Necropsy Examination

Necropsy Techniques for Feedlot Personnel

“A well-performed post mortem examination and full utilization of diagnostics are the keys to disease prevention.”

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Table of Contents

**Necropsy Examination**
- Necropsy Techniques for Feedlot Personnel  
  Page 5
- Necropsy Manual  
  Page 8
- Necropsy Procedures  
  Page 9
- Points to Remember  
  Page 10
- Necropsy Equipment  
  Page 14
- External Exam  
  Page 15
- Procedure  
  Page 17
- Left Side Down Preparation  
  Page 19
- Right Side Down Preparation  
  Page 21
- Preparation  
  Page 23
- Examination of Hard & Soft Palate, Tongue, Esophagus, Epiglottis and Trachea  
  Page 24
- Examination of Thoracic and Abdominal Cavities  
  Page 26
- Diagnostics  
  Page 30
- Reflecting Thoracic Viscera  
  Page 31
- Heart Examination  
  Page 34
- Reflecting Abdominal Viscera  
  Page 35
- Joint Examination  
  Page 42
- Brain Removal and Examination  
  Page 44
Table of Contents

Necropsy Manual Observations
Trachea Page 48
Larynx Page 49
Lung Page 50
Liver Page 51
Kidney Page 52
Esophagus Page 53
Abdominal Cavity Page 55
Rumen Page 56
Abomasum Page 57
Cecum Page 58
Small Intestine Page 59
Large Intestine Page 60
Muscle Page 61
Heart Page 62
Brain Page 63
Necropsy Observations References Page 64
Necropsy Examination
Necropsy Techniques for Feedlot Personnel

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Necropsy Techniques for Feedlot Personnel

Though dead cattle in a feedyard are a source of great economic loss, they may still have some worth in the form of valuable diagnostic information. Necropsies are an excellent training tool to teach about anatomy, physiology and pathology. Evaluating obvious pathology associated with respiratory, digestive, urogenital and/or reproductive tracts will enable you to rule out about 75% of the most common causes of feedlot diseases.

Feedyard personnel can be trained to perform simple yet thorough and informative examinations.

First, a comprehensive history of the animal should be gathered and recorded. This should include the age, sex, weight and breed of the animal. Type and duration of symptoms, and treatment are also important in interpreting findings. The place of death and the position when found should be noted, as well as the number of animals in the group and others affected. A history of nutritional management, current ration, and days on feed may aid in the diagnosis. Any piece of information relevant to the animal or its environment may be the part that completes the puzzle.

Before examining the internal organs, an external examination should be performed.

Anything abnormal in appearance should be noted, such as:
1. General appearance of carcass
2. Thriftiness or apparent nutritional status
3. Condition of hair coat and presence of external parasites
4. Color and appearance of all visible mucous membranes
5. Presence or absence of discharges from all body openings and mammary glands
6. Evidence of swellings, wounds, hernia and fractures.

The purpose of a necropsy is to expose tissues so lesions can be seen and samples, if necessary, can be collected. By following certain procedures, an animal can be examined and questions can be answered.

Points to remember are:
1. A good necropsy is always cost effective.
2. Personnel who perform necropsies not only become more knowledgeable but also, most importantly, become an extension arm for the consulting veterinarian.
3. A properly performed necropsy allows laboratory procedures to be performed to yield maximal diagnostic information.
4. Routine necropsies permit monitoring the herd health status and managerial procedures.
5. Necropsies should be fully utilized as a means of understanding disease pathogenesis and for distinguishing one disease from another.
6. Allows to make assessments of vaccination and therapy programs based on knowledge and not upon casual assumptions.

Necropsy equipment should include:
1. Sharp knives
2. Latex gloves
3. Bucket
4. Rib cutter
5. Hatchett and/or saw
6. Sharpening stone
7. Sharpening steel
8. Scissors
9. Disinfectant
10. Diagnostic sample collection. Supplies should include:
   a. Test tubes
   b. Swabs with transport media
   c. Baggies/tissue jar
   d. Syringes
   e. Needles

Adherence to a definite necropsy protocol will result in a uniform, systematic, consistent interpretation of lesions and assures that each organ will be grossly observed.

Procedural steps include:
1. Place animal on left or right side. Whichever side you use, do it the same way every time. I normally place the animal on the right side.
2. Start a midline incision at the sternum and extend it to the lower jaw. Extend the incision from the sternum caudally to the groin above the umbilicus, mammary gland or external male genitalia.
3. Reflect the front leg by lifting the leg and cutting the muscle attachments close to the thorax and lay the leg dorsally and flat.
4. Disarticulate the hind leg by grasping the upper part of the hind leg, incise the muscles and disarticulate the coxofemoral joint and lay the leg dorsally and flat.
5. Reflect the skin ventrally along the midline incision.
6. Cut between the mandible (lower jaw), grasp the tongue and cut it loose from the medial surface of the mandibles close to the bone. While grasping the tongue, cut behind the hard palate and around the pharynx to the level of the hyoid bones. Disarticulate the hyoid bones and continue reflecting the tongue, pharynx, esophagus and trachea to the thoracic inlet.
7. Open esophagus and trachea.
8. Remove the rib cage by cutting the ribs along the proposed line of the thoracic inlet to the xiphoid cartilage.
of the sternum. The next cut begins from the most dor-
sal aspect of the first rib and extends caudally to the
first lumbar vertebra. After the ribs are detached along
these lines, the severed rib cage is removed by cut-
ting it from the diaphragm.
9. Open the abdomen by cutting caudally along the mid-
line to the brim of the pelvis.
10. After removing the upper rib cage and abdominal
wall, examine the internal organs in situ.
11. Collection of specimens for bacteriologic examination
or direct culturing should be done at this time before
contaminating any organ by manipulation or handling
of viscera.
12. Remove heart and lungs. Open the trachea and
extend the incision into the bronchi and bronchioles.
Palpate the lungs and give a lesion score:
   0 - Normal
   1 - Slight
   2 - Moderate (10-30% involvement)
   3 - Severe (>30% involvement)
13. Reflect abdominal viscera.
14. Sever the dorsal attachment of the rumen from the
abdominal wall and pull the rumen counter-clockwise.
Sever the attachments between the liver and omasum
ventrally and pull the omasum, abomasum, reticulum
and rumen clockwise until they are out of the abdomi-
nal cavity. Cut the abomasum from the duodenum.
15. The spleen lies on top of the rumen and can be exam-
ined at this time.
16. Remove the liver from its attachments to the
diaphragm and remove from the abdominal cavity for
examination.
17. Grasp the intestines, pulling them taut from their
attachments, sever and remove from abdominal cav-
ity. Cut the intestines close to their mesenteric attach-
ments, freeing the attached border so that the
intestines are easily straightened and opened for
examination.
18. Reflect the kidneys, adrenals, urinary bladder and
uterus caudally and place them over the paralumbar
fossa.
19. Joints normally examined are knee, shoulder, stifle,
hip, hock and atlanto-occipital.

A well-performed post mortem examination and full
utilization of diagnostics are the keys to disease prevention.
Necropsy Manual

- Though dead cattle in a feedyard are a source of great economic loss, they may still have some worth in the form of valuable diagnostic information.
Necropsy Procedures

• **Purpose:** To expose tissues so lesions can be seen and samples, if necessary, can be collected.
• By following certain procedures an animal can be examined and questions can be answered.
Points to Remember

- A good necropsy is always cost effective.
- Personnel who perform necropsies not only become more knowledgeable but also, most importantly, become an extension arm for the consulting veterinarian.
Points to Remember

• A properly performed necropsy allows laboratory procedures to be performed to yield maximal diagnostic information.
Points to Remember

• Routine necropsies permit monitoring the herd health status and managerial procedures.
Points to Remember

• Necropsies should be fully utilized as a means of understanding disease pathogenesis and for distinguishing one disease from another.
Necropsy Equipment

- Sharp knives
- Latex gloves
- Bucket
- Rib cutter
- Hatchett and/or saw
- Sharpening stone
- Sharpening steel
- Scissors
- Disinfectant
External Exam

- Position of animal at time of death
- General appearance of carcass
- Thriftiness or apparent nutritional status
- Condition of hair coat and presence of external parasites
- Color and appearance of all visible mucous membranes
External Exam

- Presence or absence of discharges from all body openings and mammary glands
- Evidence of swellings, wounds, hernia and fractures.
Procedure

• The bovine species is the model in this demonstration.
• Placing the animal on either right or left side will be demonstrated in this presentation.
• There is no right or wrong way to do a necropsy. Once you start, do them the same way every time.
Procedure

• Start a midline incision at the sternum and extend it to the lower jaw. Extend the incision from the sternum caudally to the groin above the umbilicus, mammary gland or external male genitalia.
Left Side Down Preparation
Right Side Down Preparation
Preparation

• Lift the front leg and cut the muscle attachments close to the thorax and lay the leg dorsally and flat.
• Grasp the upper rear leg; incise the muscles (adductor, gracilis and quadratus) and disarticulate the coxofemoral joint and lay the leg dorsally and flat on the surface.
• Reflect the skin ventrally along the midline incision.
Examination of Hard & Soft Palate, Tongue, Esophagus, Epiglottis and Trachea

• Grasp the tongue and cut it loose from the medial surface of the mandibles close to the bone.
• Cut behind the hard palate and around the pharynx to the level of the hyoid bones.
• Disarticulate the hyoid bones and continue reflecting the tongue, pharynx, esophagus and trachea to the thoracic inlet.
Examination of Hard & Soft Palate, Tongue, Esophagus, Epiglottis and Trachea

- Open esophagus and trachea.
Examination of Thoracic and Abdominal Cavities

- Open the abdomen by cutting caudally along the midline to the brim of the pelvis.
Examination of Thoracic and Abdominal Cavities

- Remove the rib cage by cutting the ribs along the line of proposed cuts. The cuts are from the xiphoid cartilage to the thoracic inlet (just ventral to where the esophagus, trachea and tongue were reflected).
Examination of Thoracic and Abdominal Cavities

• The next cut begins from the most dorsal aspect of the first rib and extends caudally to the first lumbar vertebra.
Examination of Thoracic and Abdominal Cavities

• After the ribs are detached along these lines, the severed rib cage is removed by cutting it from the diaphragm.
• After removing the upper rib cage and abdominal wall, examine the internal organs in situ.
Diagnostics

• Collection of specimens for bacteriologic examination or direct culturing should be done at this time before contaminating any organ by manipulation or handling of viscera.
Reflecting Thoracic Viscera

- Grasp the tongue, esophagus and trachea and reflect the thoracic viscera (heart, lung and thymus) from the thoracic cavity. Follow the esophagus caudally and check for ulcers or parasites.
Reflecting Thoracic Viscera

- Check the thyroid and parathyroid glands that lie adjacent to the trachea and caudal to the larynx.
- Open the trachea and extend the incision into the bronchi and bronchioles.
Reflecting Thoracic Viscera

- Palpate the lungs and give a lesion score:
  0 - Normal
  1 - Slight
  2 - Moderate (10-30% involvement)
  3 - Severe (>30% involvement)
Heart Examination

• Examine the heart for myocardial hemorrhages, enlargement with rounded apex and fibrin.
• Open right ventricle and atrium.
• Open left ventricle and atrium.
Reflecting Abdominal Viscera

Left Side Down:
• Grasp the ileum near its entry into the cecum and cut the small intestine away from its mesentery attachment until the small intestine disappears under the large intestine (duodenum/jejenum flexure).
Reflecting Abdominal Viscera

• Cut the small intestine close to its mesenteric attachment, freeing the attached border so that the intestine is easily straightened for examination.
Reflecting Abdominal Viscera

- Cut the duodenum caudal to the gall bladder, check gall bladder patency and bluntly dissect the duodenum to the abomasum.
Reflecting Abdominal Viscera

- Bluntly dissect, sever and remove the rectum from the pelvic inlet.
- Grasp the large intestine, pulling it taut from its mesenteric attachments, sever and remove it from the abdominal cavity.
Reflecting Abdominal Viscera

- Reflect the kidneys, adrenals, urinary bladder and uterus caudally and place them over the paralumbar fossa.
Reflecting Abdominal Viscera

- Sever the dorsal attachments of the rumen from the abdominal wall and pull the rumen counterclockwise.
- Sever the attachments between the liver and omasum ventrally and clockwise pull the omasum, abomasum and rumen until they are out of the abdominal cavity.
Reflecting Abdominal Viscera

- The spleen lies on top of the rumen and can be examined at this time.
- Remove the liver from its attachments to the diaphragm and remove from the abdominal cavity.
Joint Examination

- Joints examined:
  - Coxofemoral
  - Right hip
  - Stifle
  - Hock
  - Shoulder
  - Atlanto-occipital

- To expose stifle, reflect skin, bend joint and cut patellar ligament.
Joint Examination

- To expose shoulder joint, bend forelimb down to raise joint and cut at highest point.
- To examine knee joint, make a medial skin incision, reflect the skin, bend and open.
Brain Removal and Examination

- Expose atlanto-occipital joint and remove head.
- Skin major portion of head.
- Cut sagittal, just medial to occipital condyle on both left and right sides.
Brain Removal and Examination

- Cut transverse through the frontal bone caudal to supraorbital process.
- Pry up skull cap and remove.
- Cut olfactory tracts and cranial nerves as brain is removed.
A well-performed post mortem examination and full utilization of diagnostics are the keys to disease prevention.
Necropsy Manual
Observations
Trachea

- **Normal:** inner surface smooth, white or pink
- **Abnormal:** foamy exudate, ulcerated, caseated pus (chunks of cheesy material adhering to surface). Pasteurella pneumonia, IBR
Larynx

- **Normal**: pale pink in color
- **Abnormal**: Cauliflower-like growth, foamy exudate – Diphtheria, IBR, Hardbreathers
Lung

- **Normal:** Spongy, pink
- **Abnormal:** Firm, consolidation, reddened areas: cut surface oozes blood and/or pus.
Lung, continued

- **Abnormal (cont.)**: lower portion dark red, hemorrhagic – acute pneumonia; Fibrinous, consolidated, caseated pus – chronic pneumonia; Abscessed – chronic pneumonia with Arcanobacterium; Emphysema, air pockets – possible BRSV
Liver

- **Normal**: Deep red in color; edges sharp and defined; tough and rubbery texture.

- **Abnormal**: Edges rounded – organ swollen; black tracts – indicates fluke infection; pus – abscessed.
Kidney

- **Normal:** pale pink to deep red in color; clumped like cluster of grapes; color uniform throughout surface.
- **Abnormal:** Raised patch on surface that is red, black, green and/or brown (infarct); inner core red. Mottled in color; Septicemia (bacterial infection)
Esophagus

- **Normal**: light pink in color; inner surface white; smooth in appearance.

- **Abnormal**: Lengthwise pits or ulcerations on inner surface – BVD
Rumen

- **Normal:** Full of feed contents; wall has gray fingerlike projections.
- **Abnormal:** Bubbly contents – acidosis; wall under projections has red patches.
Abdominal Cavity
Omentum

- **Normal**: The Omentum is a layer of normal pink to whitish sheet of fat and covers the intestines.

- **Abnormal**: discolored, fibrinous, excess fluid in abdominal cavity suggests peritonitis, ruptured bladder, abomasum ulcer, castration infection.
Abomasum

- **Normal**: Thin-walled folds; smooth surface; pink in color.
- **Abnormal**: Ulcerations on folds – BVD; Salty granular appearance – parasites.
Cecum

- **Normal**: Thin-walled; white or cream in color; full of creamy or green fluid.
- **Abnormal**: Areas of bloody patches on inner surface, contents bloody; wall thickened – Coccidiosis.
Small Intestine

- **Normal:** Pink in color, smooth surface; inner surface white; green to brown fluid contents.

- **Abnormal:** Thickened, tubular feel, hemorrhagic, reddened – Enterotoxemia.
Large Intestine

- **Normal**: Pink in color, smooth surface; inner surface white; green to brown fluid contents.
- **Abnormal**: Thickened, yellow, foul-smelling contents – Salmonella.
Heart

- **Normal**: Red in color
- **Abnormal**: Pale streaks – Selenium deficiency; Fibrinous, myocardial abscesses – Hemophilus. Ecchymotic hemorrhages – Cl. Sordeli.
Muscle

- **Normal**: Red in color.

- **Abnormal**: Black or deep red patches filled with gas – Black leg; Malignant edema; White pale streaks – Selenium deficiency.
Brain

- **Normal**: moist, shiny.

- **Abnormal**: The majority of lesions can only be seen by microscopic examination. Thromboses, infarct area – TEME; Necrotized cortical gray matter – Polio
Necropsy Observations References

- PDCR&F Pictorial Disease Guide Book
- David T. Bechtol, D.V.M., personal slides obtained through consultation and research practice.
- Palo Duro Consultation, Research & Feedlot
- Agri Research Center, Inc.

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