

Ante mortem and post mortem examination of food animals

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INTRODUCTION

Ante mortem and post mortem examinations are critical components of ensuring food safety and maintaining the health of both animals and humans in the context of food production. These examinations are particularly relevant in the livestock industry, where animals are raised for meat consumption. Ante-mortem and post-mortem examinations of food animals play crucial roles in the prevention and control of zoonotic diseases. It also contributes to the animal health, animal welfare aspects along with meat hygiene. Ante mortem and post mortem examination should be carried by a qualified veterinarian with the support of trained official assistants.

ANTE MORTEM INSPECTION

Professional examination of the live animal before slaughter by a qualified veterinarian is known as ante-mortem inspection. Examination of animals is done either immediately after arrival to the slaughter house premises or before they are slaughtered.

Ante mortem inspection has three main concerns

- 1. Public Health:** Segregating normal animals from those suffering from potentially zoonotic disease
- 2. Animal Health:** Certain diseases which are likely to cause serious epizootic may be detected at the slaughter house and these have to be intimated to state veterinary services for protection of other animals.
- 3. Animal welfare:** AMI makes sure not to slaughter animals that are suffering from any injuries or ailments (pregnant/ calves), thereby giving due consideration to the animal welfare at slaughter.

- To ensure the selection of normal rested animals and poultry which will produce wholesome meat.
- To separate diseased and suspected animals for further detailed examination
- To reduce contamination of slaughter premises/ cleaning floor by separating dirty animals and condemning the

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diseased animals thereby preventing spread of communicable diseases.

- To enforce the application of humane methods of slaughter.
- To assist and provide more clinical information for post-mortem inspection.
- To ensure that the animals suffering with acute pain are sent to emergency slaughter to relieve them from unnecessary suffering.
- To reduce contamination on the killing floor by separating the dirty animals and condemning the diseased animals.
- To identify reportable/ notifiable animal diseases to prevent killing floor contamination. Ex: Swine fever, FMD etc.
- Certain diseases such as Rabies, Tetanus, Listeriosis, heavy metal poisoning, septic mastitis and metritis can only be diagnosed during Ante mortem inspection.
- To assist in establishing and promoting a meat export trade by ensuring that all meat exported shall be clean and wholesome.

Requirements:

Place: Ante mortem inspection should be conducted in the lairage where the exhausted animals (due to transportation) are rested prior to slaughter. If there is no provision

for lairage it can be performed in alternate place like receiving area

Time: It should be conducted within 24 hours before slaughter preferably in daylight. If the slaughter is postponed, the animals should be subjected to another inspection immediately prior to considering for slaughter.

Person: AME must be carried out by a qualified veterinarian should have a thorough knowledge of normal appearance and habits of various food animals, the characteristic changes brought about by the common diseases along with knowledge of the meat trade practices. He can be assisted by a inspector competent supporting staff who can assist in collecting the preliminary data of the animal and handling of animals during inspection.

Instruments and facilities: Adequate lighting, proper ventilation, simple clinical equipment, some restraining materials/ instruments (ropes, cages, barracks, trevis etc.) along with an isolation pen are required for proper AME in the lairage. Animals found diseased or apparently diseased should be marked with colours or paints, preferably on each side of the rump.

PROCEDURE:

- ✓ When the animal reaches the slaughter facility i.e. lairage, the first and foremost thing to be carried out is the

- identification of the animal (marking/ paint/ pen cards) and collection of the details regarding the place of purchase or origin. (Ex: Ear notching, hair clipping, branding, tattooing, tags or bands – at farm)
- ✓ The main objective to identify the animal is to maintain the identity of the carcass during PME and to trace back the source of animal in case of outbreaks/ notifiable disease.
 - ✓ Animal should be inspected both in rest and in motion on both the sides.
 - ✓ First observe the animals, while they are at rest without disturbing them - to find out whether they are fatigued or at rest.
 - ✓ Observe the general condition and appearance of the each animal specially for indications of some abnormal conditions.
 - ✓ All the animals showing abnormal conditions are segregated at this stage.
- The next step is to observe the animals in motion on both sides:
- ✓ Condition of face, skin and presence of wounds can be detected
 - ✓ Observe for lameness
 - ✓ In case of female animals, the inspector looks for mastitis, metritis/ ROP
 - ✓ The ante-mortem inspection of calves is similar to that of cattle
- ✓ Observed whether they have matured enough to produce quality beef.
 - ✓ Calves which are unable to stand up, lack of normal growth, infected naval and joint enlargements are separated and examined individually.
 - ✓ Calves with an indication of generalized conditions are unfit for slaughter.
 - ✓ Locally affected calves are handled as suspect.
 - ✓ Sheep and goat are also examined both at rest and in motion. These animals are specifically examined for their condition and transit sickness.
- Conditions to be recorded:** Some of the abnormalities which are checked and recorded on ante-mortem examination are abnormalities of temperature, pulse and respiration rates, behaviour, gait, posture, nutritional status, cleanliness, structure, discharges, signs of diseases and abnormalities.
- Abnormalities in Respiration:** To measure the respiratory rate, observation should be made at the flank region. Healthy animals take regular and easy breaths which are effortless and noiseless.
- If the breathing pattern is abnormal – segregate the animal as 'suspect'.

- If abnormal respiration is found in one pig, the entire lot has to be treated as unit and treated accordingly
- Roaring – paralysis of intrinsic muscle of larynx – calf diphtheria
- Snoring – pharyngeal stenosis – tubercular lymphadenitis of retropharyngeal lymph node

Abnormalities in Temperature:

- Normal temperature is a sign of health.
- **Hyperthermia:** Elevation of body temperature indicates systemic disturbance associated with overcrowding/ high environmental temperature - **Judgment:** Must be given adequate rest before slaughter.
- **Fever/ Pyrexia:** Abnormal elevation of body temp in response to bacterial, viral, protozoal, parasitic, fungal/chemical / pyrogenic (it is mediated by cytokines)/ septicemia – judgment being held as suspect/ unfit.

Abnormalities in Pulse rate: Reflects the condition of heart. Often faster in young animals

Normal temperature, pulse and respiration rate of various species

Species	Temperature in °F (°C)	Pulse rate / min	Respiration rate / min
Cattle	101 (38.3)	40-60	12-15
Buffalo	100 (37.8)	40-70	14-18
Sheep	102.2 (39)	65-85	12-20
Goat	102.2 (39)	70-80	12-20
Pig	102.2 (39)	65-85	10-16
Calves	101 (38.3)	45-75	15-20

Abnormalities in behavior:

- The behavior of an animal foretells the duration and severity of the illness
- Responsiveness of an individual animal towards the stimulus may be considered as a criterion to judge the behavior of an animal.
- Normal animal reacts and responds very promptly with the movement of it's head, tail, eye, ears.
- Abnormalities in behavior may be manifested by one/more of the following signs:
 - Walking in circles and pushing head against wall – Otitis, Gid, *Coenurus cerebralis*, Listeriosis
 - Charging/ attacking at various objects and acting aggressively – Rabies, Heavy metal poisoning
 - Showing dull and anxious expression in the eyes
 - High stepping movement with rigidity of limbs – Tetanus
 - Stumbling gait: Encephalitis, opium poisoning/ narcotic poisoning
 - Goose stepping gait in pigs: Pantothenic acid deficiency and Hog cholera

Abnormalities in gait: Observed when the animals moves/walks

- It indicates the locomotor processes and the configuration of the animal when in motion.
- Changes in the gait associated with pain in chest/ abdomen (lameness) or is an indication of nervous disease
- Slow wobble gait: all febrile and septicaemic diseases

Abnormalities in posture: Observe the animal when it is in standing/ lying positions

- Posture denotes the anatomical configuration of an animal when they remain in stationary condition – animal stands with an extended head and stretched out feet and head turned along its side while lying
- Abnormality in posture is observed as tucked up abdomen
- If unable to rise, it is called “Downer syndrome” – these animals should be handled with caution in order to prevent further suffering
- A cow sits on the sternum and head rests on the flank: Milk fever/ Downer cow syndrome
- Frog like posture (sternal recumbency and hind legs extended): Bilateral hip dysplasia, obturator nerve paralysis
- Frog sitting posture (sheep and goat): Parturient hypocalcemia.

- Shifting of weight on one leg: Laminitis
- Dog sitting posture and kicking of belly: Acute gastric disorder
- Animal stiff with four legs abducted with locked jaw and rigid ears: Tetanus

Abnormalities in appearance

- Healthy animals generally have bright eyes, alert and responsive ears, glossy skin and moist muzzle.
- Skin is glossy with smooth hair coat – also indicates the level of hydration
- Rough hairs- endo and ecto parasites, mineral deficiencies
- Abnormal skin lesions- Bruising tear due to improper handling on the farm and during transit.
- Emaciation and cachexia – chronic wasting diseases like TB, JD, heavy parasitism etc.

Abnormalities in structure (conformation)/ external appearance:

- Conformation of the animal can be evaluated based on the bony prominences and joints – requires close observation of the animal from both front and rear side i.e the abdominal contour.
- Abnormalities in structure is manifested as
- Swelling (abscesses) seen commonly in pigs

- Enlarged joints
- Umbilical swelling
- Enlarged jaw (lumpy jaw – actinomycosis)
- Bloated abdomen

Abnormal discharges and protrusions: It is important to observe all secretions and excretions from the natural orifices (ocular, nasal, bloody diarrhea etc.)

- The discharge may be unilateral or bilateral
- Discharges from nose, excessive salivation – FMD, mucosal disease, RP
- Ocular discharge: Blue tongue, bovine viral diarrhoea and mucosal disease
- Prolapsed rectum
- Prolapsed uterus/ vagina – post parturient complications, abortions (brucellosis)
- Growths on eye

Abnormal colour: Such as black areas in swine and red areas on light coloured skin (inflammation), dark blue areas on the skin and udder (Gangrene).

Examination of visual mucous membranes: Conjunctiva, oral mucosa, vulval mucous membranes for any congestion.

Examination of superficial Lymph nodes: For any enlargements (pre-scapular, sub-maxillary (T.B), supra-mammary/superficial inguinal, pre-crural,

parotid lymph nodes, retropharyngeal (actinomycosis, actinobacillosis, FMD).

Abnormal odour: It is very difficult to detect on routine ante mortem inspection

- The foul odor may be due to discharges or due to some abnormality in the animal digestive physiology. Ex: acetone/ stinkweed odor due to ketosis.
- Cheesy odour/ Rancid odour – BQ
- Purulent exudates with medicinal odor – abscess
- Putrefactive exudates – putrid rhinitis, putrid bronchitis

Dehydration: Loss of skin elasticity, sunken eye balls and dry mucous membranes. Sometimes associated with fatigue, weakness, stiffness and pain.

Other abnormal conditions: Emaciation, injuries, heat, apoplexy, transit tetany and lesions of FMD

Decisions in Ante-Mortem Inspection (AMI) / Categorization of animals:

- Passed/ Fit
- Unfit/ Reject
- Suspect/ Detained/ Slaughter authorized under special conditions
- Delayed/ Postponed slaughter
- Casualty slaughter
- Emergency slaughter

POST MORTEM INSPECTION

Systematic examination of dressed carcasses and their blood in a hygienic manner

immediately after slaughter in the presence of adequate amount of light by a meat inspector with the object of providing wholesome meat to consumers.

Objective:

- To provide wholesome and clean meat to consumers
- To check the efficiency of slaughter and carcass dressing technique
- To control the incidence of meat borne zoonotic diseases

Principles:

- Slaughtering should be limited to certain specified hours which will be convenient to the inspector, butcher & purchasing public.
- Sufficient time & light for inspection.
- Slaughtering should be done in the presence of meat inspector as far as possible.
- Animal should be bled, skinned, feet are removed then the carcass is hoisted up & further flaying is completed.
- Abdomen is incised & the abdominal organs are allowed to fall in front of the inspector for inspection (organs kept hanging to the carcass). The organs are then wheeled to a yard for carrying out unclean operations.
- Thoracic cavity is opened for inspection of thoracic organs

- PME must be carried out in a systematic & hygienic manner, care being taken to avoid contamination.
- While inspecting an organ, always look for the associated lymph node and look for abnormalities if any.
- Record the age, sex & give a number to the carcass.

Facilities required:

- **Place of inspection:** Post mortem inspection of dressed carcasses generally be carried out in the slaughter hall while viscera on the viscera table.
- **Light and water:** Adequate lighting facilities with minimum of 540 lux/ 50 foot-candles should be there which does not distort colours. Each inspection point should have continuous supply of running hot and cold water, liquid soap and towels.
- **Meat inspector:** PM inspection can be conducted only by a qualified veterinarian.
- **Instrument:** Knives, scissors, saws, forceps, etc and sterilizer to sterilize these instruments.
- Synchronization of conveyerized lines carrying carcasses and offal is absolutely necessary for accurate identification of carcasses and their relative organs and to provide reliable

information for any subsequent examination on the detained line.

Carcass Identification: Live animal tags are not actually retained on the carcass because of hygiene - it is important to have a reliable system of substituting dead for live identifications so that accurate details of producer, ownership, carcass weight, carcass grade, classification and disease information are maintained.

Procedure: Post-mortem inspection must always be carried out in a systematic and hygienic manner, care being taken to avoid contamination, especially of septic nature. The inspector must ensure that the premises, equipment and facilities are hygienic and in good working order before the day's slaughter commences.

1. Palpation

- Visual examination followed by palpation is done for the satisfactory examination of an organ wherein the fingers should be pressed firmly on the organ/ part of the carcass.
- This enables the inspector to locate smallest abscess or cyst.

2. **Incision:** Only clean knife should be used to avoid cross-contamination of other carcasses

- Whenever necessary the lymph node or carcass/ organs may be incised to

observe lesion or cysts but care must be taken not to distort the carcass organs.

- Incision should only be deep enough to satisfy the inspector and to prevent any risk of contamination (abscess).

General aspects of PME: All parts of the animals (cattle, sheep and goats, swine) including blood must be inspected immediately after slaughter and the inspection must include:

1. Visual examination (palpation & incisions) of slaughtered animal.
2. Use of inspector's sense of smell & lab tests are important in judging the carcass at post mortem examination.
3. State of nutrition: Differentiate between physiological leanness & pathological emaciation.
4. Evidence of bruising, hemorrhages or discolouration and edema.
5. Traumatism carcass should be cut into joints as soon as possible to avoid serum infiltration into muscles.
6. Oedema -
7. Haemorrhage
8. Efficiency of bleeding
9. Any swelling and deformity
10. Abnormality of bones, joints, musculature or umbilicus
11. Age and sex of the animal
12. Abnormal odour

- Consumption of strong smelling substances like fish meals, cod liver oil, drugs before slaughter.
- Sexual odours of males (boar odour, goatly odour)
- Products of abnormal metabolism- Acetone smell in case of ketosis, fever, near parturition.

13. Condition of pleura & peritoneum

14. Palpation of certain organs, particularly lungs

15. Incision of organs & lymph nodes

16. Other evidence of abnormality

Post-mortem inspection in cattle

1. Examination of Head:

1. Inspection of head involves examination of outer surfaces of eyes, gums, lips and tongue for the lesions of foot and mouth disease, necrotic stomatitis, actinomycosis, actinobacillosis.
2. The tongue should be palpated from dorsum to tip for actinobacillosis and actinomycosis.
3. Incision of internal and external masseter muscles for Cysticercus bovis and Sarcocystis.
4. Retropharyngeal, submaxillary, mandibular and parotid lymph nodes should be incised for tuberculosis lesions.

5. Roaring in cattle is associated with enlargement of retropharyngeal lymph nodes and about of 50% of roaring is due to tuberculosis or encapsulated abscesses of retropharyngeal lymph nodes.

6. The tonsils of cattle frequently harbour tuberculosis bacilli and should always be examined and removed as unfit for food, even though apparently normal.

2. Examination of Viscera

- **Lungs:** Visual examination followed by palpation should be carried out for the evidence of pleurisy, pneumonia, congestion, oedema, emphysema, abscess, cysts, necrotic foci, consolidation, hepatization, marbling and important diseases suspected: cases of lung worms, tuberculosis, haemorrhagic septicaemia.

➤ The bronchial and mediastinal lymphnodes should be incised for tuberculosis and the lung substances should be exposed by a deep long incision from the base to apex of each lung.

➤ If there is a adhesion in the chest cavity it indicates some form of lung or peritoneal disease.

➤ If the lung tissue is of grayish or yellowish appearance and in masses or nodules, it indicates tuberculosis.

- The bronchial and mediastinal lymph nodes should be incised for tuberculosis. A healthy lymph node is of a pale brown in colour throughout and tubercular lymph glands contain small white nodules with semisolid cheese like grayish white or yellowish mass.
- **Heart:** Heart is incised longitudinally from its base to the apex through the wall of LV and the intraventricular septum. Pericardium of heart should be examined for haemorrhages, pericarditis, hydropericarditis and traumatic reticulo pericarditis. Ventricles of the heart should be examined for blood clots, petechia haemorrhages, cysticerci, hydatid cysts, vegetative endocarditis etc.
- Flabby condition of myocardium in septic conditions
- Examine mediastinal lymphnode for abnormalities in above conditions.
- **Liver:** A visual examination is made for fatty changes, actinobacillosis, abscesses and parasitic infections such as hydatid cysts, Cysticercus bovis, fascioliasis, the larval stages of Oesophagostomum. (A routine incision should be made in the left lobe for fascioliasis.) The portal and hepatic lymph nodes should be incised for tuberculosis. The large bile duct should be opened longitudinally and examined for parasites.
- **Esophagus, stomach and intestines:** The serous membranes of these organs may show evidence of tuberculosis or actinobacillosis.
- Anterior aspect of reticulum may show evidence of penetration by a foreign body. Mesenteric & gastric lymph nodes should be incised for tuberculosis or and linguatula parasitic nodules.
- **Kidneys:** Examine for hemorrhages, nephritis, pulpy kidney infarcts, degeneration, toxins and residues.
- Examine renal lymph nodes for nephritis and leptospirosis.
- **Spleen:** The surface and substance should be examined for tuberculosis, anthrax, haematomas and infarcts.
- Examine splenic lymphnode for abnormalities in above conditions.
- **Uterus:** Opened and examined for septic metritic conditions, tumors. Evidence of pregnancy or of recent parturition in a well bled and well set carcass is not significant. Examine iliac lymphnode for abnormalities in above conditions. In case of brucellosis, uterus is removed intact without incision.

- **Testes:** Inspected for orchitis, hernias and haematomas. Examine superficial inguinal lymph node for abnormalities

3. Examination of carcass:

1. Carcass should be examined for cut surfaces of bones, muscles, pleura, peritoneum and diaphragm etc. and also for the general condition of the animal and nutritional status, efficiency of bleeding, sensory evaluation for colour, odour, cleanliness, bruising, haemorrhages, icterus, cysts and various other abnormalities
2. Triceps brachii muscles are examined for the presence of *Cysticercus bovis*.
3. Thoracic and abdominal cavity for the evidence of peritonitis, mesothelioma, cysts, TB, hernia etc.
4. Prescapular, popliteal, superficial inguinal, external and internal iliac, prepectoral and renal LNs should be observed, palpated and incised – tuberculous lesions (if already found in viscera)
5. Diaphragm should be lifted for TB lesions (between diaphragm and thoracic wall)

Post-mortem inspection in calves:

- Post-mortem inspection in calves is similar to adults with special attention to certain parts such as mouth and

tongue for infectious diseases such as FMD and calf diphtheria.

- Abomasum should be examined for septic ulcers and small intestines for white scours and dysentery.
- Liver and hepatic lymph nodes examined for congenital tuberculosis.
- The umbilicus and joints for navel ill/septic omphelophlebitis
- The lungs, kidneys and spinal cord examined for evidence of melanotic deposits.
- Incise the hock joint and check the consistency of the synovial fluid

Post-mortem inspection in sheep and goats:

- Generally postmortem inspection in sheep and goats requires less detailed inspection than cattle, calves and pigs.
- Carcass should be examined for satisfactory bleeding and proper setting,
- Lungs are examined for parasitic diseases like hydatid cysts.
- Liver for fascioliasis and the bile duct is cut transversely for fluke infestation.
- The joints particularly knee and stifle for arthritis.
- Lymph nodes should be examined for the evidence of TB and Caseous Lymphadenitis.
- Fractured rib and septic pleurisy may often be encountered.

Postmortem inspection in pigs: Overall routine is similar to that of cattle

- Skin lesions – swine erysipelas, swine fever, urticaria, examined for ‘shotty eruption’
- Tail for necrosis, feet for abscess and udder – actinomycosis
- Supra-mammary LNs examined and incised for TB, abscess
- Tongue abscess – beta-hemolytic streptococcus
- Viscera inspection is similar to cattle with particular attention to pneumonia
- Vegetative endocarditis – swine erysipelas
- *Cysticercus cellulosae* – examination of thigh muscles, pillars of diaphragm, intercostals muscles, heart, tongue, larynx, abdominal wall, psoas muscles
- Appropriate examination of muscles and muscle sampling for trichinosis (tongue, diaphragm, cheek etc.)
- The kidneys and surrounding tissue shall be examined for parasitic infection

Final inspection:

- Carcasses/ viscera which are found diseased/abnormal on routine PME are subjected to final inspection in the ‘detained area’ along with their corresponding parts

- With a more thorough examination, it is determined whether they are suitable for human consumption.
- This inspection is conducted in a space especially set apart from the normal slaughter facilities to avoid danger of contamination of other carcasses & viscera.
- In doubtful cases, the carcass is held pending for laboratory findings.
- This area is drained and enclosed in such a way that clean-up and sanitizing of the floor and contaminated equipment is done without endangering the products.
- All the condemned carcasses and their parts are directly conveyed to the inedible-products department.

Re-inspection: The inspector should aim to

1. The product is being handled in a clean environment with clean equipment
2. No unfit or harmful ingredients are being added to the product
3. It has been properly prepared
4. It is not mislabeled.

Condemnation and destruction:

1. The unfit animals, carcasses and parts and meat products should be immediately condemned and promptly destroyed under the supervision of an inspector.

2. The equipment used for handling and transporting condemned products should be should be of watertight construction to avoid contamination of the premises or other products and used exclusively for that purpose and with pathogens.
3. The condemned products are kept secured under supervision until they are destroyed under close supervision by the inspector.

