
UNIT 12 GENERAL PRINCIPLE AND PROCEDURES FOR POST-MORTEM EXAMINATION

Structure

- 12.0 Objectives
- 12.1 Introduction
- 12.2 Objectives of Postmortem Examination
- 12.3 Facilities Required for Postmortem Examination
- 12.4 General Consideration
- 12.5 Postmortem Principles
- 12.6 Postmortem Examination of Different Carcasses
- 12.7 Postmortem Judgement
 - 12.7.1 Diseases and Conditions for which Carcass is Totally or Partially Condemned
- 12.8 Guidelines for Development of a risk-based System for Postmortem Examination
- 12.9 Let Us Sum Up
- 12.10 Key Words
- 12.11 Some Useful Books
- 12.12 Answers to Check Your Progress

12.0 OBJECTIVES

After reading this unit, you will be able to:

- describe the importance of postmortem examination;
- state the postmortem principles;
- enlist the facilities required for postmortem examination;
- examine different meat animals after dressing;
- state the decisions after postmortem examination;
- identify the conditions under which animals are disposed after postmortem examination; and
- detail out the guidelines for development of a risk-based system for postmortem examination.

12.1 INTRODUCTION

Postmortem examination/inspection refers to inspection of carcass and organs by veterinary doctors after slaughtering and dressing. It should be carried out as soon as possible after dressing. The carcass is examined for evidence of bruises, injuries,

or discolouration and diseased conditions. The veterinary doctor examines carcass and organs to ensure that carcass and organs are fit for human consumption. During inspection, care should be taken not to contaminate the carcass and organs from diseased animals. The knives and other instruments used for cutting and examining organs, glands and tissues should be properly sterilized before and after use. The particular sequence should be followed during postmortem examination so that each carcass and thereof organs are checked thoroughly.

12.2 OBJECTIVES OF POSTMORTEM EXAMINATION

You have studied earlier that the animals are thoroughly examined before slaughter (ante-mortem examination) and carcasses should not be sent to the chilling section without inspection after dressing. You might be thinking what is the need of the examination after slaughter, once animal has been examined before slaughter. If you can recall even during ante-mortem examination, one of the judgements include careful postmortem examination i.e., it mean to say some of the diseases are not apparent and can be detected easily in postmortem examination. Thus, one basic reason to conduct postmortem examination is detection and diagnosis of diseases not only to ensure safe meat for consumer but also to adopt preventive measures to control disease right at farm level itself. Moreover, just similar to ante mortem examination which takes care of animal handling, transportation and its stay in lairage, postmortem inspection ensures proper slaughter and dressing practices such as bleeding, trimming etc. It also directs to adopt a proper disposal procedure for condemned meat and offal. Since postmortem inspection is performed for carcasses as well as their viscera, it ensures a systematic way of evisceration and handling of offals.

12.3 FACILITIES REQUIRED FOR POSTMORTEM EXAMINATION

- The area where the examination is being conducted should have sufficient and well distributed light. The natural light is considered better than artificial light. The intensity of light must be 540 lux or 50 ft candles.
- The person carrying inspection need clean, sharp, stainless knives.
- There must be provision for hot and cold water.
- There should be a sterilizer (operates at temperature of 82°C) to sterilize the knives, saws and cleavers. The postmortem examination should be carried out under hygienic conditions. The knives should be sterilized either by dipping them in boiling water for 30 minutes or by heating them for 10-15 minutes in oil, liquid petroleum jelly or glycerin at a temperature of 248°F to 266°F. (The sterilization of anthrax contaminated knives requires special consideration).
- To put a mark on carcass and its viscera, marking dyes should also be provided, which should be cheap, non-toxic and non-corrosive in nature. Marking indicates that the carcass has been inspected and guarantees the consumer about its wholesomeness. It prevents substitution of sound organs with diseased ones and it is a means of identification of meat about which question may arise

afterwards. Marking of meat is done by (i) using a stamp (ii) branding or (iii) labeling. Common method – Metal stamp dipped in a stamping ink.

- There should be provision of detained room side by the inspection site.

12.4 GENERAL CONSIDERATION

Following points should be considered during postmortem examination/inspection:

- 1) The examination must be done as soon as possible. Carcasses of beef and pork set rapidly and if the inspection is delayed especially in cold weather the examination of lymph nodes becomes difficult.
- 2) Artificial light should be avoided as far as possible and the inspection should be carried out in day light.
- 3) Carcass and organs are to be examined methodically following a definite sequence. Healthy carcass should be examined before inspecting the diseased or suspected ones.
- 4) Great care must be taken at the time of inspection particularly in cases suspected for zoonotic diseases.
- 5) The identity of carcass and its viscera should be maintained.
- 6) Inspector should avoid unnecessary cuts considering the value of high quality food. One should incise the carcass in such a way that the surface of the carcass appears clean and undistorted.

12.5 POSTMORTEM PRINCIPLES

- (i) **Visual perception:** First the carcass and visceral organs should be examined visually for any visible abnormalities. Examination is done for any change of colour, atrophy, hypertrophy, neoplastic condition etc.
- (ii) **Palpation:** The organs are palpated for any change in consistency, sliminess or gelation, cyst etc.
- (iii) **Incisions:** The organs are incised, if needed. This is done to examine any parasite inside organ, structural deformity etc.
- (iv) **Laboratory tests:** These are done for confirmation and support the observation made by macroscopic examination. While examining the organs of carcass, lymph node of adjoining area must be examined.

12.6 POSTMORTEM EXAMINATION OF DIFFERENT CARCASSES

- 1) **Cattle:** In case of cattle, sequence of post mortem examination is as follows:
 - A) Head:
 - (i) Verify the number, age and sex of the animal.

- (ii) Inspect gums, lips and tongue for FMD, necrotic and other forms of stomatitis, actinomycosis and actinobacillosis (Palpate the tongue for the latter).
 - (iii) Incise the internal and external masticatory muscles and tongue for *Cysticercus bovis*.
 - (iv) Incise retropharyngeal, submaxillary and parotid lymph nodes for tuberculosis (TB) lesions.
- B) Lungs:
- (i) Examine visually and then palpate for the detection of pleurisy, pneumonia, tuberculosis, fascioliasis and hydatid cysts.
 - (ii) Incise the bronchial and mediastinal lymph nodes and expose the lung by giving deep incision from the base to apex (for checking TB lesions).
 - (iii) Check the tumors, abscesses etc. by palpation.
- C) Heart:
- (i) Examine the pericardium for traumatic or tubercular pericarditis.
 - (ii) Incise the ventricles of the heart and pay attention to look for petechial hemorrhages on the epicardium and endocardium and cuts in the myocardium. Flavy condition of the myocardium is indicative of septic conditions.
- D) Liver:
- (i) A visual examination should be made for fatty changes, abscesses, hydatid cysts, actinobacillosis etc.
 - (ii) For examination of fascioliasis, incise thin portion of left lobe of liver and examine the contents.
- E) Stomach and Intestines:
- (i) Check the serous surface of the intestine for TB lesions and actinobacillosis.
 - (ii) Palpate the mesenteric lymph node and if necessary incise and examine the same.
- F) Spleen:
- (i) Examine the surface and substance for TB lesions, anthrax, hematoma and presence of infarcts.
- G) Uterus:
- (i) Check for septic conditions by viewing, palpating and incising if necessary.
- H) Udder:
- (i) Check the supramammary lymph nodes by incising for the evidence of TB lesions.
 - (ii) Check for abscesses if any.

I) General inspection of carcass:

- (i) Look for the injuries and bruises. Bruises are dark colour after 24 hours and there is watery condition after 24 to 38 hours. After 3 days, the area becomes rusty orange colour and soapy to touch.
- (ii) Look for inflammation, abscesses and TB lesions in the thoracic and abdominal cavities.
- (iii) Examine the kidneys.
- (iv) Incise and examine renal lymph nodes.

2) Calves

Post mortem examination of calves is as per cattle but calves should be critically examined for following:

- (i) Examine visually for FMD and calf diphtheria.
- (ii) Look to the abomasum for the evidence of peptic ulcer and small intestine for calf scour and dysentery.
- (iii) Check the liver, portal lymph nodes and posterior mediastinal lymph nodes for evidence of congenital TB.
- (iv) Examine lungs, kidneys and spinal cord for melanotic deposits and joints and umbilicus for septic omphalophlebitis.
- (v) Check the consistency of synovial fluid of the hock joint by puncturing the hock joint.

3) Pigs

Viscera of pigs can be inspected in a manner described for cattle. However, in case of pigs, special attention should be paid for the following:

- (i) Skin should be examined for erysipelas, swine fever and urticaria.
- (ii) Submaxillary, bronchial and mediastinal lymph nodes should be incised and checked for TB.
- (iii) The substance of the pig liver need not be incised except for when it is cirrhotic.
- (iv) Portal lymph node should be examined with mesentery as a routine procedure.

4) Sheep and Goat

General procedure is same as for cattle with extra attention for following:

A) Head:

The lips, gums and nasal cavities should be examined for contagious ecthyma.

B) Lungs, heart and liver:

- (i) Palpate lungs, heart and liver and accompanying lymph glands for abscesses.
- (ii) Cut the bile duct for examining possible fluke infestation.

12.7 POSTMORTEM JUDGEMENT

Similar to ante-mortem examination, a competent veterinarian has to submit its judgement report regarding the fate of carcass and its offal. The decision is based on visual observation, palpation, smell, ante-mortem signs and the results of laboratory test, if any. The statement of judgement may be either of the following:

- (i) Fit for human consumption.
- (ii) Unfit for human consumption or total condemnation.
- (iii) The affected organs must be condemned while rest can be passed for human consumption (partially condemned).
- (iv) Approved for human consumption with conditions-distribution restricted to limited or small amount to a consumer with instruction. (Frie bank system).

The condemned carcass/organs should be disposed off following scientific procedure about which you have studied in previous units.

12.7.1 Diseases and Conditions for which Carcass is Totally or Partially Condemned

- A) **Diseases:** The carcass is totally condemned for rabies, anthrax, glanders, rinderpest, foot and mouth disease, acute enzootic meningoencephalitis, acute pleurisy, contagious bovine pleuropneumonia, ovine foot rot, sheep pox, swine fever, swine erysipelas, salmonellosis, fibrinous rhinitis, black leg, bovine viral diarrhoea, haemorrhagic septicaemia, listeriosis, pasteurellosis, coccidiosis, calf diphtheria, calf diarrhoea, malignant oedema, tetanus etc.

The carcass in case of actinomycosis, actinobacillosis and johne's disease, is totally condemned if accompanied with emaciation and in generalized form, otherwise the carcass is passed for human consumption after local condemnation. In case of corynebacterium infection, carcass is passed after removal of affected organs.

In case of heavy infestation (more than 10 cysts) with *Cysticercus bovis* and *Cysticercus cellulosae*, carcass is totally condemned; otherwise the carcass is passed after removal of head, heart, diaphragm and esophagus. *Trichinella spiralis* infected carcass is totally condemned. If carcass show the sign of fascioliasis with emaciation then it is totally condemned, otherwise it is passed after trimming of liver.

Carcass is passed for consumption after removal of lung in case of emphysema and broncheolitis. If there is no fever, then carcass with sign of gastroenteritis is unconditionally passed.

The judgement of carcass suffered from tuberculosis depends on method of spread, extent of disease, character and age of lesion and general condition of the animal. Carcass is totally condemned when tuberculosis spreads through portal or pulmonary or systemic circulation. In case of localized tuberculosis, the carcass is passed after removal of the affected organs and associated lymph nodes.

- B) **Metabolic and nutritional disorders and intoxication:** The carcasses are totally condemned if they show any of the following sign:

(i) Anaemia with emaciation, (ii) grass tetany, (iii) haemoglobinuria, (iv) jaundice, (v) ketosis with chronic indigestion, (vi) poisoning, (vii) bloat or (viii) impaction etc.

C) **Abnormal conditions:** Abnormal conditions like, abnormal colour, taste and smell, buck smell, bore smell etc. results in total condemnation of the carcass.

12.8 GUIDELINES FOR DEVELOPMENT OF A RISK-BASED SYSTEM FOR POSTMORTEM EXAMINATION

Postmortem examination procedures and tests should be established by the competent authority according to a risk-based system. Procedures have to be based on current scientific knowledge and practice.

Postmortem examination procedures based on current knowledge and practice vary considerably in different countries. The procedures that are presented in the following *Tables 12.1, 12.2 and 12.3* are only intended to provide general guidance, and should be adapted by the competent authority as appropriate.

In particular:

- Routine procedures may be supplemented by additional procedures to assist judgement.
- Young animals are likely to need less intensive examination than older animals, although some diseases are confined to young animals e.g., omphalophlebitis.
- In the case of farmed game birds, postmortem examination procedures should reflect the particular circumstances of harvesting and transport to the establishment.
- Special postmortem examination procedures may need to be applied to animals that have reacted to screening test, e.g.,
 - (i) Animals which have reacted positively to tuberculin test should be slaughtered under special hygienic conditions and be subject to more intensive examination procedures than non-reactor animals.
 - (ii) Irrespective of detection of lesions suggestive of infection, the udder, genital tract and blood of animals which have reacted positively to a brucellosis test should be judged as unfit for human consumption.

Table 12.1: Procedures for routine post-mortem examination of the head of the animals intended for human consumption

	Cattle	Pig	Sheep/goat
External surfaces/oral cavity	V	V	V ^a
Submaxillary lymph nodes	V, I ^b	V, I	—
Parotid lymph nodes	V, I	—	—
Retropharyngeal lymph nodes	V, I	—	—
Tongue	V, P ^c	V	—
Muscle of mastication	V, P, I ^d	V, P, I	—
Other	—	—	—

V = visual examination, P = examination by palpation, I = examination by incision.

- a) Notwithstanding postmortem examination for animal health purposes, the head may be discarded if brains and tongues are not collected for human consumption.
- b) Incision of lymph nodes of the head is not necessary in calves.
- c) Palpation of the tongue is not necessary in calves.
- d) The muscles of mastication should be incised according to the potential for infestation with cysts of *Taenia* spp.

Table 12.2: Procedures for routine post-mortem examination of the animal carcass intended for human consumption

	Cattle	Pig	Sheep/goat	Poultry
External surfaces	V	V ^a	V	V
Prescapular lymph nodes	V	—	V	—
Thoracic cavity/pleura	V	V	V	V
Abdominal cavity/peritoneum	V	V	V	V
Superficial inguinal lymph nodes	V,P	—	V,P	—
Supramammary lymph nodes	V, P ^b	V	V	—
Pre-pectoral lymph nodes	V,P	—	V,P	—
Popliteal lymph nodes	—	—	P	—
Renal lymph nodes	V,P	V,P	—	—
Diaphragm	V	V ^c	V	—
Other	— ^d	—	—	—

V = visual examination, P = examination by palpation,

Note: ● The umbilicus and joints of the limbs should be viewed and palpated in very young animals.

- A quality assurance system should be in place to ensure that all thyroid tissues have been removed from the throat.

- a) Castration sites should be palpated.
- b) Supramammary lymph nodes should be incised in lactating animals.
- c) The muscles of the diaphragm should be incised according to the potential for infestation with cysts of *Taenia* spp.
- d) The udder should be incised if it is intended for human consumption.

Table 12.3: Procedures for routine postmortem examination of the animal viscera intended for human consumption

	Cattle	Pig	Sheep/goat	Poultry
Lungs	V, P ^a	V,P	V,P	V
Oesophagus	V	V	V	—
Trachea	V	V	—	—
Bronchial lymph nodes	V, P ^b	V,P	V,P	—

Mediastinal lymph nodes	V,I	V,P	V,P	—
Heart	V, P, I ^c	V,P,I ^c	V,P	—
Pericardium	V	V	V	V
Liver	V,P	V,P	V,P	V
Portal lymph nodes	V,P	V,P	V	—
Gall bladder	V,I ^d	—	V,P	—
Kidneys	V	P	V	V
Renal lymph nodes	V	—	—	—
Spleen	V	V	V	—
Gastrointestinal tract	V	V	V	V
Mesenteric lymph nodes	V,P	V,P	V	—
Genital organs	V ^e	V	—	V

V = visual examination, P = examination by palpation, I = examination by incision.

- a) Incision of the diaphragmatic lobe can be used to examine the bronchi if lungs are intended for human consumption.
- b) Incision of the bronchial and mediastinal lymph nodes is not necessary in calves.
- c) The number and location of incisions in the heart muscle should be according to the potential for infestation with cysts of *Taenia* spp.
- d) An alternative to incision of the bile ducts for the detection of distomatosis is incision through the gastric surface of the liver. Examination for distomatosis is not necessary in calves.
- e) Palpation and incision should be carried out as appropriate if tissues are intended for human consumption e.g., uterus of heifers.

Check Your Progress

1) Name five diseases for which carcasses are condemned after postmortem examination.

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2) Enlist facilities required for postmortem examination.

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3) Name the principles of postmortem examination.

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4) What are the main decisions of postmortem examination?

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12.9 LET US SUM UP

In this unit, we have learnt that the postmortem inspection is a very important step for producing wholesome and good quality meat for the consumers. For effective postmortem examination, there should be provision for expert veterinary doctor, instruments, light of at least 540 lux intensity, hot and cold water, marking system, instrument sterilizer and detained room etc. Postmortem examination is mainly done by visual perception, palpation, incision and laboratory test. We have seen that the sequence followed for the examination by veterinary officer includes examination of carcass and its parts and different organs. The carcass of the animals that are free from diseases shall be passed as fit for consumption. The suspected cases are further examined properly and the condemned carcass is disposed off efficiently. In some cases, carcasses are totally condemned and in some cases, these are partially condemned i.e., the carcasses are passed for human consumption after removal of affected organs and some associated tissues.

12.10 KEY WORDS

Actinobacillosis	: Bacterial disease of cattle affecting tongue
Actinomycosis	: Bacterial disease of cattle affecting jaw bones
Bronchial lymph node	: Lymph nodes located under aortic arch
Cysticercus bovis	: It is the larval stage of <i>Taenia saginata</i> (a tapeworm) and it forms muscle cyst
Endocardium	: Inner layer of heart
F.M.D	: Food and Mouth Disease, contagious viral disease of cattle
Fascioliasis	: Infestation with liver fluke i.e., fasciola
Haematoma	: Blood enclosed inside membrane
Hydatid cyst	: Cyst formed by a tapeworm called <i>Echinococcus granulosus</i> .
Inflation	: Blowing air
Infarcts	: Blockage of artery by some obstruction (e.g., a blood clot or cholesterol deposit)
Lesions	: Abnormal growth, wound
Masticatory muscle	: Chewing muscle

Mediastinal lymph nodes	: Lymph nodes close to esophagus
Mesenteric lymph nodes	: Lymph nodes of intestines
Myocardium	: Muscular layer of heart
Necrotic	: Dead (specially dead cell of the body)
Palpation	: By pressing with hand
Parotid lymph nodes	: Lymph nodes located near parotid salivary gland
Pericarditis	: Swelling of outer membrane of heart
Pericardium	: Outer membrane of heart
Petechial haemorrhage	: Pin point bleeding
Pleurisy	: Swelling of pleura with accumulation of fluid
Post-mortem	: After slaughter or death
Retropharyngeal lymph gland	: Lymph glands located anterior to pharynx
Septic	: Pus forming infection
Stomatitis	: Inflammation of oral cavity
Submaxillary lymph gland	: Lymph glands located on either side of maxillary bone of lower jaw
Traumatic	: Wound caused by foreign material
Ventricles	: Lower chamber of heart
Viscera	: Organs including stomach and intestine
Wholesome	: Good, fresh, healthy

12.11 SOME USEFUL BOOKS

Biswas, S. 2001. Monograph on the Elements of Hygienic Meat Production. University Publication. W.B.U.A.F.S., Kolkata.

Gracey, J.F, Collin, D.S. and Huey, R.J. (2000). Meat Hygiene, 10th edn, W.B. Saunders Company Ltd., London.

12.12 ANSWERS TO CHECK YOUR PROGRESS

- 1) Five diseases for which carcasses are condemned after postmortem examination are as follows:
 - (i) Septicemia
 - (ii) Foot and mouth disease
 - (iii) Anthrax
 - (iv) Generalised T.B
 - (v) Black leg.
- 2) Following facilities are required for postmortem examination :
 - Intensity of light at inspection area must be 540 lux.
 - Knives should be clean, sharp and made of stainless steel.

**Slaughter Techniques
and Meat Inspection**

- Sterilizer should be there for sterilization of knives, saws, cleavers.
 - Hot and cold water should be provided.
 - Carcass and viscera should be marked properly.
 - Detained room should be there side by the inspection site.
- 3) The principles of postmortem examination are:
visual perception, palpation, incisions and laboratory test.
- 4) Main decisions of postmortem examination are as follows:
- Approval for human consumption.
 - Totally condemned for human consumption.
 - Partially condemned for human consumption i.e., removal of affected organs and parts.
 - Approval for human consumption with certain restriction.