eliminated since in addition to being cruel, it has an adverse effect on the muscle and hence economic value of the animal.

Ante-mortem Inspection of Food Animals

Definition

This is the comprehensive examination of food animals destined to slaughter prior to slaughter. Ante-mortem examination of meat animals for slaughter is very necessary in order to produce wholesome meat and safeguard the health of the consumers.

This aspect of meat inspection should be conducted in the Lairage within 24 hours of slaughter and repeated if slaughter has been delayed over a day.

Objectives

- a) To ensure that animals are properly rested and that proper clinical information, which will assist in the disease diagnosis and judgement, is obtained.
- b) To detect animals suffering from scheduled infectious diseases which are communicable to man.
- c) To detect certain diseases which are toxic or contagious and whose identification is either difficult or impossible during post-mortem, e.g. tetanus, rabies, listeriosis etc.
- d) To make post-mortem examination more efficient, accurate and less laborious
- e) To ensure that injured animals and those with pain and suffering receive emergency slaughter and that animals are treated humanely.
- f) To prevent unnecessary contamination of building and equipment of the abattoir.
- g) To require and ensure the cleaning and disinfection of trucks used to transport vehicles

Ante-mortem Inspection

Some of the major objectives of ante-mortem inspection are as follows:

- i) to screen all animals destined to slaughter
- ii) to ensure that animals are properly rested and that proper clinical information, which will assist in the disease diagnosis and judgement, is obtained to reduce

- contamination on the killing floor by separating the dirty animals and condemning the diseased animals if required by regulation.
- iii) to ensure that injured animals or those with pain and suffering receive emergency slaughter and that animals are treated humanely.
 - iv) To identify sick animals and those treated with antibiotics, chemotherapeutic agents, insecticides and pesticides.
 - v) To require and ensure the cleaning and disinfection of trucks used to transport livestock.

Both sides of an animal should be examined at rest and in motion. Ante-mortem examination should be done within 24 hours of slaughter and repeated if slaughter has been delayed over a day.

Animals affected with extensive bruising or fractures require emergency slaughter. Animals showing clinical signs of disease should be held for Veterinary examination and judgement. They are treated as "suspects" and should be segregated from the healthy animals. The disease and management history should be recorded and reported on an ante-mortem inspection card.

Other information should include:

1. Owner's name
2. The number of animals in the lot and arrival time
3. Species and sex of the animal
4. The time and date of ante-mortem inspection
5. Clinical signs and body temperature if relevant
6. Reason why the animal was held
7. Signature of inspector

Ante-mortem inspection should be carried out in adequate lighting where the animals can be observed both collectively and individually at rest and motion. The general behaviour of animals should be observed, as well as their nutritional status, cleanliness, signs of diseases and abnormalities. Some of the abnormalities which are checked on ante-mortem examination include:

1. Abnormalities in respiration

2. Abnormalities in behaviour
3. Abnormalities in gait
4. Abnormalities in posture
5. Abnormalities in structure and conformation
6. Abnormalities discharges or protrusions from body openings
7. Abnormalities colour
8. Abnormalities odour

Abnormalities in respiration commonly refer to frequency of respiration. If the breathing pattern is different from normal the animal should be segregated as a suspect. Abnormalities in behaviour are manifested by one or more of the following signs:

The animal may be

- a. walking in circles or show an abnormal gait or posture
- b. pushing its head against a wall
- c. charging at various objects and acting aggressively
- d. showing a dull and anxious expression in the eyes

An abnormal gait in an animal is associated with pain in the legs, chest or abdomen or is an indication of nervous disease.

Abnormal posture in an animal is observed as tucked up abdomen or the animal may stand with an extended head and stretched out feet. The animal may also be laying and have turned along its side. When it s unable to rise, it is often called a "downer".

Downer animals should be handled with caution in order to prevent further suffering.

Abnormalities in structure (conformation) are manifested by:

- a. swellings (abscesses) seen commonly in swine
- b. enlarged joints
- c. umbilical swelling (hernia or omphalo-phlebitis)
- d. enlarged sensitive udder indicative of mastitis
- e. enlarged jaw ("lumpy jaw)
- f. bloated abdomen

Some examples of abnormal discharges or protrusions from the body are:

- a. discharges from the nose, excessive saliva from the mouth, after birth
- b. protruding from the vulva, intestine
- c. protruding from the rectum (prolapsed rectum) or uterus
- d. Protruding from the vagina (prolapsed uterus)
- e. Growths on the eye and bloody diarrhoea

Abnormal colour such as black areas on horse and swine, red areas on light coloured skin (inflammation), dark blue areas on the skin or udder (gangrene).

An abnormal odour is difficult to detect on routine ante-mortem examination. The odour of an abscess, a medicinal odour, stinkweed odour or an acetone odour of ketosis may be observed.

Since many abattoirs in developing countries have not accommodation station or yards for animals, Inspector's ante-mortem judgement must be performed at the admission of slaughter animals.

General Guidance for Inspection of Meat

- i. Carcasses, organs and viscera of all animals slaughtered for sale must be inspected at the time of slaughter and dressing of the carcass and passed as fit only if they satisfy the basic hygienic conditions expected. When disease is obviously present in an advanced or generalized degree so as to make further inspection unnecessary, the carcass and organs should be rejected forthwith.
- ii. Animals to be slaughtered for emergency reasons, or suspected of being diseased at ante-mortem inspection, should be kept apart from others and should be slaughtered in the casualty block where such blocks exist. Where this is not possible, such animals should be slaughtered after killing of normal animals is completed.
- iii. Tools, implements and equipment must be kept clean before and after use.
- iv. Inspecting officers and slaughter men shall have at least two knives so that replacement of a contaminated knife is possible at any time. A contaminated knife must be cleaned and sterilized by boiling before further use.

- v. Inspecting officers should incise selected organs and parts of the carcass. All incisions should be made, if possible, in such manner as not to impair the market value of the carcass, organ or part. If the routine incisions are not sufficient to reach a diagnosis the inspecting officer may incise other parts of the carcass as he may deem to be necessary.
- vi. When incising diseased parts of organs, the inspecting officer should avoid contaminating healthy parts of the carcass and organs, the floor and abattoir equipment.

Ante-Mortem Examination Procedure

The disease and management history of the animals should be recorded and reported on an ante-mortem inspection card with the following information:

- a) Owner's name
- b) The number of animals in the lot and arrival time
- c) Species and sex of the animal
- d) The time and date of ante-mortem inspection
- e) Clinical signs and body temperature if relevant
- f) Reason why animal is held
- g) Signature of inspector

Ante-mortem examination should be carried out in adequate lighting where the animals can be observed both collectively and individually at rest and motion.

The examination should be carried out in two stages:

Stage I

General Examination: Meat animals should be observed in the lairage during rest as well as in motion. The general behaviour, reflexes, fatigue, excitement, gait, posture, evidence of cruelty, level of nutrition, clinical signs of diseases or any other abnormalities should be closely observed.

Stage II

Detailed examination: Suspected or diseased animals should be segregated for detailed examination. Their temperature, pulse rate and respiration rate should be recorded.

Animals showing elevated temperature and systemic disturbance should be detained for further inspection and treatment in the isolation pen.

Some of the abnormalities which are checked for are:

- i. abnormalities in respiration
- ii. abnormalities in behaviour
- iii. abnormalities in gait
- iv. abnormalities in posture
- v. abnormalities in structure and conformation
- vi. abnormal discharges or protrusions from body openings
- vii. abnormal colour
- viii. abnormal odour

Principles of Judgement in Ante-Mortem Examination

- a) *Fit for slaughter.* Animals which are normal and free from any clinical signs of disease should be sent for slaughter.
- b) *Unfit for slaughter.* Highly emaciated, skin bound animals and those affected with tetanus or communicable diseases like rabies etc. or diseases which can not be treated should be declared unfit for slaughter.
- c) *Suspects.* All suspected animals need further attention. Some animals with localized condition and recovered cases should be passed for slaughter as suspect with instructions for careful post-mortem examination.
 - i. *Detained animals.* Some animals need to be detained for specified period of time for treatment of disease or excretion of known toxic residues.
 - ii. *Emergency slaughter.* It is recommended in cases where the animal is in acute pain or is suffering from a condition where any delay in slaughter would be contrary to the welfare of animal. It is done under strict supervision so that there is no hazard to the consumer health. Such condition could be recent injuries, recent fractures, tympany (bloat), prolapse of uterus etc.

Ante-mortem examination of meat animals is of prime importance from Public Health point of view. It is the initial step in detection of any sign of disease, distress, injury etc. which helps in

taking appropriate decision before slaughter of animal. It should be done properly and systematically by Veterinarians, which will in turn help in maintaining high standards of meat quality.

Specific diseases that can be encountered in different meat animals during ante-mortem examination and their judgement

S/N	Disease/Condition	Salient signs	Judgment
1.	Emaciation	Pathological condition due to chronic illness, higher metabolic rate	Unfit for slaughter
2.	Rabies	Acute infective disease due to bite of an infected animal manifested by neurological disorder	Unfit for slaughter (to be destroyed)
3.	Anthrax	Acute manifested by fever, bloody diarrhoea and red dark discharge from natural openings	Unfit for slaughter (to be destroyed)
4.	Foot and Mouth Disease (FMD)	Most contagious, causing dullness, depressed appetite, lameness etc.	Unfit for slaughter
5.	Actinomycosis	Chronic granulomatous disease diagnosed by lumpy jaw	Suspect
6.	Actinobacillosis	Marked development of fibrous tissue causing enlargement and hardening of tongue (wooden tongue)	Suspect
7.	Black Quarter	Acute infection characterized by severe inflammation of muscles followed by crepitant swelling on shoulder, neck, breast, loins or thigh	Unfit for slaughter (remove at once)
8.	Tetanus	Acute highly fatal infective disease characterized by spasmodic contraction of voluntary muscles	Unfit for slaughter (remove at once)

		especially masseter muscle often causing lock jaw condition	
9.	Mastitis	Inflammation of the mammary gland	Suspect
10.	Tuberculosis	Chronic inflammation of lungs, swelling of retropharyngeal lymph gland	Unfit for slaughter
11.	Sheep scab	Parasitic disease caused by sucking mites, crust formation on the skin coupled with progressive emaciation	Suspect
12.	Caseous lymphadenitis	In sheep and goat, externally placed lymph nodes enlarged and contain a greenish yellow gelatinous pus	Generalized - Unfit for slaughter; Localized – Suspect
13.	Pneumonia	Nasal discharge, lungs are severely affected	Suspect
14.	Swine fever (Hog cholera)	Acute highly contagious disease, with signs of septicaemia in the form of multiple haemorrhages	Unfit for slaughter
15.	Atropic Rhinitis	In pig, snout becomes inverted, with wrinkling of skin over the affected area. Nasal septum distorted with bloody nasal discharge	Suspect
16.	Swine Erysepalus	Characterized by different forms such as acute septicaemia, skin form, chronic arthritis and vegetative endocarditis	Suspect
17.	White Scour	In calves, a large abscess in the abdominal wall near umbilicus which becomes hard and swollen	Unfit for slaughter
18.	Calf Diptheria	Characterized by foul smelling diptheric patches and ulcers in mouth,	Unfit for slaughter

		tongue, gums and pharynx	
19.	Salmonellosis	Severe diarrhoea with foul-smelling which may contain blood, fever, loss of appetite, dullness, dehydration	Unfit for slaughter
20.	Listeriosis	Stiffness of neck, uncoordinated movement of limbs, paralysis of muscles of jaw and pharynx	Acute case - Unfit for slaughter Recovered – Suspect
21.	Selenium poisoning	Peeling of the skin	Unfit for slaughter Recovered animal – Suspect

Slaughtering and Handling of Meat

Slaughtering means putting the food animals to death and thereafter preparing the carcasses for human consumption. The essentials in the slaughter of food animals are that it should not cause unnecessary suffering to the animals and bleeding should be as efficient as possible. Besides, it should be safe for the handlers also.

Slaughter types

Home slaughter

In developing countries animals are often slaughtered at home, and this practice is likely to continue for many years to come. Domestic slaughter of animals is not recommended. Instead, animals should be taken for slaughter at an approved slaughter slab.

The assurance of clean, wholesome meat; the elimination of contamination of the premises of the owner with blood or intestinal contents and the danger of diseases spreading to animals and man are the factors in favour of using a slaughter slab. In slaughtering, a hole of about

50cm deep should be dug under the bleeding animal. Dogs must be kept away from the slaughter place.

During all operations, utensils, hands and clothes should be as clean as possible. Only the slaughterer should be allowed to touch the meat, while other people may only handle hides and intestinal contents.

Emergency slaughter

As an emergency, animals that have been hit by a vehicle, or have broken limbs, or have been gouged by horns, or damaged in any other accidental way can be slaughtered on the understanding that slaughter takes place immediately after the accident before the multiplication of pathogenic and other micro-organisms can start and all broken, damaged or bruised bones or meat are considered as condemned and discarded as such.

Dry slaughtering

This occurs when all the operations: flaying, evisceration, splitting and despatching are done without the carcass coming into contact with water, either directly or through wet walls, floors or equipment. It must not however be understood to mean that the premises are dirty or unwashed, on the contrary, strict pre-slaughter hygiene and thorough cleaning and washing of the premises and equipment must be carried out after each slaughter operation so that the next slaughter takes place in clean, dry premises. Care must be taken that meat does not come in contact with intestinal contents, floors hides and skin and unsafe water.

In dry slaughtering, all operations are performed on the rail from the point of entry to exit. This however does not interfere with strict meat inspection.

Muslim method of slaughter or Halal

When animals are to be slaughtered according to Muslim injunction, the meat produced thereof is known as *Halal* meat. Such must follow the following principles:

- a) The animal must be healthy and conscious.
- b) Slaughter should be quick, with a single stroke cut to the throat without inflicting suffering to the animal. Stunning is not acceptable.
- c) The animal should be slaughtered lying on the floor with its head facing Mecca.
The neck of the animal is severed by cutting the four major blood vessels (carotid

arteries and jugular veins) with a sharp knife. The spinal cord is left intact. So the nerve centres controlling the heart and lungs remain functional and an efficient bleeding is ensured. It also enhances the keeping quality of meat.

- d) The name of Allah be invoked during the slaughter
- e) Since pig is regarded as unclean animal, and the consumption of pork is prohibited under the Muslim injunction, it is not acceptable to slaughter pigs under the same roof as cattle, sheep or goats. Also, a meat shop selling mutton, goat or beef slaughtered according to Muslim rites cannot sell pork to non-Muslims.