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Abattoirs — Code of hygienic practice

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ES 1134:2005

Foreword

This Ethiopian Standard has been prepared under the direction of the Agriculture and Food Technology Technical Committee and published by Quality and Standards Authority of Ethiopia.

In preparing this Ethiopian Standard the following publications have been used:

- Codex Alimentarius , "*General requirements(Food hygiene)*", Vol. 1B second edition 2001
- Codex Alimentarius, "*Meat and meat products including soups and Broths*", Vol.10 Second edition 1993
- Indian Standards IS 4393-1979." Basic requirements for an Abattoir".
- Australian quarantine and inspection service, (1995): Operational guidelines for the welfare of animals at abattoirs and slaughterhouses.
- Food and Agriculture Organization of the United Nations, FAO, (1990): Manuals of Food Quality Control 5, Food Inspection.
- Food and Agriculture Organization of the United Nations, FAO, (1992): Construction and Operation of Medium Size Abattoir in Developing Countries. Animal Production and Health Paper. Rome.

Acknowledgement is made for the use of information from the above publications.

Abattoirs- Code of hygienic practice

1 Scope

This Ethiopian Standard covers the hygiene and sanitary for abattoirs carrying out sheep, goats, pigs, camels and cattle.

2 Normative references

The following Ethiopian Standard contains provisions which, through reference in this text, constitute provisions of this Ethiopian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES 261:2001, *Drinking water specification*.

3 Definitions

3.1

abdomen

the part of a mammal's body between the thorax and the pelvis.

3.2

abomasum

the fourth compartment of a ruminant stomach, sometimes called the true stomach.

3.3

abscess

a localized collection of pus in a cavity formed by the disintegration of tissues.

3.4

adhesion

the fibrous band or structure that forms an abnormal union of two adjacent tissues or organs.

3.5

aitch bone

the bony surface of the pulvic bone that is exposed when the carcass is split.

3.6

amphoteric surfactants

the sanitizing (disinfecting) agents which are surface active, compatible with all other detergents and sanitizers and unaffected with hard water

3.7

ante-mortem Examination

Examination of animals within the abattoir premises (lairage) by an authorized veterinarian or inspector within 24 hours of their arrival in order to determine their fitness for slaughter.

3.8

anthrax

a bacterial disease that affects both animals and man and caused by a bacterium called *Bacillus anthracis*.

3.9

apron

a piece of leather, plastic or waterproof cloth worn across the front of the body to protect the clothing and the person of the wearer.

3.10

bilateral

on both sides

3.11

brand

a mark or label of identification. The brand may indicate inspection, grade or commercial name

3.12

brisket

the breast or anterior lower portion of the chest of a beef carcass.

3.13

bruising

an injury or mark of a body (skin, muscle, etc) that is not broken but is darker in color often as a result of being hit by some thing.

3.14

bung

the cecum or blind gut which is cleaned and prepared as a sausage.

3.15

captive bolt

an instrument that is used to drives a bolt out of a barrel for a limited distance.

3.16

carbuncle

painful swelling on the skin of man as a result of infection by a disease called anthrax.

3.17

carcass

the eviscerated, usually skinned body of a slaughtered animal.

3.18

carotid arteries

major blood vessels located on the neck and supply oxygenated blood to the brain.

3.19

casings

tubular container for sausage products made of either natural or artificial (synthetic) materials.

3.20

caudal

towards the hind part of a body.

3.21

caul

Omental fat.

3.22

cecum

the blind extension of the intestine that opens into the intestinal tract at the junction of the small and large intestine.

3.23

charcoal

a hard black substance similar to coal which can be used as fuel.

3.24

chemical disinfection

the act of disinfection of abattoir equipment by means of approved chemicals such as Chlorine , Iodine and others.

3.25

chlorination of water:

addition of a chlorine chemical to water so as to control the level of bacteria found in it and make it safe for drinking and other use.

3.26

clean

free from dirt, disease contaminant or any undesirable element.

3.28

cleaning

the removal of soil, meat residues, dirt, grease or other objectionable matter.

3.29

coliforms

group of bacteria, such as Escherichia coli, which are capable of causing serious food poisoning illness in man and animals as a result of their contamination of food substances such as meat.

3.30

condemned

inspected and judged as, or otherwise officially determined to be, unfit for human consumption and requiring destruction.

3.31

contaminant:

objectionable matter, and includes substances and/or microorganisms that make fresh meat unsafe and/or unwholesome.

3.32

cross-contamination

transfer of bacteria or other contaminants from the diseased unclean part of a product to a clean product by direct or indirect means (from product, equipment, utensils, clothing, etc.

3.33

decontamination

a process of freeing oneself, area or material from a certain contaminating agent such as bacteria.

3.34

denature

means to treat a meat product to make it unsuitable for use as food.

3.35

detergent

a cleansing substance which, acting with water, can remove soil, or dirt from surfaces.

**3.36
disinfection**

the reduction, without adversely affecting the meat, by means of hygienically satisfactory chemical agents and/or physical methods, of the number of micro-organisms to a level that will not lead to harmful contamination of meat.

**3.37
disinfection by heat**

the application of moist heat to raise the surface temperature to 82°C.

**3.38
dressing**

the progressive separation on the dressing floor of a slaughter animal into a carcass (or sides of a carcass), offal and inedible by products

**3.39
dry landing area**

a curbed area immediately adjacent to a stunning box on to which stunned animals roll when the stunning box is opened.

**3.40
edible**

any material fit to be eaten or known to be safe for eating.

**3.41
encase**

to cover or enclose completely.

**3.42
etiologiical agent**

the microorganism which is responsible for causing a certain particular disease.

**3.43
evisceration:**

act of separating the thoracic and abdominal cavities organs from the carcasses.

**3.44
eviscerator**

one who removes the abdominal or thoracic organs from the carcass.

**3.45
excise**

to remove a certain part of an organ or tissue by cutting.

**3.46
abattoir**

a premise used for the slaughter of animals for export purpose for human and approved by the federal regulatory administration.

**3.47
faeces**

solid waste excreted from animals or man.

**3.48
flaying**

to remove the skin from the body of a slaughtered or dead animal

3.49

food grade dyes

a chemical substance (approved by the regulatory authority), which can be added to edible products such as meat, to change its color without causing any unwanted side effects on the consumer.

3.50

foot and Mouth Disease

a disease of cloven-hoofed animals capable of causing very significant economic losses.

3.51

grubby tissue

a part of an animal's body that is affected by a certain parasitic (larval) stage of a fly called Hypoderma bovis.

3.52

HACCP

is a management system in which food (meat) safety is addressed through the analysis and control of biological, chemical, and physical hazards from raw material production, procurement and handling, to manufacturing, distribution and consumption of the finished product.

3.53

Hala

permitted, allowed, authorized, approved, sanctioned, lawful, legal, legitimate or licit.

3.54

hot-water disinfection

a method of disinfection of removable parts of a machinery and smaller items by submerging the material in a sink or tank containing water at suitable disinfection temperatures(82°C) for two minutes.

3.55

hpz (lbf/ sq. in) (pound force per square inch)

Unit of measurement for water pressure.

3.56

humane slaughter

the act of slaughter without making the animal suffering unnecessarily.

3.57

hygiene

conditions or practices conducive to health - as related to cleanliness.

3.58

hyoid bones

the bent "y"-shaped bone structure that supports and "hinges" the rear or back of the tongue.

3.59

immersion

to put something completely under the surface of a liquid.

3.60

Incinerator

an abattoir facility used for complete burning of any condemned material.

3.61

Inedible

officially determined to be unfit for human consumption.

3.62

infective agent

a microorganism which is capable of causing disease in man or animals.

3.63

ingesta

meat or drink taken into the stomach.

3.64

in-place cleaning

the cleaning of equipment including pipe runs, with water and detergent solution without dismantling the equipment or pipe runs.

3.65

iodophors

sanitizing (disinfectant) compounds having iodine as a main constituent.

3.66

jugular veins

major blood vessels that remove deoxygenated blood from the head region and are located on the neck.

3.67

Kgf/cm²

an abbreviated word, which stands for kilogram force per centimeter square.

3.68

labeling

a written material attached to the meat or meat product package, which can give the required information on specific matters about the product to the buyer and the regulatory authority.

3.69

lairage

the portion of the abattoir in which the animals to be slaughtered are received and allowed to rest for a period of 24-72 hours during which they are supplied with water and feed if they stay for more than 24 hrs or water alone if to be slaughtered within the next 24 hrs.

3.70

larynx

a muscular hollow organ between the nose and the lungs (the first part of the wind pipe or trachea also known as voice box).

3.71

leak proof container

a container that is free from a hole or crack that allow the escape of its content.

3.72

manual cleaning

removal of dirt by scrubbing in the presence of a detergent solution.

3.73

Manure

excrement from animals.

3.74

marking and branding

the application of visible information on the surface of an inspected meat product by means of a metal dipped in an approved dye notifying its inspection status.

3.75

meat by-product

any part other than meat that has been derived from either of cattle, sheep, or goats, capable of use as human meat.

3.76

Muslin

a very thin cotton material.

3.77

Offal

parts of a slaughtered animal other than the carcasses (such as heart, liver, tongue etc.)

3.78

offensive taste

unpleasant taste.

3.79

pathological lesion

an injury or affection of a certain organ or tissue due to some disease conditions.

3.80

pelvic cavity

an area (cavity) of the body in which body organs such as the rectum, cervix, urinary bladder, etc. are located.

3.81

pet

an animal (such as dogs and cats), which is kept in the home as a companion and treated affectionately.

3.82

pH

a measure of the degree of acidity, neutrality or alkalinity of a certain substance.

3.83

physician

a medical doctor especially one who has a general knowledge but not a surgeon.

3.84

pizzle

the entire penis of a male slaughtered animal that has been severed from its pubic attachment to the carcass and freed from the prepuce.

3.85

porcelain

a hard but delicate shiny white substance made by heating a special type of clay.

3.86

postmortem inspection

inspection of carcasses and other parts of a slaughtered animal in the slaughter hall before the meat is allowed to be dispatched or further proceed for human consumption.

3.87

ppm

an abbreviated word which stands for parts per million.

3.88

precautionary

an action that should be done to prevent the happening of an unpleasant situation.

3.89

prepuce

the external skin covering of the male genital organ.

3.90

protective clothing

special garments intended to prevent the contamination of meat and used as outerwear by persons in an abattoir and includes head coverings and footwear.

3.91

PSI

an abbreviated word for "pressure per square inch".

3.92

quaternary ammonium compounds

they are among the commercial disinfectants which have a good cleansing (detergent) but weak disinfectant property.

3.93

rail system

One of the systems of carcasses dressing where by carcasses are suspended by a spreader and single wheel trolley and can be gravitated to operating stations.

3.94

regulatory authority:

a Federal, *reginal* Governmental, Ministry or Authority which has been given legal power to carryout meat inspection, certification and all other control activities with regard to export abattoirs.

3.95

rendering plant:

a facility of an abattoir for the purpose of processing all inedible and condemned meat products to produce some useful by-products such as inedible oil and make the rest of the material free from disease causing (infectious) agents.

3.96

residue

that part of a drug, chemical etc. that has still remained in the body tissue.

3.97

rinse

to use water to remove dirt or soap from something.

3.98

ripping

the act of making initial cuts on the throat of the skin of an animal and extending it to the tail base and its appendages (limbs) so that complete flaying can take place.

3.99

ritual slaughte

slaughter approved in accordance with the requirements of a religious faith that prescribes a method of slaughter where the animal suffers a loss of consciousness by anemia of the brain caused by severance of the carotid arteries with a sharp instrument

3.100

rodding

a process of separating the oesophagus from the surrounding neck and thoracic tissues.

3.101

sanitizing

the process of reducing the level of microorganisms present to a level deemed safe by the regulatory authority.

3.102

shackling

the application of a chain loop to the hind leg in preparation for hoisting carcasses to an overhead rail.

3.103

shroud

an unbleached muslin sheet soaked in water or salt brine and then pulled tightly around the beef side and pinned into place.

3.104

skinning

the act of removing the skin (flaying) from a slaughtered or dead animal.

3.105

slaughtering

act of making an animal bleed to death by severance of the neck with major blood vessels.

3.106

sphincter muscle

a muscle that surrounds an opening in the body such as anus and can tighten to close it.

3.107

sporulated (spore)

a particular stage (form) of certain groups of bacteria such as anthrax, which is capable to resist and survive adverse physical or chemical treatments.

3.108

sterilization

the complete elimination of microbial viability by approved means.

3.109

sticking

act of making an animal bleed to death by direct puncturing of the heart

3.110

stockyards

a set of enclosures where livestock are kept before slaughter.

3.111

stunning

a mechanism by which animals are made to lose their consciousness and their sensations to pain so that they will not feel pain while being slaughtered.

3.112

tags

Identification marks written on materials that can be hung on parts of an animal to be slaughtered or parts of the carcasses of a slaughtered animal.

3.113

tainted

of material that is spoiled or decomposed only to the degree that it is detectable by taste or smell.

3.114

trimming

removal of a certain amount of flesh from carcasses which is found contaminated with dirt or affected with some sorts of mechanical injury.

3.115

tripe

cleaned, denuded rumen and reticulum.

3.116

urinary bladder

a body organ, which stores urine before micturition.

3.117

virulence

measure of severity of the disease condition that a certain microorganism is capable of causing to the patient.

3.118

viscera

the internal organs and glands contained in the thoracic and abdominal cavities.

3.119

vulva

the part of the female sex organ that is found outside the body (external opening).

3.120

wrapping

the act of covering or protecting meat and meat products by a piece of material such as plastic.

4 Abattoir and Establishment Plant Facilities

4.1 Abattoir and Plant Facilities for holding, slaughter, dressing, further processing and distribution should provide an environment that allows the application of consistently applied minimum food safety requirements. The structure of the abattoir or establishment and the equipment use should limit microbial contamination to as low a practicable level as possible and prevent subsequent growth to levels that may constitute a hazard. The structure and equipment should also protect meat from contamination from outside sources.

5 Sanitation

Sanitation in relation to meat hygiene in an abattoir is the *control of environmental influences which may adversely affect the appearance, flavor, shelf life, safety and aesthetic acceptability* of meat products

5.1 Employee Training

- Management has a responsibility of assuring that the requirements are being consistently met by their employees in the interest of the quality of the product and the well being of their staff.
- For insuring the abattoir or abattoir employees understand what they do and why they must follow specific working procedures personnel training should be considered as an important activity of the abattoir or establishment.
- Abattoir employees must understand the risks associated with contamination of meat by microbiological or chemical agents.
- All meat handlers must be given appropriate training in personal hygiene and hygienic handling of meat at the beginning of their employment as well as at other times (at least once in a year) on a regular basis.

- Employees must be shown the ways to avoid the contamination of the product and they should be given the proper equipment to achieve this goal.
- All employees should be given a copy of their work instructions (with regard to hygiene and any other activities of their own) and that they fully understand what is expected of them.

5.2 Health Status of Employees

- Persons who come in contact with meat in the course of their work should have a *medical examination prior to their employment and regular check up every six months and at other times when necessary.*
- The management should assure that medical advises are provided for any person afflicted with open wounds, sores, diarrhea, colds, respiratory ailments or any other illness as soon as it is reported.
- The management should take care that no person while known or suspected to be suffering from, or to be a carrier of a disease likely to be transmitted through meat (typhoid, dysentery, salmonella and cholera) or while afflicted with infected wounds, skin infections, sores or with diarrhea is permitted to work in any meat handling area.
- Any person who has a cut or wound should not be allowed to handle meat or meat contact surfaces until the injury is completely protected by a water proof covering which is firmly secured.

5.3 Sanitary Work Habits

- These should preclude the use of chewing gum, snuff and tobacco in any form in the meat handling areas.
- Eating and drinking should be confined to the designated lunchroom areas.
- Scratching of the head, face, etc., or the placing of fingers in or around the mouth or nose should be prohibited.
- Coughing, sneezing and spitting are non-acceptable practices.
- Rules such as “ *No Smoking; No Eating, No Nose Fingering etc* ” should be clearly written and placed in areas where all employees can have a look at it should be strictly adhered to.
- Hands, including fingernails, should be clean and should be washed at all times after using the lavatory facilities.
- Every person, while on duty on the slaughtering or meat handling area, should wash his hands thoroughly as soon as his hands come in contact with blood or any other dirt with a suitable hand cleaning preparation (liquid soap under running warm water).
- Hands should always be washed and disinfected immediately, with 100-ppm chlorine or 15-ppm iodine solution or liquid soap under running warm water, before commencing works after using the toilet or handling any material, which might be capable of transmitting disease.
- Hand wash facilities, which are to be located at the entrances to production areas, should be used by everyone upon entering the meat production/handling/ area.
- Hand sanitizers for the use of meat handlers should have the composition and strength of 100-ppm chlorine or 15-ppm iodine solution.
- The frequency of changing the hand sanitizers' solution, which should be established by the inspector based on his evaluations in the light of organic material being added over the time period, should be adhered to.

- Care of the hands should include the treatment and appropriate covering of all cuts and sores by the abattoir's nurse or designated first aid employee.
- One must avoid the use of nail polish, hand creams and lotions when handling edible product.
- Employees should neatly and cleanly dressed (with out any visible sign of contamination or dirt), whether they wear head coverings that properly cover their hair, and should avoid any unwarranted human contact with the product such as contact with the forearms
- Persons handling materials or products capable of contaminating the end product should not come in contact with any end product unless and until they discard all protective clothing worn by them and have changed in to clean protective clothing.
- Responsibility for ensuring compliance by all personnel with all requirements should be specifically allocated to competent supervisory personnel to be assigned by the abattoir's management.

5.4 Working apparel

- Suitably washed, ironed (other than boots and aprons) and maintained work clothing must be substituted for worn over or any other piece of clothing that may contact meat products.
- Work clothing must not be worn or stored in incompatible areas (washrooms, lunchrooms, lockers used for street clothing, outside the abattoir, etc.).
- The boots to be used in the dressing and other meat handling areas of the abattoir should be of a material impervious to moisture and should be of a color distinct from other footwear and these boots must be worn only at the workrooms.
- Other footwear must be utilized when walking to and from the workstation.
- Any insecure jewelry or jewelry that cannot be adequately disinfected should be removed from the hands of employees working in the slaughterhouse.
- Jewelry items, which cannot be removed such as continuous loop earrings, wedding bands, bracelets or necklaces, etc., also create a potential risk to the safety of the product and must be adequately covered.
- In these same areas, items such as pens, pencils, etc., should not be kept in coat/shirt pockets where they may accidentally fall into products.
- All persons working or entering areas where meat products are open to exposure must wear appropriate head coverings such as hairnets, to prevent the contamination of the product through the introduction of falling hair. In order to achieve this, the head coverings must cover all exposed hair.
- Protective clothing of a light color (such as overalls, gowns aprons, head coverings, and foot wears) and of such material as to render them easily cleaned and in such a number as to be sufficient for the abattoir employees and meat inspectors for changing every day and some more spare protective clothing that are to be used for visitors should be provided.
- Each set of protective clothing should be washed and ironed at the end of the day's operation.
- Those types of protective clothing such as aprons and foot wears should be washed by hand held sprays as soon as contaminated by blood or gut contents.
- If any hand tools and equipment such as knives are found contaminated with blood, gut content or any dirt matter during slaughtering, flaying and other subsequent operations, they should be sanitized

(washed in a sanitizing solution such as a 200 ppm chlorine solution or in hot water of 82°C for two minutes and rinse them in water) before proceeding to the next activity.

- Hand tools such as knives used to slaughter or dress one animal or a carcass should be washed before re-using it for slaughtering any other animal or dressing a carcass.
- If gloves are used in the handling of meat products, should be maintained in a clean and sanitary condition by washing with hot detergent (soap) solution and rinsed with water.
- The wearing of gloves should not exempt the operator from having thoroughly washed hands.
- At the end of operations, work clothing and equipment such as knives, hooks, steels, mesh gloves, etc should be cleaned and sanitized and be available for a pre-operational inspection.

5.5 Visitors, vehicles and animals

- Unauthorized personnel and vehicles, non-slaughter animals such as dogs and cats, wild birds and vermin should be kept out of the abattoir compound.
- The abattoir's management should take precautions to prevent visitors to meat handling areas and thereby contaminating meat and meat products.
- If they are allowed to visit, they should be supplied with protective clothing before letting them have access to these areas.

5.6 Building and equipment maintenance

- When maintenance of the abattoir is required the abattoir management should do with prior consultation and close supervision of the inspector for its adequacy and approval of the type of replacement (maintenance) materials to be used with regard to meat safety.
- It should be checked that the newly replacement equipment or materials are free from heavy metals such as lead and others.

5.7 Sanitation Program

The abattoir management should have a written cleaning and sanitation program for the entire premises.

The program specifies the following:

- Areas to be cleaned,
- Method of cleaning to achieve the required efficiency,
- Person responsible,
- Frequency of activity.

Monitoring of the effectiveness of the sanitation program is the responsibility of abattoir management. In addition to the pre-operational inspection, checks for effectiveness of the sanitation program should be instituted.

5.8 Pre-Operational Inspection Program

Pre-operational inspection of the abattoir should be conducted by a responsible abattoir employee to ensure that operations only begin after sanitation requirements have been met.

5.9 Cleaning

5.9.1 General Remarks

- Good hygiene demands effective and regular cleaning of abattoir's equipment and vehicles to remove meat residues and dirt, which may contain meat poisoning and spoilage microorganisms.
- Water used for cleaning, hand washing and carcass spraying should be of a potable quality (*annex3*).
- Detergents must have good wetting capacity and rinsing property (*see annex 3*). The detergent used should be non- corrosive and compatible with other materials including disinfectants used in the sanitation program.
- Cleaning operations should include areas such as lairages, stunning & bleeding sectors, slaughter hall, deboning department, refrigeration and meat preparation area, offal and hide rooms, boiler room, toilets, service areas, and all types of equipment.
- The methods of cleaning & disinfections should be considered satisfactory by the official regulatory agency and the procedures be set down by the management in written schedules and made available for the guidance of employees.
- There should be adequate supervision by the abattoir's management to ensure its effective implementation.

The abattoir premises should be cleaned:

a) While the work is going on

- Removal of garbage,
- Gross contamination (blood, feces, etc.) cleaning by using low pressure water spraying,
- Cleaning of hand tools such as knives, hooks, saws etc, which are used for bleeding, skinning, dressing, inspection etc., as soon as contaminated and/or after using them for one animal or carcass and before proceeding to the next (by immersing in a hot detergent solution or in 200ppm chlorine solution and finally rinsing with water (Where appropriate)).

b) Thoroughly every day after work stops (floors, walls, equipment, clothing and others)

c) Thorough cleaning and disinfection at least once a week.

Cleaning and disinfection should be so arranged in such a way that meat should not be contaminated with dirt or disinfectants while cleaning and disinfecting.

5.9.2 Cleaning Procedures:

- Removal of gross debris from surface by brushing and scrapping of deposits followed by application of water,
- Where appropriate, application of detergent solution to loosen soil and bacterial films and holding them in solution or suspension,

- Where appropriate, rinsing with hot water,
- Disinfection (daily or weekly as may be required).

5.9.3 Cleaning Schedule

Although the abattoir management in consultation with the inspection staff should prepare a more detailed cleaning (sanitation) program and follow up its proper implementation, a more comprehensive cleaning schedule (both in time and place) up on which the management should have adherence to is outlined below.

5.9.3.1 Cleaning by Time

a) Cleaning During Working Hours (Operational Sanitation)

- During routine operations, feet, hides and skins, offal, waste scraps, condemned carcass or parts should be removed immediately from the slaughter floor and transferred to their respective designated areas so that the slaughter hall looks tidier and makes the general and subsequent cleaning activities easier.
- Garbage found any where in the abattoir compound should be collected during and after working hours and disposed off to the designated waste disposal area at least once daily.
- Where appropriate, obsolete equipment, (which are not in use) should be removed from production (working areas) and transferred to the warehouse room for further maintenance or disposal.
- During work break hours cleaning of floors by using cold-water spraying can be done but the use of hoses (cold-water spraying) during active work hours has to be done with great care to avoid the splashing of carcass and offal.
- Where appropriate, any hand tools such as knives, hooks, saws, etc., which are used for bleeding, ripping, head and feet removal, skinning, carcass dressing, inspection, etc., should be sanitized by immersing in a tank of water at a temperature of 80-82^oc for two minutes or in a 200ppm chlorine solution and then rinsing with hot water after being contaminated with dirt mater and/ or using them for one animal or carcass and before reusing them.
- Those types of protective clothing such as aprons and foot wears should be washed by hand held sprays as soon as contaminated by blood or gut contents
- Immediately after disposal any receptacle (container) coming in to contact with the condemned and inedible products should be cleaned & disinfected in a similar manner.

b). Cleaning After Working Hours (Post Operational Sanitation)

- Dry cleaning (removal of the top and gross dirt particles without using water) should be done immediately after completion of slaughtering operations have ceased and before fat has had time to harden. This should embrace the whole premises including the lairages.
- Where appropriate, after dry cleaning is completed, detergent solution (soap or any other approved detergent) is applied on the surface of the area (walls, floors, surfaces of stationary equipments, etc.) to be cleaned the equipments and hand tools are immersed in the hot water detergent solution to loosen soil and bacterial films and holding them in solution or suspension.
- Removal of soil and gross dirt matter by scrubbing from the surface of the walls, floors and equipments and hand tools in the presence of detergent solution (where appropriate).
- Where appropriate, rinsing with hot water must be applied under 14kgf/cm^2 pressure and 82°c temperature. Conveyors, chutes and other types of equipment should be cleaned in a similar manner.
- Where appropriate, all work (protective) clothing such as aprons, boots, overall, gowns etc. should be cleaned by using a hot detergent water solution and final cold water rinse, followed by drying and ironing after the end of the day's operation.

c) Cleaning and Disinfection at Weekly Intervals

Where appropriate, a more thorough weekly use of detergents and sanitizers is necessary for areas such as the killing floor, detain room, head room, casing and cleaning room, offal preparation room, meat cutting and boning room, condemned and inedible room.

For this different types of cleaning and disinfection methods in combination or alone can be utilized (see annex 4) as required. The commonly used method being:

- For small item of equipment such as knives, hooks, saws, trays and others, soaking in a detergent solution in a separate receptacle is necessary to loosen the dirt prior to scrubbing.
- Removal of soil and gross dirt matter by scrubbing from the surface of the walls, floors and equipment in the presence of detergent solution.
- Where appropriate, application of detergent on the surfaces of areas and stationary equipments in the form of foam, which is allowed to remain for up to 15-20 minutes and

then rinsed off with a hot water (80-82°C) spray.

- Where appropriate, removable parts of machinery and smaller items of equipment must be submerged in a tank of water at a temperature of 80-82°C for two minutes.

5.9.3.2 Cleaning by Area and Material

a). Lairage:

- Being the point of stock reception the possibility of contamination for lairage (including races leading to the stunning area) is very high that regular cleaning is essential.
- At the end of each day's operation, gross debris, dirt and faecal matter should be removed and followed by washing down of floors, walls and partitions using high pressure (14Kgf/cm²) cold-water spray. Care has to be taken not to splash stocks in the pens.
- At monthly interval partitions, walls or tubular fittings will require scrubbing with a stiff brush or scraper.

b). Where appropriate, Slaughter Hall and Accessory Departments (Kill Floor, Head Room, Casing and Cleaning Room, Offal Preparation Room, Boning And Cutting Room, Detain Room):

- In these areas in which carcasses and meat are handled, cold water at low pressure must be used constantly during working hours (with greater care not to splashing the carcass) to remove dirt from the floor and some fixed equipment and to clean operators boots and aprons when contaminated by fecal, blood or other dirt matter while doing their work.
- Where appropriate, cleaning using high-pressure hot water (14kgf/ cm²) pressure at the nozzle and 82°C temperature) should be used at specified times when operations are suspended (break hours) and at the end of the day's kill.
- When stationary equipment is cleaned, meat products must either be removed from the room or area, or adequately protected from splash contamination.
- Where appropriate, for effective cleaning of equipment such as pipe runs, in place cleaning (cleaning without dismantling) with water and detergent solution having a minimum fluid velocity of 1.5 meters per second (5 feet per second) with turbulent flow is required. If it cannot be cleaned satisfactorily by this method, the parts should be dismantled and cleaned by immersing in a hot water detergent solution.
- All mobile equipment and equipment which can be dismantled should be moved to cleaning and sterilization room for cleaning together with other smaller hand tools such as knives, hooks, cleavers (saws), trays and others after the end of the day's operation by immersing in batches in tanks containing hot detergent solution for two minutes and final washing by hot water (82°C) rinses.
- Where appropriate, hot water jet hoses can be used to clean certain types of equipment

such as offal racks, containers etc.

- Where appropriate, all equipment, which has come in contact with contaminated material or condemned product should be washed by immersing in sanitizing chlorine water solution of 200ppm or hot water detergent solution of 82°C for two minutes and final hot water rinse before reuse.
- All hand tools (equipment) such as knives etc. which are used to bleed, skin, dress, inspect etc. one animal or carcass should be washed clean and sanitized by immersing in a sanitizing chlorine water solution of 200ppm or hot water detergent solution of 82°C for two minutes and then rinsed with hot water before reusing them for the next animal or carcass.
- Those types of protective clothing such as aprons and foot wears should be washed by hand held sprays as soon as contaminated by blood or gut contents
- All work (protective) clothing such as aprons, boots, overall, gowns etc. should be cleaned by using a hot detergent water solution and final cold water rinse, followed by drying and ironing (except for boots and aprons) after the end of the day's operation.

5.10. Changing Rooms and Toilets

5.10.1 Changing facilities and toilets should be kept clean at all times and a routine cleaning and disinfection procedure should be conducted during work hours and after the day's operation is finalized (as indicated for other areas).

5.11 Condemned and Inedible Room

5.11.1 As in the other areas of the abattoir, sanitary conditions must be maintained at all times in the condemned and inedible rooms of the abattoir by applying a daily clean up activities

- **Removal of gross debris (dry cleaning)**
- Where appropriate, Detergent solution is applied on the surface of the area to be cleaned and the equipments and hand tools are submerged in the water detergent solution to loosen soil and bacterial films and holding them in solution or suspension
- Where appropriate, removal of soil and gross dirt matter by scrubbing from the surface of the walls, floors and equipments and hand tools in the presence of detergent solution.
- Where appropriate, sterilization (sanitize) of work equipment after the completion of the day's operation by immersing in batches in tanks containing hot detergent solution or 200ppm chlorine solution for two minutes and final washing by hot water (82°C) rinses and the rooms with hot water sprays (82°C).
- In addition to the daily cleaning activities, whenever unsanitary conditions develop due to a spill of product or for any other reason, management should arrange for an immediate

clean-up.

- A more thorough weekly cleaning and disinfecting programs should be practiced as indicated above and taking immediate effective actions if unsanitary conditions develop.
- Condemned products holding containers must be thoroughly cleaned and sanitized (by immersing in 200 ppm chlorine or hot water detergent solution for two minutes and rinsing in hot water (82°C)) after discharge of the material in the condemned area before they are returned to an edible area.

5.12 The Abattoir Campus

- Where appropriate, Roadways and yards in the immediate vicinity of the slaughter hall and serving premises such as lunchrooms should always be kept clean and free from any objectionable odour.
- Any garbage material should be immediately collected and disposed of to the designated waste disposal area at least daily.
- The manure should be collected and bayed near the lairage every day on the dirty side of the compound and transported out of the abattoir to designated waste disposal areas (*which need to be arranged based on environmental sanitation and protection principles*) and at least once a week without creating any objectionable odour and serving as a breeding place for insects.

5.13 Vehicles:

- Where appropriate, Meat transport vehicles should be washed clean as soon as they enter to the gate of the abattoir by using high-pressure hot water detergent solution spray and rinsed by hot water.
- Where appropriate, Livestock transport vehicles should also be washed clean as soon as they enter to the gate of the abattoir by using high-pressure cold-water spray.

5.14 Drying after cleaning:

If equipment is left wet after cleaning, microorganisms may grow in the water film.

- Equipment should be left dry as soon as possible after cleaning by air-drying or by use of non-reusable tissue or absorbent materials.
- Adequate drainage points should be provided in equipment that cannot be dismantled and drying racks provided for small pieces.
- Any equipment that unavoidably remains wet for a period during which significant microbial growth might occur should be disinfected (by hot water hosing at 82°C for two minutes) immediately before use.

5.15 Equipment and clothing storage

- All knives, scabbards, steels, hooks, and other tools used by employees, as well as their work clothing such as aprons, are to be considered as an integral part of abattoir equipment and must be maintained as such and stored on conveniently-located (preferably stored in a central location, at or near the workstations) rust-resistant racks or multiple scabbards, and not in clothes lockers.
- If locker storage for personal tools of employees is used, the facilities should be separate from those used for clothing
- Work clothing must not be worn or stored in incompatible areas (washrooms, lunchrooms, lockers used for street clothing, outside the abattoir, etc.).
- Where appropriate, packaging material should be stored and used in a clean and sanitary manner (they should not be accessed by rodents, insects and contaminated by toxic chemicals and other materials).

5.16 Equipment

In the effective control of operational sanitation, nothing is more important than simply designed and easily cleaned equipment constructed of non-corrosive and rust-resistant material such as stainless steel.

- For the production of meat in a sanitary manner the following points should be considered in the purchase of abattoir equipment.
 - a. Equipment made of stainless steel and easy to clean are recommended.
 - b. Equipment used in the export abattoir should not be constructed by use of metal over wood since the wood material is difficult to clean.
 - c. Copper is not acceptable for equipment, which contacts edible meat products.
 - d. Cadmium is not acceptable in the construction of equipment used for handling of edible meat products.
 - e. Lead should not be used in the construction of equipment contacting edible meat products.
 - f. The use of containers or equipment made of enamelware or porcelain is not acceptable for handling and processing of meat products.
 - g. Aluminum may pit and corrode when exposed to certain chemicals. When friction occurs between aluminum and meat or fat, a black oxide is produced which discolors the meat. Therefore the use of aluminum should be limited to applications where the metal does not directly contact the meat.
- Portable equipment used for the collection, holding and transfer of condemned and other inedible material must be of rust-resistant metal, be watertight.
- These equipment must be distinctly and uniformly marked, for ready identification (either by

color or the word condemned and inedible)

- Painted racks are not suitable for use in a high moisture area since they are subject to chipping and thus resulting in corrosion. However, no objection will be taken to the use of painted racks for packaged or boxed products in dry storage or freezer areas where there is limited amount of moisture and cleaning required.

(For more information on the types of the commonly used hand tools in cattle slaughter, see annex 1.

5.17 Vermin (Pest) Control

- Vermin (pest), through their habits, are capable of introducing serious human diseases to meat products
- Care should be taken to prevent access to waste by pests and there should be an effective and continuous program for the control of pests.

5.17.1 Insects

An excellent housekeeping program, along with the use of screens, air curtains, and electrical insect control devices and elimination of all places where the insects can breed and hide are the first steps in avoiding the introduction of insects and rodents.

5.17.2 Insecticides

These may be residual or non-residual. They may take the form of aerosols, sprays, powders, pellets, repellents or gases.

Each may be specifically formulated for designated use and places with the full awareness of the inspection staff for any potential restrictions for their use or application.

- Pesticides should only be used if other precautionary measures cannot be effectively used.
- Before pesticides application, care should be taken to safeguard all meat, equipment and utensils from contamination. After application contaminated equipment and utensils should be thoroughly cleaned to remove residue prior to using them again.
- The insecticides that are applied should be restricted only to those listed by the meat inspection service delivery (regulatory) authority.

5.17.3 Rodents

Rodent control is facilitated by the elimination of rodent harborages in surrounding areas as well as in the abattoir through:

- The elimination of food supply for rodents or,
- The destruction of rodents.

Rodent destruction can be performed by the use of traps.

Traps can be used where there is rodent infestation but they need to be checked at least every 24 hours.

5.17.4 Responsibility for Use

The responsibility for using insecticides rests with the abattoir management.

- Only licensed pest control operators or designated abattoir employees, personnel who have a thorough understanding of the potential hazards to health resulting from the use of these agents, under adequate inspection control, should prepare and use such materials.

5.17.5 Storage of Hazardous Chemicals

- Pesticides and other hazardous substances should be suitably labeled with warning about

their toxicity and use.

- The management should assure that all meat products would be safely covered or protected from contamination through the use or storage of pesticides.
- There are occasions when hazardous chemicals such as insecticides, herbicides, etc. are stored in export abattoir. Such situations have the potential to lead to accidental misuse or contamination of meat products. For this the following points should be considered.
 - a. Where feasible, hazardous chemicals are to be stored away from abattoir and only required amounts be brought onto the premises under the direct supervision of a responsible company employee.
 - b. Such materials, if it is necessary to store them on the premises, are to be stored in a separate room or partitioned area of a storage room, under lock and key, with controlled access being given to a responsible authorized and properly trained person.
 - c. Where hazardous chemicals are stored in an export abattoir, the use of a colour coding or similar type of system is strongly recommended to enable company personnel to identify different categories of product.
- The abattoir management together with the inspection staff should review individual situations and where necessary, take action to ensure good control and security of the storage of hazardous chemicals.

5.17.6 Disposal of Waste Products

Manure, paunch and viscera contents should be disposed of in a manner, which will not create a sanitary problem on the premises of the export abattoir.

Storage of such wastes in the vicinity of the export abattoir is not acceptable.

They should be removed from the slaughter hall as soon as they are recovered from the animal or emptied from visceral organs and transported to designated waste disposal areas (*which need to be arranged based on environmental sanitation and protection principles*) during or after working hours without creating any objectionable odor and serving as a breeding place for insects.

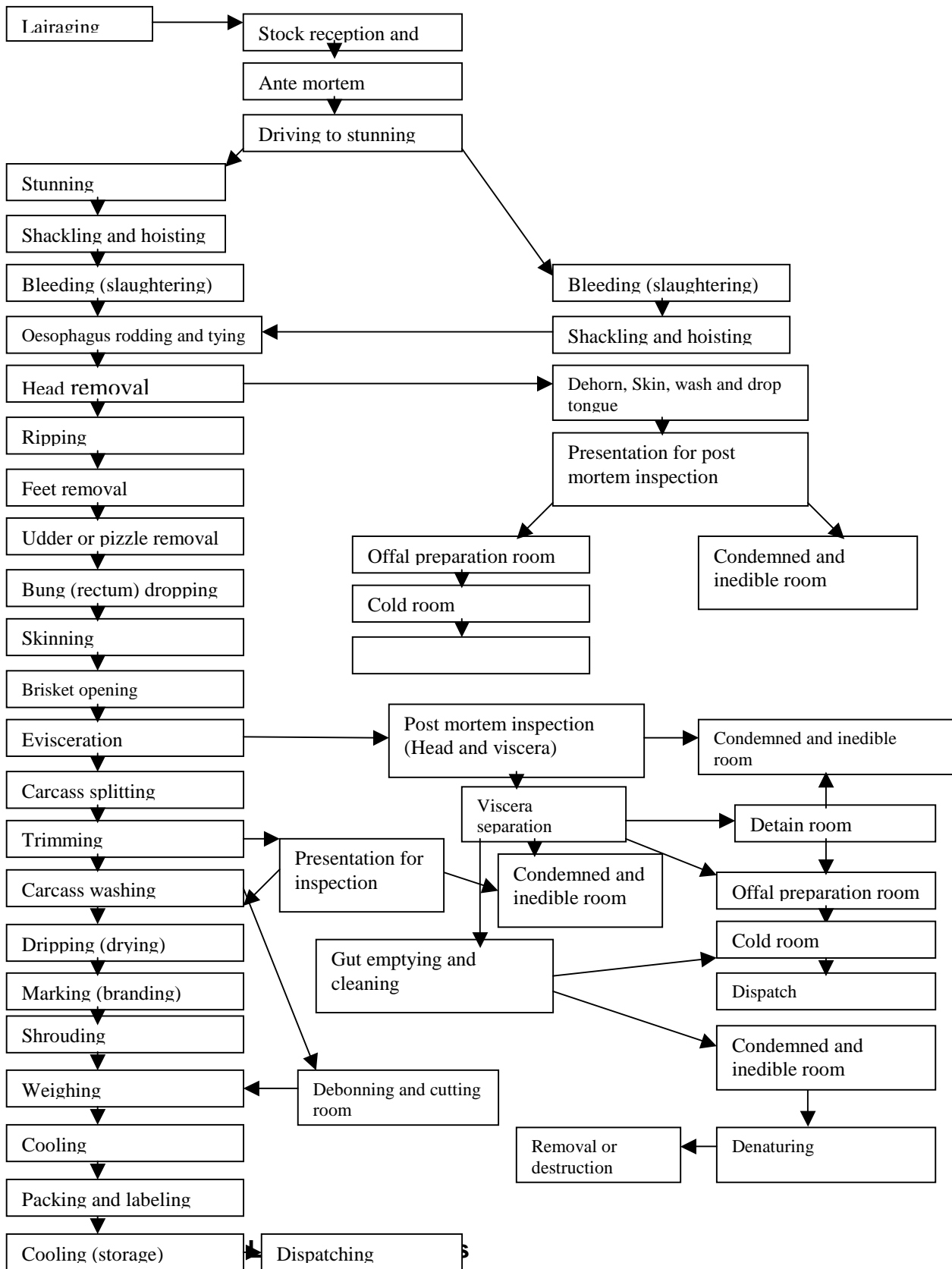
5.17.7 Records

- To demonstrate that the written preoperational and operational sanitation, inspection and training programs are being delivered according to the written plans, the designated abattoir employee should maintain written records of these activities.
- The records should demonstrate the effective monitoring and control of these activities.

6 pre and post slaughter operations

6.1 The major pre and post slaughter export abattoir operations can be categorized based on their defined locations whereby the activities are to be conducted. This operational categorization can be summarized in the following sequential order:

Fig. 1. Schematic representation of operational procedures in the export abattoir



Lairage is the first part of the abattoir whereby slaughter stock reception takes place and the animals are allowed to rest and checked by the veterinarian for their fitness for slaughter.

Depending on the actual stress conditions which are caused by transporting animals for long distances (for more than 12 hrs. travel) the abattoir management can decide the animals take rest in the nearby areas of the abattoir before entering to the lairage.

The following fundamental procedures should be followed while the animals are staying in the lairage and before they are sent to the slaughter hall.

6.1.1 Stock Reception and Handling

- Animals coming by vehicles should be unloaded by using a platform along side the truck reception point as soon as possible after arrival under the direct supervision of an experienced livestock handler.
- Animals should be permitted to quietly walk off the transport vehicle to minimize the risk of injury or stress.
- Mixing of different species of animals or unfamiliar groups of the same species should be avoided, as this will cause disturbance among them.
- Aggressive animals (animals that fight with others or disturb by any other means) and females on estrous must be also isolated.
- For fatigue and excited animals adequate rest should be given so as to improve the quality of meat. Depending on the condition and journey of slaughter animals, a period of 24-72 hrs rests is required in the lairage before slaughter.
- Suitable drinking troughs with sufficient water should be provided daily during all their detention period.
 - In the dry season an animal weighing about 250kg may require about 25 liters of water.
 - If the water source is not constant the abattoir should have at least half day's supply in a storage tank.
- Animals should be supplied with feed until 24 hrs before slaughter but after that feed restriction (fasting) is required as this may reduce the chance of carcass contamination that will be brought with animals slaughtered with full stomachs. However, according to the Muslim slaughter 24 hrs fasting is not recommended.

6.1.2 Lairage sanitation

Being the point of stock reception the possibility of contamination for lairage (including races leading to the stunning area) is very high that regular cleaning is essential.

- At the end of each day's operation: Gross debris, dirt and faecal mater should be removed and followed by washing down of floors, walls and partitions using high pressure (14Kgf/cm²) cold water spray.
- Care has to be taken not to splash stocks in the pens.
- At monthly intervals partitions, walls or tubular fittings will require scrubbing with a stiff brush or scraper and followed by washing down of floors, walls and partitions using high pressure (14Kgf/cm²) cold-water spray.

6.1.3 Ante mortem examination

Animals in the lairage should take ante mortem examination by meat inspectors (veterinarian) within 24 hours of arrival at the abattoir (lairage) and this inspection must be repeated immediately before slaughter if more than 24 hours have been elapsed since the previous inspection.

No animal which has entered the lairages shall be removed therefrom, whether for slaughter or otherwise, unless permission in writing has been granted by the inspecting officer.

- The main reasons why animals should be examined by an inspector before slaughter are:
 - To detect diseases and abnormalities that cannot be found using the routine postmortem inspection procedures (eg. rabies, poisons etc.)
 - To eliminate contamination of the kill floor from the carcasses and parts of diseased animals that are obviously unfit for human consumption.
 - To allow the veterinarian to gather information from the live animal which are needed to make the correct postmortem disposition of the carcass and parts.
- Ante-mortem examination consists of:
 - Examining the live animals,
 - Separating those which appear abnormal or diseased,
 - And passing the rest for slaughter.
- Competent handlers of livestock should be available to assist the ante-mortem inspection and care should be taken to prevent horning and other injuries during this time.
- Animals presented for ante-mortem inspection should have passed the required drug withdrawal period if they were treated for any sort of systemic illness before they were sent to the lairage.
- Animals, which are kept in lairage pens and are waiting for ante-mortem inspection, should be identified by the abattoir employee by giving "pen cards", which consist of information on:
 - Establishment No _____
 - Date _____
 - Pen lot _____
 - Species of animals _____
 - No. in pen _____
 - Origin of animals (Kebele-----Woreda-----Region-----)
 - Breed _____
 - Inspector's Signature _____
 - Time of inspection _____
 - Number of suspect animals _____
- An abattoir employee should fill out all the information except the inspector's signature; the time of inspection and number of suspect animals.
- The "pen card" should hang on the lairage pen in which animals are kept.
- The abattoir employee assigned to assist the ante-mortem inspector (veterinarian) should move the lots so as to separate and put them in a "suspect pen" for further checkup while the inspector indicates any abnormal or diseased animals and give their identification numbers.

- A tag or other device showing the word "condemned" should identify all animals condemned on ante-mortem inspection.

It is the abattoir management's responsibility to ensure that only those animals that have received ante-mortem examination and certified by the inspector (veterinarian) to be fit for slaughter are permitted to proceed to the slaughter floor.

6.1.4 Moving livestock to the slaughter hall

The following points need to be considered and followed in moving livestock from lairage to the kill floor:

- To prevent the introduction of flies in to the killing floor, an approved chemical is sprayed over the back and face of the animals outside the kill floor before the animals are moved to enter the stunning box
- Moving of livestock should be achieved with the minimum of excitement of the animal.
- Natural following behavior of the animals should be exploited as much as possible while moving to the slaughter hall.
- Animals with extremely wide horns or pronounced lameness should not be introduced in to the lead-up race unless they are able to move freely along the race.
- As an animal always tries to keep to other animals and humans in sight, the drover of the animals to the slaughter hall should always stand by the side of the animals out side the races.
- Animals dislike going from light to dark and will avoid shadows so that gaps under doors should be avoided.
- Contact implements used for moving animals should be employed as little as possible.
- Sticks, metal pipes, or pointed objects should not be used for moving livestock. Canvas or leather flappers, soft polythene pipes and rattles, which create sufficient noise to encourage movement of stock, are recommended.
- Gates should not be used as an implement for forcing an animal along races.
- When the first animal from the pen are driven up to the kill floor, the "*pen card*" should be delivered to the designated post-mortem inspector.

6.2 Slaughter hall (Kill floor) operations

6.2.1 Stunning

- Stunning will proceed in a manner that the animals do not regain consciousness while being slaughtered or bled.
- Where reversible stunning is used, the rate of stunning should be commensurate with the rate at which animals are bled so that no animals will stay long and regain consciousness. But if the animal regains consciousness it should be re-stunned before being slaughtered.
- The time between rendering the animal insensible to pain (stunning) and bleeding should be kept to the absolute minimum, i.e., stun the animal (cattle, sheep or goat), then bleed it before going on to the next animal to be stunned. This helps to ensure that the animal is bled before it regains sensibility.

6.2.2 Personnel stunning animals

- Should possess the expertise to ensure that each animal is rendered unconscious with a minimum of excitement or disturbance and without suffering.
- Should perform the stunning procedure in a manner that should normally ensure that each animal is immediately rendered unconscious.
- Should operate the stunning equipment in accordance with the manufacturer's specifications for effective stunning.

6.2.3 Restraint of Animals to be Stunned

- At the time of stunning animals should be adequately restrained.
- The head of each animal confined in a stunning box must be securely fastened to enable the animal be stunned with little pain.

6.2.4 Stunning to Slaughtering Interval

Type of animal	Method of stunning	Maximum acceptable time required
Sheep, goat, lamb	Reversible electrical	15 seconds
Calves	Reversible electrical	10 seconds
Cattle	Head percussion	30 seconds
Cattle	Electrical	10 seconds

The "dry" landing area, where stunned animals are discharged from the stunning box, should be kept clean and dry at all times.

- To remove post-stunning defecation, washing the anal area by applying low-pressure water spray must be done.
- This is carried out with the animal lying on its side on the "dry" landing area, or with the hindquarters slightly elevated.
- After stunning is done and the animal discharged to the dry landing area, shackling and hoisting it on to the bleeding rail should be done.
- But if the animal regains consciousness, it should be re-stunned before being shackled, and hoisted and then slaughtered.

6.2.5 Bleeding (Slaughtering)

The objective of bleeding is to allow the complete removal of blood out of the body of the slaughter animal and facilitate the immediate death of the victim by terminating the blood supply to the brain. The main method of bleeding is a transverse incision of all soft structures on the undersurface of the neck.

- All animals must either be instantaneously slaughtered or stunned by means of instruments capable of instantaneously rendering the animal insensible to pain until death supervenes.
- Animals in pain should be slaughtered without delay.
- No person should slaughter any animal in a slaughterhouse in the sight of any other animal awaiting slaughter.
- It is the abattoir employees that should perform the bleeding or slaughtering.
- In stunned animals, since animals should be bled or slaughtered while they are unconscious it should be performed without much delay as this may lead the animals regain their consciousness and feel pain.
- In stunned animals, no animal should be bled if it appears conscious. It should rather be re-stunned before bleeding if that happens.
- In stunned animals, the animals should be promptly shackled and hoisted to a properly constructed bleeding area, and then bled. But in those animals slaughtered without prior stunning slaughtering is done on a bleeding table and the carcass is then shackled and hoisted.
- The blood vessels must be completely severed in order to prevent the possibility of regaining consciousness before the brain ceases function through lack of blood supply.
- Where no stunning is carried out the animal should not be moved after incision (bleeding) for at least 2-6 minutes and in any case until all brain reflexes have ceased.
- No carcass, meat or edible offal should be inflated with air or gas in a way that alters its appearance prior to post-mortem inspection or causes contamination.

6.2.6 Esophagus rodding and tying

- Rodding separates the esophagus from the trachea, lungs and surrounding tissue and permits removal through the diaphragm and thoracic cavity without rupture of the esophagus during evisceration.
- Rodding and tying of the weasand takes place after bleeding.
- To prevent contamination with rumen contents, the esophagus should be effectively tied before evisceration.
- Where appropriate, Clean and sterilize rodding instrument by immersing in a 200 ppm chlorine solution or in a nearby located sterilizing hot water for 2 minutes and rinse in potable water after each use.

6.2.7 Head removal

- The identity of heads should be preserved until final disposition of the corresponding carcasses.
- After esophagus rodding and tying is completed, head should be removed from the carcass immediately, without the exposed surfaces becoming contaminated.

- The transverse cut made through the throat should continue around the back of the head in a line close to and behind the horns, leaving the ears on the head.
- Ensure that ingesta (whether from the cut ends of the weasand, or that which has been regurgitated into the throat or windpipe) do not contaminate the head meat.
- Take the removed heads to the headroom and hang them by their mandible (lower jaw bones).
- Where appropriate, the employee who removes heads must wash his hands first by using hand sanitizer solutions (100-ppm chlorine or 15-ppm iodine solution) or by liquid soap and then by water in a nearby located hand washing facility and sanitize his knives by washing in a sanitizing solution such as a 200 ppm chlorine solution or in hot water of 82°c for two minutes and rinse them in potable water after each head removal.

6.2.8 Ripping

- The skin should be cut from inside out to prevent carcass contamination with hair and dirt, except for the necessary starting cuts.
- Knives should be rinsed clean (see cleaning) after ripping and before proceeding to the next operations.

6.2.9 Feet removal.

- Skin the area above and below the carpal joints (the place where the front feet are to be cut) and make a circular incision around these joints and remove the front feet without contacting the hide.
- In a similar manner the hind feet are removed by skinning the area above and below the tarsal joints (the place where the hind feet are to be cut) and make a circular incision around this joint of each leg and remove the hind feet without contacting the hide.
- The feet should be placed in a receptacle (container) and removed from the slaughter floor and taken to the inedible room as soon as possible.

6.2.10 Udder or pizzle removal

Udders must be carefully removed in such a manner that its removal avoids all risk of contaminating the carcass.

- The proposed procedure whereby both requirements can be observed is:
 - a. A longitudinal cut is made between udder and rectum
 - b. A second cut from navel to udder is made
 - c. The adjacent hide is flayed off the belly to the right until the base of the udder is sufficiently exposed for its removal.
 - d. The hide is flayed off above the udder to the left until the base of the udder is sufficiently exposed for its removal.
 - e. The adjacent hide is flayed off the belly to the left until the base of the udder is sufficiently exposed for its removal.

- f. The hide is flayed off above the udder to the right until the base of the udder is sufficiently exposed for its removal.
 - g. The udder then becomes freed for excision
 - h. The udder is firmly grasped and excised intact.
- Mammary lymph nodes should remain on the carcass until the inspection is completed.
 - If requested by an inspector udders must be retained for inspection but if not they should be sent to the condemned and inedible offal room as soon as removed from the carcass.
 - The penis and prepuce must also be removed without contamination of the carcass.
 - No part of the prepuce is to contact any cut surface of the carcass.
 - Ring and sever the penis attachments, taking care not to cut the rectum or urethra.
Contaminated facilities and equipment must be washed and sanitized before reuse (see cleaning).

6.2.11 Bung (Rectum) dropping

- A circular cut should be made around the anus (and vulva for females), taking care to leave the anal sphincter intact.
- The subsequent cut freeing the anus and rectum from the surrounding tissue must be done with a clean knife.
- Pull the bung (rectum) out, using a hook or other device, and tie it firmly, along with the neck of the urinary bladder to prevent contamination and they are then dropped into the pelvic cavity.
- Remove any small pieces of skin left on the anal region before returning the bung to the pelvic cavity.
- Sterilize the instrument after use on each carcass (see cleaning) before reuse to the next.
- Whenever knives become contaminated during any part of this procedure, they are to be rinsed clean and sterilized (see cleaning) before continuing the activity.

6.2.12 Hide and skin removal (Skinning or flaying)

- No opening should be made into the chest or abdomen before the hide is removed.
- The exposed tailbones are clamped securely in the jaws of the tail grip.
- Remove the hide in such a way that its outer surface rolls away from the carcass.
- During hide pulling, ensure there is no flapping of the hide (by fixing the folded-back hide with pegs or pins) as this will cause contamination of the carcass.
- The knife used for skinning operations must be washed and sanitized (see cleaning) prior to re-use.
- If chains or other means of restraining the carcasses during hide removal are employed, these are to be sanitized (see cleaning) between each carcass.

- Regardless of the method employed for hide removal, the skin or hide should be removed immediately from the kill floor to the skin and hide section of the abattoir without becoming a source of contamination.
- No hide, skin or pelt should be washed, defleshed or left in any part of an abattoir or establishment used for slaughtering or dressing of animals or for the preparation or holding meat intended human consumption.

6.2.13 Brisket opening

The brisket is opened to facilitate removal of organs from the thoracic cavity.

- Opening can be done after complete hide removal.
- Where appropriate, only a clean cleaver (brisket cutter) or saw should be used to split the brisket.
- Clean and sanitize the cleaver or saw or brisket cutter after use on each carcass (see cleaning).

6.2.14 Evisceration

- Any contaminated part should be trimmed off from the midline (incision line) before opening the abdominal cavity.
- Cut the abdominal cavity by making a small starting cut on the caudal extremity of the ventral side of the abdominal muscle by using a sharp pointed knife.
- After the starting cut of the abdominal muscle is made, the incision is extended downward to the chest area as much as sufficient space is available for the removal of both the abdominal and thoracic viscera.
- The removed viscera should be placed on the near by located clean viscera truck or table (viscera inspection table).
- During evisceration avoid:
 - Contamination from urine and faeces when opening the abdomen and pulling the bung and bladder down.
 - Cutting the intestines where they pass across the liver.
 - Puncturing the paunch.
 - Removing any hepatic lymph nodes from the liver.
 - Tearing the duodenum when dropping the paunch.
- The liver may be removed after initial dropping when the bung and lower bowel have been freed. This provides better access for pulling the weasand (already rodded and tied) through the diaphragm.
- The uro-genital organs such as bladder, ovaries and uterus, should be removed in total without incising them, following which they must be transferred to water tight metal containers or chutes for direct delivery to the condemned and inedible room.

- The thoracic viscera should be removed after the removal of the abdominal viscera is completed and placed in the viscera table.
- After evisceration the viscera should be identified by a similar number (tag), which was attached to the head and carcass
- To prevent cross-contamination on the kill floor, the exposed carcass must not come in contact with stationary parts of the viscera table, any other un cleaned equipment on the kill floor (high bench, retaining bars, etc.) or any other carcass, prior to final carcass inspection.
- While accidental contamination may occur, contaminated carcasses must be trimmed but not washed.
- The eviscerator should not flush out carcass cavities.
- Knives are to be washed and sterilized (see cleaning) after use on each carcass.
- Where appropriate, if the eviscerating knife is contaminated while evisceration is being done, it must be sanitized with water of a minimum temperature of 82°C or immersed in a 200-ppm chlorine solution for two minutes before reuse.
- Where appropriate, moving tables should be automatically cleaned and sanitized by spraying with water of a minimum temperature of 82°C before reuse.
- Eviscerators must wash their hands, arms, boots and aprons after each carcass (see cleaning).

6.2.15 Carcass Splitting

- To prevent contamination by a saw or cleaver to other carcass surfaces, abscesses, grubs, grubby tissue or contamination should be removed from the back of the carcass before splitting.
- Carcass splitting is done by:
 - Stand by the backside of the carcass.
 - Hold the splitting saw by its handle directing its blade on the midline of the vertebral column.
 - Saw the carcass by moving its blade back and forth starting from the tail region down to the neck along the midline of the vertebral column.
- Where appropriate, the splitting saw, ax or cleaver must always be sanitized (see cleaning) after becoming contaminated while splitting the same carcass or after splitting a held carcass but before reused to split the next carcass.

6.2.16 Carcass trimming

- Trimming should be carried out before and after inspection.
- The trimmer must remove hair, blood clots, pieces of hide, flecks of rail and other dust, and minor amounts of faecal material or stain.
- Bruising or pathological lesions should not be trimmed before inspection.

6.2.16 Work-up on the viscera table before inspection

- No offal or viscera should be removed from the viscera table until inspection is completed.

- Work-up operations on the viscera table are to be kept to a minimum until after inspection and maintain identification of the viscera with the carcass.
- Wash hands and sterilize knives after use on each set of viscera (see cleaning).
- No employee is permitted to cut into the heart until it has been inspected and passed by an inspector.
- Hepatic lymph nodes are to remain attached to the liver for inspection purposes.
- Kidneys should be either be presented for inspection with other edible offal, or left hanging on the carcass by their attachments.

6.2.17 Postmortem Inspection

- The head, viscera and carcass of each slaughter animal must be inspected by authorized inspectors and receive approval before being transferred to the subsequent sections of the abattoir for further processing.
- During presentation for inspection the identity of the head, viscera and carcass should be maintained.
- In slaughter abattoirs where tails are removed from the carcass prior to final approval of the dressed carcass and detached portions, the identity of tails must be maintained until final disposition of the carcass.
- To facilitate the post mortem inspection, the abattoir employee should present the carcass and other parts to be inspected as clean as possible and presented in a uniform manner.
- Employees should convey condemned carcasses and parts to, and place them in, secure disposal facilities (condemned room), which must be located within the sight of the point of inspection as soon as the decision is made by the meat inspector.
- No condemned head, carcass, or viscera are to be left awaiting disposal during work breaks (they should be removed as soon as possible).
- Based on the decisions of the meat inspector:
 - a. The abattoir employee should transfer those parts of carcasses or viscera which are free from diseases or gross contamination to:
 - The whole or part of the carcass, which are safe for human consumption to the next stage of carcass dressing (carcass wash).
 - Those parts of viscera (stomach and intestines) to the casing cleaning room
 - The edible offals (such as heart, liver, head together with tongue, etc.) to offal preparation room
 - Offals accepted as Inedible, should be put in large cans (containers) marked "inedible" and transferred to condemned and inedible room.

- b. Those parts of carcass or viscera which may need further checkup by the inspecting veterinarian must be transferred to the detain room.
- c. Those parts of carcass or viscera, which are not fit for human (due to disease or gross contamination) consumption should be put in large cans marked "*condemned*" and be transferred to the condemned and inedible room.
- d. Those parts of carcass or viscera, which are not fit for human consumption but are fit for pet animal consumption should be put in large cans marked "*inedible*" troughs and be transferred to the condemned and inedible room.
 - The collection and conveyance of condemned carcasses, organs and portions of carcasses or any other condemned meat product from the killing floor should be done in such a way that no contamination of the killing floor is done.
 - Any contact of condemned meat products with carcasses being dressed or approved meat products should be prevented.
 - All equipment having been in contact with condemned meat products should be cleaned and sanitized before reuse (*see cleaning*).

6.2.18 Carcass re-trimming

Carcass re-trimming must be done after inspection if there is still a need of removing any remnants of stick wounds, any residual pieces of hide, blood clots, bruised tissue and contamination before washing.

6.2.19 Carcass washing

Where appropriate, after postmortem inspection and re- trimming, all carcasses should be washed to remove blood and bone dust. Carcass washing should be done from top to down wards at a temperature of 80-85⁰c with a flow rate of 10 liters per minute for about 30-60 seconds.

6.2.20 Carcass dripping

Where appropriate, after washing carcasses should be allowed to stay in the slaughter floor for about 30 minutes until the water dripped out of the carcass so that stamping (marking) can easily be done.

6.2.21 Shrouding/Wrapping

Where appropriate, Carcasses (mostly beef), which are not to be cut, or debonned should be shrouded or wrapped with sterile linen sheets or a large pieces of clothe soaked in 10% salt (sodium chloride) solution (helps to minimize color shrink and improve the external appearance of the carcass) around the outside of the carcass halves and attached with metal shroud pins and then conveyed to the cold room.

- Shrouding/Wrapping should be stored and used in clean and sanitary manner.
- Wrapping should be non-toxic and should not leave harmful deposits of any kind on the meat, or otherwise contaminate it; and cases or cartons used should be provided with a suitable inner liner or other satisfactory means of protecting meat, except that the liner or other protection may not be required if individual pieces of meat such as cuts, are individually wrapped before packing.

6.3 Head room operations

- On removal from the carcass, the head should not touch the floor but must hung by the pith or mandible (lower jawbone).
- Hooking by the muzzle is only acceptable when the mandible is being skinned to allow subsequent hanging by the mandible for the rest of the head work-up.
- Head hooks should be sanitized and heads be kept separate from other heads and products and be positively identifiable with the carcass from which it came at all times, until the carcass and viscera have passed final inspection.

6.3.1 Removing the horn and skinning the head

- Removal of the stubs (horns) must take place before the head is skinned.
- Remove stubs below the skin-horn junction, so that all skin is removed from the area.
- Completely remove skin from the head (includes muzzle, lips, nostrils and eyelids).
- Where appropriate, after each head (after every use) all equipment used for head work-up, horn removal and skinning should be washed clean and sterilized by immersing in a sterilizer with 82°C water for 2minutes or immersing in a 200 ppm chlorine solution and final rinsing with water before re-use.

6.3.2 Head washing

- Where appropriate, before making any further incision in the musculature, including oral and nasal cavities, heads should be thoroughly washed by using high-pressure water spray from a hand held gun in a head washing cabinet which confines waste water effectively and prevents splashing of other meat.
- To prevent over splash of water and debris, the wash area should be shielded with a sheet of metal.
- Heads are to enter the cabinet and be washed one at a time.
- The nose, mouth and back of the throat (i.e. nasal, oral and pharyngeal cavities) should be flushed and washed within the cabinet.
- Water volume and pressure are to be sufficient to remove dirt, ingesta, etc. A single long tube that will reach down a nostril, or through the mouth, to the back of the throat is recommended for flushing.
- Heads should not come into contact with one another until after completion of inspection and disposition of the carcass.
- The identity of heads should be preserved until final disposition of corresponding carcasses.

- Dirty water should be ducted and drained from the cabinet.

6.3.3 Dropping the Tongue

- The head is to be completely clean (nostrils, mouth, tongue external skinned surfaces, back of the throat, between the teeth) before the tongue is dropped.
- Heads, which are not clean, are to be returned for trimming and rewashing.
- Cut just in front of the hyoid bone, so that only the tongue is dropped.
- Take all possible care not to cut the tonsils or internal cheek muscles and the head lymph nodes must be left intact.
- Rewash the exposed tongue and throat to remove any blood, saliva and/or particles of meat material.
- Leave the tongue attached to the head and do not drop the internal and external cheek muscles before inspection. This permits the head inspector to fully inspect these muscles in their natural position.
- Take the head to the viscera inspection area (an area located near the offal preparation and casing cleaning rooms) and place in the viscera inspection table tray for inspection.
- The heads must be transferred to the offal preparation room for further processing only after they are inspected and approved to be safe by the meat inspectors.

6.4 Offal preparation room operations

Where appropriate, as a basic principle, all edible offals must be chilled or frozen as soon as possible and should not be permitted to remain in unrefrigerated areas for extended periods of time.

6.4.1 Head and tongue

- Cheek meat removed from the head must be trimmed free of salivary glands and mucous membranes, then washed thoroughly and chilled as quickly as possible.
- The tongue must be removed from the head, trimmed, washed free of blood etc., prior to refrigeration.
- Removal of the eye and teeth should be done only after inspection.

6.4.2 Heart

Hearts can be prepared for human consumption from all meat animals.

- Hearts should be cut open to permit the complete removal of all blood clots.
- The aorta and other major blood vessels are to be removed to within 2 cm of their origin.
- After washing, hearts must be drained and refrigerated (where appropriate).

6.4.3 Livers

The livers are prepared by removing the gall bladder.

- If the livers are intended for export, the portal lymph nodes should be left attached.
- Any small areas of dry adhesions, parasitic scars, etc. must be trimmed.
- Where appropriate, Livers are chilled by immersion in cold running water or by air chilling in a cooler. In the latter case, the livers are hung on racks or placed in trays.
- Where appropriate, alternatively, livers may be packed and frozen.

6.4.4 Kidneys

Kidneys may be prepared as an edible product.

- Kidneys should be deeply incised and soaked in water and washed, before they are incorporated into a meat product.
- Where appropriate, Kidneys must be chilled before packaging or packed and frozen.

6.4.5 Fatty tissues

- The sanitary collection of clean fatty tissue from approved dressed carcasses and approved detached portions should be carried out as speedily as possible.
- Where appropriate, Fatty tissues should be refrigerated or rendered immediately after collection if intended for edible purposes.
- Fat trimmings harvested from carcasses prior to approval cannot be considered edible.

6.4.6 Beef tail

- Any incidental contamination of skinned tails must be removed by trimming prior to washing to remove blood and loose tissue particles.
- Approved tails should be either placed in containers or hung on racks for refrigeration.

In general:

- After their final preparation in the offals preparation room, all offals large enough to be effectively stamped must be branded with one inspection legend and offal not large enough to be effectively stamped (marked) must be packed in non-reusable film or other approved material which must have the inspection legend printed thereon and then transferred to the cold room for storage.
- When they are to be transferred for further processing and or packing, they should be placed in containers with tight-fitting lids suitable for edible product, which are clearly marked with the inspection mark and the word "*edible*".

6.5 Debonning and cutting room operations

- If pre-rigor cutting and boning are required, the meat should be removed from the dressing area and transferred to the cutting and boning room as quickly as possible.
- Where appropriate, during the cutting and debonning process, the cutting and boning rooms should be temperature controlled (the room temperature must not exceed 10° c).
- Where appropriate, cutting up, boning and packing should be carried out without delay, immediately, there after the meat should be transported to chilling room.

6.6 Cold room operations

- Meat that has passed as fit for human consumption should be handled and stored in a manner that will protect from contamination and deterioration (where appropriate).
- Efficient refrigeration can preserve meat in a condition approaching its natural state for periods adequate for commercial requirements; its appearance, weight, and flavor are little altered, and no substance is added to the meat nor any extracted (where appropriate).
- In order to preserve the quality, bloom, and weight of meat, it is highly desirable to begin refrigeration as soon as possible after slaughter (where appropriate).

6.6.1 Chilling

- As soon as the dressing operations are completed, carcasses, sides or quarters, must be moved to a room with a temperature of 10 °c and the mean air speed at a level above 0.75m/s to be kept for the first 10 -12 hours (where appropriate).
- For the storage of chilled carcasses, sides or quarters or portions the temperature must be within -2 to 2°c and the mean air speed over the product above 0.5m/s with relative humidity below 95% or if the product is to be stored for more than 72 hours, below 90% (where appropriate).
- For the storage of offal the temperature must be maintained below -2 °c or, if to be stored for more than 72 hours and below -10 °c (where appropriate).
- Offal such as stomach, intestine, lungs, spleen, head and feet should be held in a separate chamber and spread out to allow for more effective cold action but offals such as liver, kidney and heart can be given the same cooling treatment as the carcass (where appropriate).

6.6.2 Freezing (where appropriate)

- The carcasses can be frozen whole or cut transversely along the last rib into two and packed in a way to allow free air movement around them (where appropriate).
- As soon as the dressing operations are completed, carcasses, sides or quarters, must be moved to a room with a temperature of 10 °c and the mean air speed at a level above 0.75m/s to be kept for the first 10 -12 hours (where appropriate).
- For further storage transfer carcasses to freezing rooms with a temperature of below -2°c (preferably from -12 to -18 °c) (where appropriate).
- For the storage of offal for more than 72 hours the temperature must be maintained below -10 °c (where appropriate).

In all the chilling and/or freezing rooms the following activities should be performed.

- Each room should be loaded as quickly as possible (where appropriate).
- Meat should be hanging or placed in a suitable corrosion resistant tray by allowing adequate circulation of air around meat (keep 0.3-0.4m on the rail minimum space requirement between carcasses) (where appropriate).

- Meat that is not in cartons should be placed in corrosion resistant trays and allowed to get sufficient circulation of air (where appropriate).
- Drips from one piece to the other should be avoided.
- Carcasses must not touch each other
- Doors should not be left open for extended periods, and should be closed immediately after use.
- Entry to this room should be restricted only to personnel required to carry out the operations
- Chilling room or freezing rooms or freezer store should not be loaded beyond their designed capacity.
- Temperature must be checked regularly
- Refrigerating coils should be defrosted and the defrosted water removed frequently to prevent excessive accumulation of ice and loss of refrigerating efficiency.
- The abattoir management should assign an individual to accomplish the task of regular temperature reading and recording or automatic temperature recorders should be installed.

6.7 Packaging and labeling room operations

6.7.1 Packaging

- Packaging material should be stored and used in a clean and sanitary manner (they should not be accessed by rodents, insects and contaminated by toxic chemicals and other materials).
- The wrapping should be sufficient for the purpose of protecting the meat from contamination.
- The wrapping should be non-toxic and should not leave harmful deposits of any kind on the meat.
- Products (such as deboned meat, meat cuts, offals and others) for which inspection marks were not required to apply directly to the product surface, inspection marks should be applied on the containers or the packaging material.

6.7.2 Labeling

- Stamped label should be placed on the package in such a way that opening of the package is impossible without breaking of its wholeness.
- The label should not be false or misleading.
- Label information should be conspicuously displayed in a manner that ordinary consumer can easily read and understand.
- The product labels must state the following: (where appropriate)
 - Country of origin,
 - Establishment of origin,
 - Product identification (such as species and other details of the animal, from which the meat is derived from),
 - Net weight,
 - Manufacturing date,
 - Expiry date

- Labels can also include some other required additional information, but the information to be included as a label should get acceptance by the regulatory (inspection service delivery) authority and be registered before use.

Once the product is properly packed and labeled, it should be immediately transferred to the chilling or cold room and stay there until dispatching.

6.8 Dispatching and meat transport

The meat inspection staff and the abattoir management have the responsibility of assuring meat and meat products prepared, inspected and certified for their fitness for human consumption in an approved abattoir, be delivered in unaltered manner in any way that will affect their fitness for human consumption until they are delivered to the customer or retailer.

For this, meat and meat products should be dispatched directly from the abattoir's dispatch area and transported in the following manner.

- Meat should not be carried in any means of transport used for conveying animals or goods that may adversely affect its quality.
- Meat should not be placed in any form of transport that has not been cleaned and sanitized before loading (see cleaning).
- Meat should not come in to contact with the floor.
- Where human labor is required for transportation, personnel should be healthy and neatly dressed (without any visible sign of blood or any form of dirt on their clothing) with proper protective clothing.
- Carcasses, sides and quarters, other than those that are adequately wrapped and frozen, should be hung during transport or placed in a suitable manner on racks or similar equipment.
- Meat should be transported under the required temperature (see cold storage) unless the period of transport is less than two hours.
- Meat should be transported in a vehicle or container that prevents the entry of pests and other sources of contamination; and in any way that prevents unacceptable rises in temperature.

6.9 Condemned and inedible room operations

Although condemned and inedible products may be used for other useful purposes (see annex 5), they should be handled carefully and disposed off in a sanitary manner as indicated below.

6.9.1 Condemned products handling

Condemned meat products include: -

- Carcasses and portions of carcasses which upon inspection or re-inspection are found to be affected by disease or an abnormal condition that renders them unfit for human consumption.
- Animals condemned on ante-mortem inspection, carcasses of animals that died while being driven to the export abattoir and carcasses of animals that died in the yard or a livestock holding pen of the export abattoir.

Of all the inedible meat products in an abattoir, condemned meat products require the closest supervision as some condemned meat products can spread disease to man and animals if they are not handled and disposed off in a sanitary manner.

- The condemned materials, which were transferred from the slaughter hall, should stay in the condemned room until they are treated by the veterinarian to make them obviously unfit for human meat (by sight, smell, or taste by adding certain chemicals such as powdered charcoal, kerosene, food grade dyes, etc.) and be liberally stamped with .
- Before they leave the abattoir for further processing or to be destroyed in the incinerator, which is prepared for this purpose, they should be packed in a leak proof and marked containers with the word '**condemned**'.
- Dead and condemned animals to be destroyed during ante-mortem inspection should not be taken away from the condemned and inedible room until rendered inedible by the veterinarian.
- No condemned head, carcass, or viscera is to be left awaiting disposal during work breaks (it should be removed from the killing floor and transferred to the condemned and inedible room as soon as possible).
- There should be no direction reversal of condemned meat products to the edible products section (to all areas of the abattoir in which meat for human consumption is handled).
- As in the other areas of the abattoir, sanitary conditions must be maintained at all times in the condemned and inedible room of the abattoir by applying a daily clean up activities and taking immediate effective actions if unsanitary conditions develop (*see cleaning*).
- An employee working in the condemned and inedible room of the abattoir should completely change his/her protective clothing and thoroughly wash his/her hands before he commences work in the edible section of the abattoir
- There should be proper segregation of condemned and inedible products, but if mixing of condemned meat products and other inedible meat products occur, all inedible meat products must be treated as condemned meat products.
- When a carcass is condemned an inspector puts mark on its outer surface to make identification obvious.
- Under no circumstance should the skinning, evisceration and other preparation of animals condemned on ante mortem inspection, or found dead carcasses, be allowed on the killing floor. Such condemned meat animals or found dead carcasses should be directly conveyed from the livestock yards or pens to the condemned and inedible section of the export abattoir.
- Containers used for condemned meat products should be distinctly marked "**Condemned**". They should be preferably of a color that distinguishes them from containers used for edible meat products.
- Immediately after disposal any receptacle (container) coming in to contact with the condemned products should be cleaned & disinfected (*see cleaning*).

6.9.1.2 Condemned meat products that require sterilization

Condemned meat products must remain under strict control from the time of condemnation until they are disposed off in an acceptable manner.

The abattoir management should be aware that meat and meat products considered unfit for human consumption should be seized and processed or treated (by heating or freezing), recycled or destroyed, as decided and supervised by the veterinarian.

The control measures will include one or several of the following:

- Product is freely slashed, crushed or ground and mixed or sprayed with an accepted denaturant such as powdered charcoal, food grade dyes, etc.
- The denaturant should be reasonably well distributed to ensure that all condemned meat products are denatured.
- The product is then transferred in containers marked with the word "**Condemned**" to an authorized inedible rendering abattoir or incinerator for sterilization.
- In the case of a carcass that has not been dressed (dead animals or those condemned during ante mortem inspection), the denaturant must be applied by injecting it into portions of the carcass to the extent necessary to preclude its use for human or pet animal consumption purposes.
- In the case of a carcass that has not been dressed, the denaturant may be applied by injecting it into portions of the carcass to the extent necessary to preclude its use for human or pet animal consumption purposes.
- If the condemned carcass is known to be affected with some potentially hazardous disease conditions such as "Anthrax", the abattoir should facilitate its destruction to be carried out based on the professional recommendations (*see emergency situation*).

6.9.3 Non-condemned inedible meat products handling

Inedible meat products include those meat products, which are not condemned but are not edible due to their nature (such as lungs, spleen, uterus, ovaries, udder and others).

- These organs should stay in the condemned and inedible room until they are treated by the veterinarian to make them obviously unfit for human consumption (by sight, smell, or taste) and be liberally stamped with "**Condemned**" before they leave the abattoir.
- There should be no direction reversal of inedible meat products to the edible products section (to all areas of the abattoir in which meat for human consumption is handled) once they are placed in the condemned and inedible room.
- The dispatch containers for meat products destined for pet animal meat should be labeled "**pet meat**".
- Those products that can be used for pet animals' meat, should be cooled, packed and dispatched in separation with the edible products.
- The inedible products, which are not used for pet meat, once treated by the veterinarian to make them obviously unfit for human or pet animal meat (by sight, smell, or taste by adding certain chemicals such as charcoal, kerosene etc.) and be liberally stamped with "**Condemned**" should be packed in a properly

"inedible" marked and leak proof containers and send to the designated rendering plant for further processing or to the incinerator to be destroyed.

- In similar manner, other by-products such as, horns, hoofs and bones should be kept away from the meat stores and disposed off according to the veterinary regulations (at least 2kms away from the abattoir's campus if not to be used for further processing (*see annex 5*) or be incinerated.
- Immediately after disposal any receptacle (container) coming in to contact with the inedible products should be cleaned & disinfected (*see cleaning*).

7 Emergency situations

Although slaughter animals sent to the export abattoirs are known to be free from important diseases which may cause severe livestock and/or public health problems, it is always wise to consider the possibility of their occurrence and get prepared what measures to be taken if in cases they are to be detected.

While working in an abattoir, emergency situations such as the occurrence of reportable diseases such as Foot and Mouth Disease and others may be encountered. In such cases the inspector veterinarian in charge, with the full awareness of with the abattoir management, should immediately report the situation to the Federal Animal Health Authority as soon as possible.

Apart from such types of diseases, the occurrence of some other diseases, such as Anthrax, which will have very significant public health significance should get considerable emphasis and be handled in a sanitary manner.

7.1 Measures to be taken when Anthrax is Suspected

The presence of this disease in the abattoir is a cause for alarm because of the human health implications, the extreme resistance of the sporulated form of the etiological agent (*Bacillus anthracis*), and the virulence of the disease to livestock.

- In the event of even a suspicion of **Anthrax** on ante mortem inspection, the animal must be held in isolation. The animal will be held until released by the veterinarian.
- In the event of a clinical diagnosis of **Anthrax** on ante mortem inspection, the veterinarian will take two blood samples and blood smears for confirmation in a Federal Government Laboratory.
- The carcass must not be eviscerated but condemned immediately.
- The carcass must be wrapped in a strong sheet of plastic, large enough to encase the whole carcass.
- The wrapped carcass must be removed from the premises to a suitable place where it will be destroyed by burning in the incinerator under the supervision of an inspector veterinarian.
- Precautionary measures must be taken to avoid distribution of the infective agent.

7.1.1 Pens and area of possible contamination

- The pens and all possible areas of the stockyards and cattle cars or trucks that may have been contaminated should be cleaned and disinfected (based on the veterinary regulations) under the supervision of an inspector.
- No animal in a lot in which Anthrax has been found on ante mortem inspection should be presented for slaughter until it has been determined by careful ante mortem inspection that no other animal in the lot is infected.

7.1.2 Personnel Decontamination

All persons who have accidentally handled **Anthrax infected material** should immediately be subjected to a personal decontamination.

- Arms and hands should be thoroughly washed with liquid soap and hot water.
- It is necessary that these steps be taken immediately after discovery of exposure, before the *vegetative Anthrax organisms have time to form spores*.
- In the cleaning, a brush or other suitable appliance should be used to ensure the removal of all the contaminating material from under and around the fingernails.
- This process of cleaning is more effective when it is performed in repeated cycles of lathering and rinsing rather than in spending the same amount of time in scrubbing with a single lather.
- After the hands and arms have been thoroughly rinsed free of soap, they may be immersed for about one minute in a solution of organic iodine, Dettol, Lysol or other acceptable agents followed by a potable water rinse.
- A complete change of clothes should be made with the garments possibly contaminated being thoroughly cleaned and disinfected.
- As a precautionary measure, all persons exposed to **Anthrax infection** should promptly report any suspicious condition (sore or carbuncle) or symptoms, to a physician.

In the event that **Anthrax** is detected on the killing floor, all operations must cease and:

- All parts of an affected carcass including the hide, horns, hooves, hair, viscera and contents, and blood must be condemned.
- All tissues from an infected carcass should, if they can be identified, be collected and placed in plastic bags.
- The plastic bags containing the infected tissue should be removed from the abattoir for destruction in the incinerator under the supervision of an inspector.
- Any other carcass or parts that may have been contaminated with **Anthrax material** through possible contact with contaminated equipment must be condemned and disposed off under the strict supervision of an inspector.
- That portion of the abattoir that has been contaminated with **Anthrax infected material**, should be cleaned and disinfected immediately with an approved disinfectant such as 5% solution of sodium

hydroxide or commercial lye. A freshly prepared solution of sodium hypochlorite (Javel) containing approximately one half of one percent (5,000 ppm) of available chlorine should be used.

- After disinfection procedures are completed, under the inspectors' supervision, the area should be rinsed with hot water of 82°C spray wash before the commencement of further processing (as may be indicated by the veterinary regulations and meat inspection manual).

8 Chemical Standards

Chemical analysis should be carried out for substances listed in Tables 1 and 2 and test results should be within the ranges of the recommended limits.

Table 1. Recommended Limits For Chemical Substances Related To Health

Substance	Maximum Acceptable Concentration mg/L	Objective (Preferably Required) Concentration mg/L
Inorganic		
Antimony	--	0.0002
Arsenic	0.05	0.005
Barium	1.0	0.1
Boron	5.0	0.01
Cadmium	0.005	0.001
Chromium	0.05	0.0002
Cyanide (Free)	0.2	0.002
Lead	0.05	0.001
Mercury	0.001	0.0002
Nitrate (as N)	10.0	0.001
Nitrite (as N)	1.0	0.001
Selenium	0.01	0.002
Silver	0.05	0.005
Sulphate	500.	150.
Uranium	0.02	0.001
Organic		
Nitrilotriacetic Acid		

(NTA)	0.05	0.0002
Pesticides (Total)	0.1	--
Trihalomethanes	0.35	0.0005

Table 2. Recommended Limits For Pesticides

Pesticides	Maximum Acceptable Concentration mg/L	Objective (Preferably Required) Concentration mg/L
Aldrin Dieldrin	0.0007	5×10^{-8}
Carbaryl	0.7	5×10^{-4}
Chlordane (Total Isomers)	0.0007	5×10^{-8}
DDT (Total Isomers)	0.03	5×10^{-8}
Diazinon	0.014	1×10^{-6}
Endrin	0.0002	1×10^{-8}
Heptachlor Epoxide/Heptachlor	0.003	1×10^{-8}
Lindane	0.004	1×10^{-6}
Methoxychlor	0.1	5×10^{-8}
Methyl Parathion	0.007	1×10^{-6}
Parathion	0.035	1×10^{-6}
Toxaphene	0.005	5×10^{-8}
2. 4D	0.1	1×10^{-3}
2.4.5-TP	0.01	1×10^{-3}
Total Pesticides	0.1	--

ANNEX 4. CLEANING AND DISINFECTION

- i. Good hygiene demands effective and regular cleaning and disinfection of abattoir's equipment and vehicles to remove food residues and dirt, which may contain food poisoning and spoilage microorganisms.
- ii. Detergents

Detergents must have good wetting capacity and rinsing property. The detergent used should be non- corrosive and compatible with other materials including disinfectants used in the sanitation program. While cold solutions may be effective in some circumstances, the use of heat is required in removing fat deposits.

The deposition of mineral salts on equipment may form a hard scale (*'stone'*) especially in the presence of fats or proteins; the use of an acid or alkaline detergent sequentially may be necessary to remove such deposits.

Industrial detergents and disinfectants that may be required for cleaning and disinfection need careful handling.

Alkaline and acid products must not be mixed

- Hypochlorite solutions must not be mixed with acidic products, as chlorine gas will be released.
- Operators handling strong alkaline or acidic products must wear protective clothing and goggles and must be thoroughly instructed the handling techniques.
- Containers in which such substances are kept should be clearly marked and stored separately from meat inspection and packaging materials.

Cleaning and Cleaning Procedures:

- Removal of gross debris from surface by brushing and scrapping of deposits followed by application of water
- Application of detergent solution to loosen soil and bacterial films and holding them in solution or suspension
- Rinsing with hot water
- Disinfection (daily or weekly as may be required).

Cleaning Methods:

Cleaning can be carried out by separate or combined use of physical and chemical methods.

According to circumstances one or more of the following methods may be used:

Manual Cleaning:

Involving removal of soil by scrubbing in the presence of detergent solution. For small item of equipment, soaking in a detergent solution in a separate receptacle may be necessary to loosen the soil prior to scrubbing.

In-Place Cleaning:

The cleaning of equipment including pipe runs, with water and detergent solution, without dismantling the equipment or pipe runs. A minimum fluid velocity of 1.5 meters per second (5 feet per second) with turbulent flow is required for effective cleaning of pipe runs. If it cannot be cleaned satisfactorily by this method, the parts should be dismantled and cleaned.

Low- pressure high volume spray: the application of water or detergent solution in large volumes at pressure up to 6.8 bar (100 psi).

High-pressure low-volume spray: the application of water or detergent solution in low volume at high pressure up to 68 hpz (1000 lbf/ sq. in)

Foam cleaning: the application of detergent in the form of foam, which is allowed to remain for up to 15-20 minutes and then rinsed off with a water spray.

Drying After Cleaning:

If equipment is left wet after cleaning, microorganisms may grow in the water film. It is important that the equipment is left dry as soon as possible after cleaning by air-drying or by use of non- reusable tissue or absorbent materials.

Adequate drainage points should be provided in equipment that can not be dismantled and drying racks provided for small pieces.

Any equipment that unavoidably remains wet for a period during which significant microbial growth might occur should be disinfected immediately before use.

b. Disinfection

No disinfection procedure can exert its full effect unless its use is preceded by thorough cleaning.

The abattoir management, in consultation with the regulatory team, should chose disinfectants according to:

- The microorganisms to be killed,
- The type of meat to be processed,
- And the material making up the meat contact surfaces,
- The character of the water available and,
- The method of cleaning used.

i. Disinfection by Heat

The application of moist heat to raise the surface temperature to at least 70°C is one of the commonest and most useful forms of disinfection.

Hot-water disinfection: This is the most commonly used through out the meat industry. Removable parts of machinery and smaller items of equipment are submerged in a tank of water at a temperature of 80-82°C for two minutes.

ii. Chemical Disinfection

The continued use of a certain chemical disinfectant may lead to the selection of resistant microorganisms. Chemical disinfection should be used where use of heat would not be practicable.

The following factors affect the performance of chemical disinfectants:

- Inactivation by dirt: the effectiveness of all chemical disinfectants is reduced by the presence of dirt.
- Temperature: a warm solution is preferable to a cold solution. There are, however, limitations to the temperature that may be used, and the manufacturers' guidance should be followed. For instance

Iodophors release iodine above 43°C, which can result in staining of materials, and the corrosive action of chlorine is also increased when hot hypochlorite solutions are used.

- Time and concentration: the minimum contact time and concentration of chemicals should be used according to the manufacturers' instructions.
- Stability: all disinfectant solutions should be freshly made in clean utensils as prolonged keeping of ready-to-use solutions may be ineffective or may serve as a reservoir of resistant organisms. Disinfectants may be inactivated if mixed with detergents or other disinfectant solutions.

iii. Chemicals Suitable for Disinfection in Meat Premises

Chemical disinfectants that taint or stain the meat such as phenolics should not be used in meat premises or vehicles. Among the commonly used chemicals:

iv. Chlorine and Chlorine Based Products

If properly used, these are among the most suitable for meat abattoir and vehicle. They are relatively cheap and the most suitable general-purpose disinfectants. They should be used at concentrations of 100-250 mg of available chlorine per liter.

This group of disinfectants is corrosive to metals and has a bleaching action. Therefore surfaces of disinfection should be subjected to a final rinsing as soon as possible after an adequate contact time. Chlorine disinfectants with the exception of chlorine dioxide are readily inactivated by the presence of organic soil.

v. Iodophors

These are particularly suitable particularly in those circumstances where an acid cleaner is required. They have a rapid action and a wide spectrum of antimicrobial activity. A solution of about 25-50 mg per liter of available iodine at pH of less than 4 is usually required for disinfecting clean surfaces as they are readily inactivated by organic matter.

They may have a corrosive action on metals depending up on the particular formulation of the iodophor and the nature of the surface to be applied. For this reason care should be taken to rinse them away after use.

vi. Quaternary Ammonium Compounds

They have good detergent characteristics and are relatively non-corrosive to metal and non-toxic but unlike iodophors and chlorine, are not as effective against gram-negative bacteria.

The solutions tend to adhere surfaces and thorough rinsing is necessary. They should be used at concentrations of about 200-1200 mg per liter. They are not compatible with soap or anionic detergents.

vii. Amphoteric Surfactants

These are comparatively recent types of disinfectants having both detergent and antimicrobial properties. They are of low toxicity, relatively non-corrosive, and efficient disinfectants if used according to the manufacturers' recommendations.