

# Feedlot Session III

## "Feedlot Animals Found Dead in the Pen"

Moderator: **Jim Sears**

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## Necropsy Procedure for Cattle

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Objectives of a Necropsy:

1. To aid in making a diagnosis
2. To provide information for determining a practical management or therapeutic plan.

### **Introduction:**

The key to disease control is the diagnosis. While history and clinical signs, possibly supplemented by laboratory tests, may lead to the diagnosis, it is often only the post mortem examination which can determine the nature of an animal's disease. Necropsies should therefore be regarded as standard diagnostic procedure, particularly in the case of herd problems. A skillfully conducted and intelligently interpreted post mortem examination will always give the stock owner a surprisingly high degree of satisfaction and will greatly enhance his confidence in the veterinarian.

The performance of a necropsy is both a science and an art. As a science, it requires a thorough knowledge of general and special pathology of organs and organ systems. It assumes a familiarity with the infections, metabolic and parasitic diseases of different species. It demands the ability to recognize normal and pathological tissues with or without post mortem changes.

As an art, it requires facility in standardized necropsy procedure to effectively illuminate pathological conditions so they may be studied accurately. It necessitates a concern for precision, neatness, and thoroughness so that a complete diagnosis can follow.

The necropsy examination looks easy when one watches an experienced prospector at work. Familiarity and repeated use of a procedure increases proficiency and dispels the useless pulling, cutting, and destruction of lesions which greatly reduce the possibility of arriving at a diagnosis. The veterinarian who learns and adheres to a definite necropsy protocol will be uniform, rapid, systematic, and complete.

Completeness facilitates diagnosis, or problem solving of cases, and is the key to consistent interpretation of lesions. Following a standard protocol assures that each organ system will be grossly observed in turn. Short cuts lead to a lack of thoroughness and a consequent missed diagnosis, or no diagnosis at all.

### **Equipment:**

1. Sharp knife
2. Stone and steel
3. Gloves
4. Containers for sample collection

### **External examination:**

The external examination should not be neglected and with a little experience, takes only minutes and can give valuable information.

### **Identification.**

Make sure you have adequate history, the breed, age, sex, and special characteristics such as marks, brands, and tags should be noted. The weight should at least be estimated.

### **Nutritional condition.**

Classification into very good, good, poor, very poor (cachexia) should serve most purposes.

### **Signs of death.**

- (1) *Algo mortis* (coldness of cadaver). Remember that the post mortem temperature may rise with certain diseases (tetanus) and in large animals due to fermentation and decomposition of the gastrointestinal contents.

- (2) *Hypostasis*. Dark red areas (“death spots”) due to gravitation of blood may be seen in the lower parts of the body.
- (3) *Rigor mortis*. Test by moving the jaws and the joints of the extremities. It usually occurs within hours and disappears within a day after death, depending upon external temperature (higher temperature hastens the process) and exercise of the muscles before death (strychnine poisoning-almost immediate rigor mortis). The normal sequence of occurrence and disappearance of rigor mortis is: heart, respiratory muscles, masticatory muscles, neck, forelimbs, trunk, hind limbs.
- (4) *Autolysis*. This is the destruction of cells due to enzymes produced by the body. The first obvious changes are desquamation of epithelial linings of mucous membranes, disintegration of erythrocytes, and diffusion of hemoglobin into the surrounding tissue. The optimal temperature is 98-104x and the optimal pH is 4-6.7.

*Putrefaction*. It is caused by destruction of protein due to enzymes produced by putrefactive bacteria. Substances of characteristic odor are produced. Putrefaction is prevented when the water content is below 10-15%, or when the temperature is below 32x or above 140x. Putrefactive bacteria, but not yeasts and molds, are inhibited by acid reaction.

#### Natural Body Openings.

- (1) *Ears*. Examine the external ears and the surrounding areas.
- (2) *Eyes*. Examine the surroundings of the eyes for remnants of exudate and also examine the conjunctiva and the eyeballs.
- (3) *Nose*. Examine the surroundings and the mucous membrane. Squeeze from the bony to the cartilaginous parts and examine the expressed contents.
- (4) *Mouth*. Examine mucous membranes and teeth.
- (5) *Anus*. Examine whether open or closed and whether the surroundings are soiled. Note the type of fecal material, if present.
- (6) *Genitalia*. In male animals palpate both testicles and note whether they are in the scrotum or not. Examine the mucous membranes of the penis and prepuce. Note abnormal contents.

In female animals, examine size and mucous membrane of the vulva. Note whether open or closed and whether there is a discharge. Examine the mammary glands externally and note their size and uniform development.

#### Body Surface.

Examine systematically from head to tail, including legs and hooves. Note especially hair covering, pigmentation, traumatic and other lesions, and any parasites.

#### Opening the animal:

1. Place the animal on the left side, relieve rumen pressure
2. Reflect right front leg
3. Disarticulate right hind leg
4. Cut between mandible
5. Remove pharynx, trachea and esophagus
6. Open trachea and esophagus
7. Open rib cage and remove heart and lungs
8. Examine lungs
9. Open abdominal cavity
10. Remove omentum and inspect all organs: gall bladder, liver, duodenum, ileum, small and large intestine, rumen, abomasum, omasum, reticulum, kidneys, bladder, reproductive organs.

FIGURE 1. Place the animal on left side and if necessary relieve the pressure from the rumen by making a quick stab incision about midway in the abdomen and slightly to the left of the midline. Make an incision to reflect the right front leg.

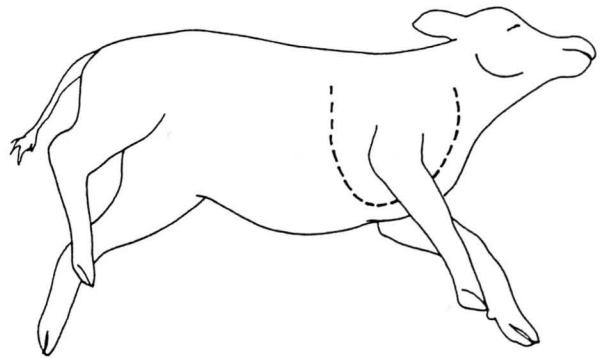


FIGURE 2. Cut deeply through the skin and muscles to expose the rib cage.

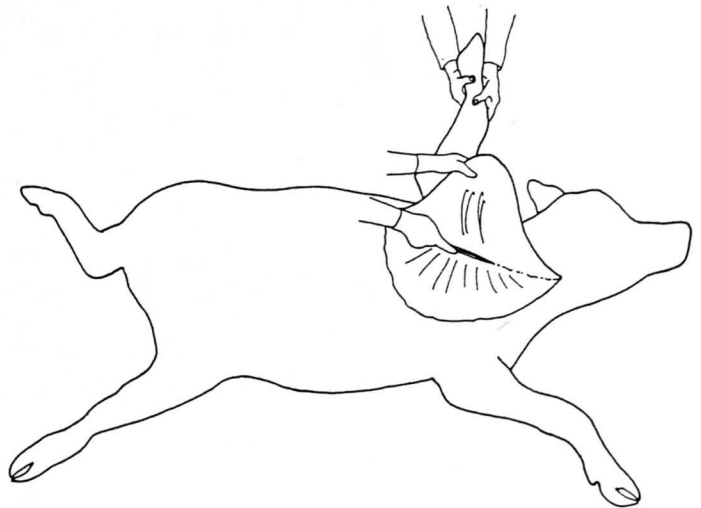


FIGURE 3. Cut through the muscles of the right hind leg, disarticulate the right hip joint, and turn the leg away from the body.

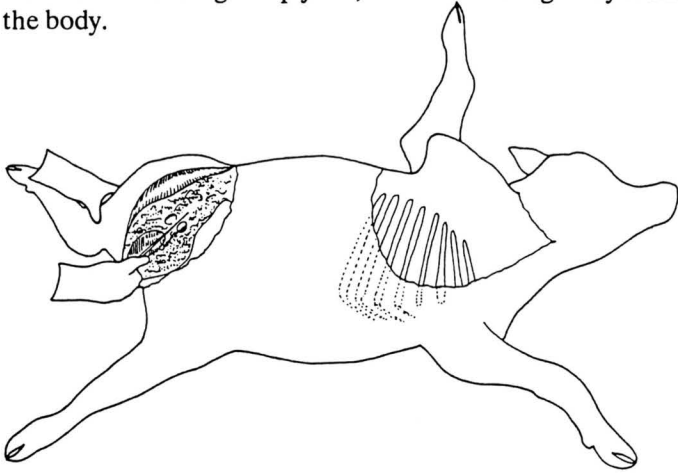


FIGURE 4. Cut between mandibles and through the base of the tongue and the cartilagenous junction of the hyoid bones. Extend the cut to the thoracic inlet and reflect skin and muscle from the trachea.

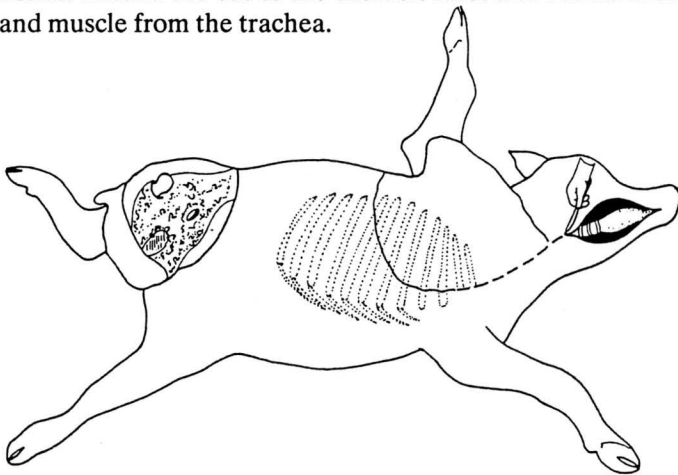


FIGURE 5. Cut the esophagus and trachea from the neck as far as the anterior of the thorax.

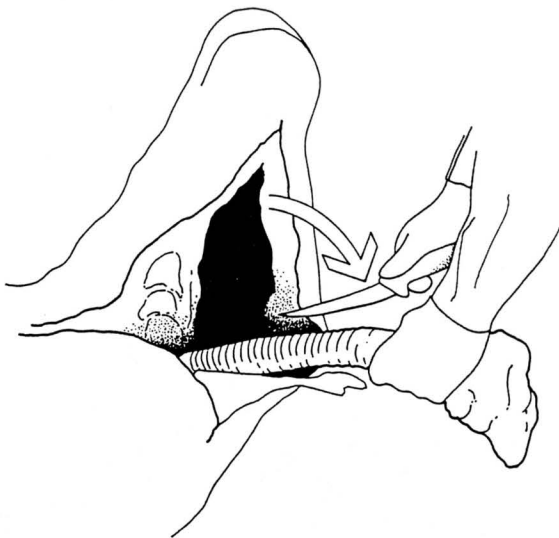


FIGURE 6. Open the trachea and examine the larynx, mucous surface, and contents. Do the same for the anterior esophagus.

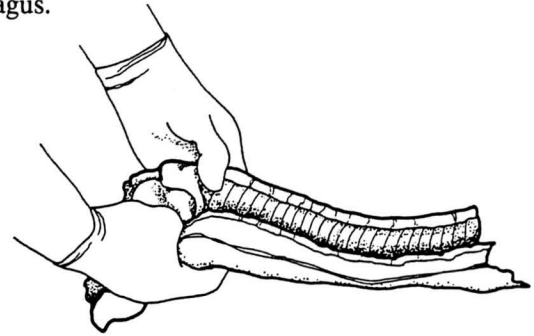


FIGURE 7. Open the thoracic cavity by cutting along the sternum and then along the vertebral column. Then cut through the aorta, esophagus and vena cava and remove the heart and lungs.

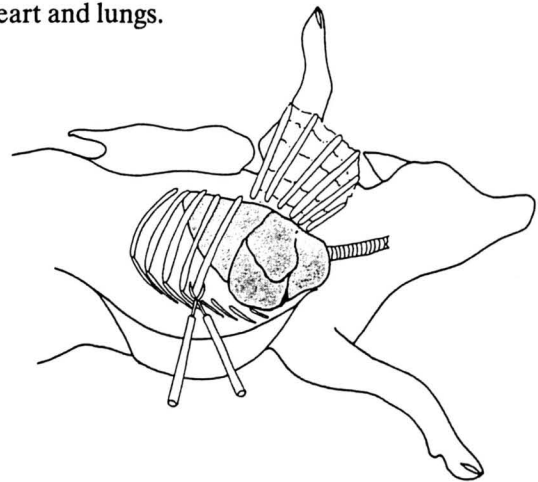
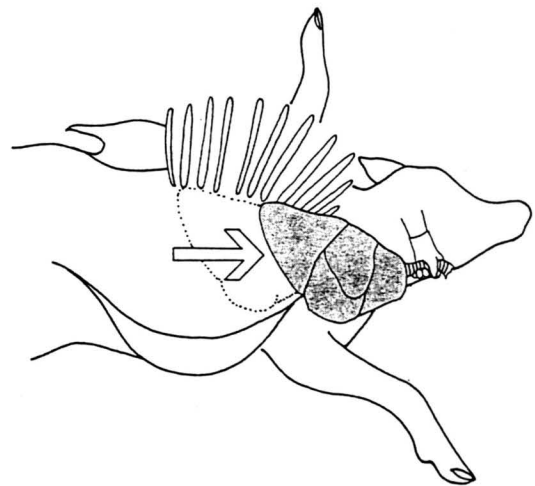
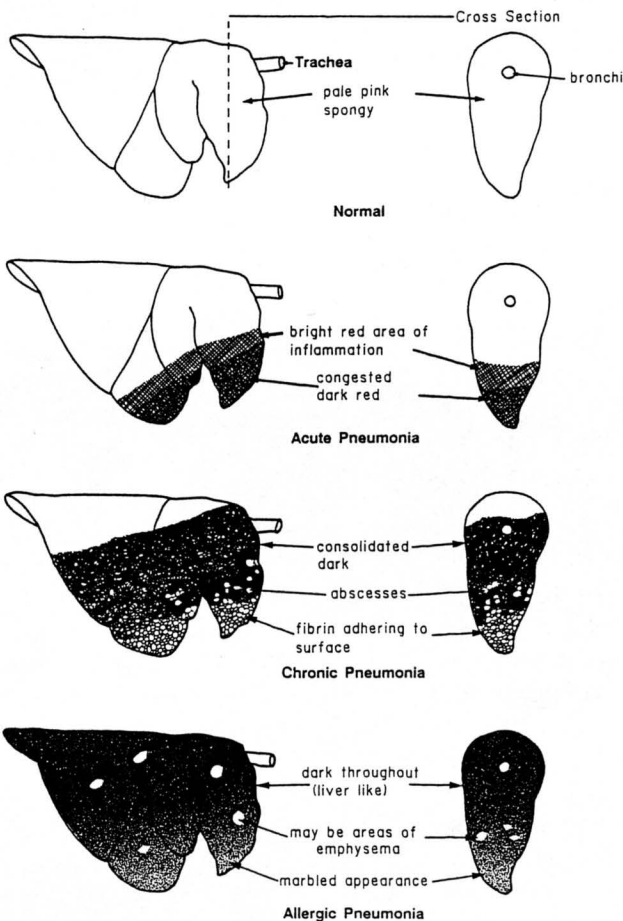


FIGURE 8. Remove the heart and lungs and place them in an upright position to better evaluate the extent of lesions. Note the pattern of any lesions present in the lungs and differentiate as to the following changes:



- (1) **ATELECTASIS.** Affected areas are airless, bluish-red, firmer and thinner than normal as is present in a fetal lung. The surface is depressed, and the cut surface is dry.
- (2) **EMPHYSEMA.** Affected areas are raised, yellowish, and softer than normal. In interstitial emphysema, gas is seen in the interlobular tissue.
- (3) **EDEMA.** The lungs are heavier than normal, mostly hyperaemic, and edematous fluid flows from the cut surface. The lung tissue has a marbled appearance. The bronchi and possibly the trachea contain white froth.
- (4) **HYPEREMIA.** The lungs are somewhat bluish-red, heavier than normal, and of slightly firmer consistency, resembling rubber. A large amount of blood flows from the cut surface. Edema and hyperemia usually occur together and is the lesion of allergic pneumonia.
- (5) **INFLAMMATION.** The affected areas are firm and, depending upon the type of inflammation, greyish to reddish-blue in color. The cut surface shows a more catarrhal, purulent, or fibrinous exudate and is of a ventral distribution.

See Lung diagrams



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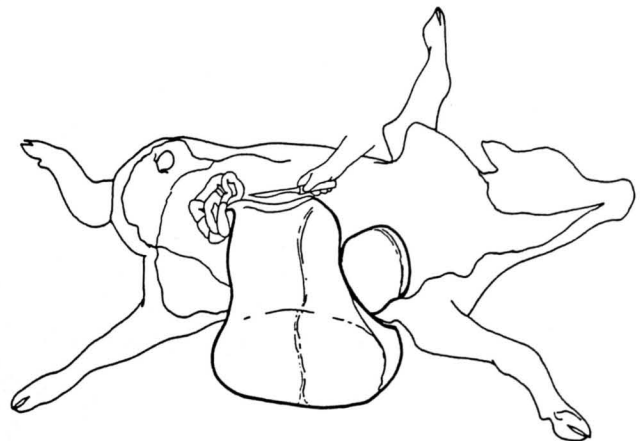
**FIGURE 9.** Remove the skin and muscle from the abdomen by continuing the cut along the midline back to the area where the right hind leg was removed and then reflect this up over the back. Open the abdomen by cutting along the midline thus exposing the viscera.

Remove the omentum and inspect the position of all organs. If the gall bladder is distended and the animal is icteric, the patency of the gall bladder should be tested by opening the duodenum and gently squeezing the gall bladder to see if bile enters the duodenum.

Cut the ileum near the apex of the cecum. Examine and remove the small intestine. Cut the duodenum posterior to the gal bladder and bluntly discet it to the abomasum. Examine the large intestine and remove it from the abdominal cavity.

Cut the dorsal attachments of the rumen from the abdominal wall and the attachments between the liver and omasum.

Cut the costal attachments of the diaphragm and remove the liver and diaphragm.



Sample collection:

1. Fresh samples for bacteriology or virus isolation
2. Formalin fixed samples for histopath
3. Blood or fluid
4. Smears
5. Rumen or intestinal contents
6. Other

Organ	Normal	Abnormal	Cause
Larynx	Pale pink in color, smooth surfaces	Dark red, thickened membrane resembles clotted blood	Honker
		Where the two cartilages meet, covered by cauliflower-like growth, foamy material in trachea	Diphtheria
Trachea	Pale pink, inner surface smooth	Thickened inner membrane, foamy material in lumen	Allergic pneumonia
		Inflamed lining with debris sticking to surface, may also contain foam and fluid in lumen	IBR, BVD, Bacterial pneumonia
		Dark inflamed lining with little or no exudate	Due to asphyxia prior to death as in bloat
Esophagus	Light pink in color, inner surface smooth	Erosions or ulcerations can be severe ulcers extending in rows	BVD
Lung	Pale pink, spongy	Lower portion dark red and engorged with blood with definite line of redness separating pale pink upper portion	Acute pneumonia
		More advanced than above with fluid, fibrin adhering to surface of lung and nearly entire ventral half to two-thirds of the lung involved. Many abscesses evident on cut surface	Chronic pneumonia
		Very dark red in appearance as though were engorged with blood. May have air pockets (emphysema) scattered throughout lung tissue. Entire lung tissue affected. Cut surface has liver appearance and lung very heavy. No ventral consolidation or fibrin present as with chronic pneumonia.	Allergic pneumonia

Organ	Normal	Abnormal	Cause
Abdominal cavity	Intestines covered by layer of normal pink to whitish sheet of fat (omentum)	Some discoloration of omentum, evidence of infection	Ruptured ulcer
Abomasum	Folds are pink, thin walled and smooth surface	Dark red folds, thickened, evidence of hemorrhage on surface, contents watery to foamy  Some ulceration on folds with patchy hemorrhages  Granular appearance, small nodules, some reddened areas, contents watery to foamy	Pasteurella enteritis (shipping fever complex)  BVD  Parasite
Small intestine	Outer surface pale pink, uniform color, inner surface folds with pink color, smooth, green to brown fluid on lumen	Discoloration, dark red areas in some sections, inner surface dark red with some areas very dark, red to black, contents greenish to dark brown  Discoloration with nodules in some sections, watery contents  Some discoloration to dark red patchy appearance of inner surface with some sloughing of inner membrane -thickened walls, contents foamy yellow to green	Enterotoxemia  Parasites  Salmonella
Large intestine and colon	Same pink outer color of small intestine, inner surface smooth thin walls, contents greenish pasty to watery fluid	Darkened (nearly black) outer color, very thin darkened walls, contents dark green to black  Very bloody contents to black and tarry material	Enterotoxemia  Coccidia
Rumen	Wall covered with rough gray uneven projections, the lining sloughs off easily after death, Contents -based on ration but quite fluid and even foamy	Unless evaluated very soon-after death, the changes including sloughing of the inner walls are normal. Very dark blunted projections and contents very foamy	Bloat or enterotoxemia

Organ	Normal	Abnormal	Cause
Kidney	Pale pink in color. A clumped appearance with firm nodules. Cut surface reveals smooth pink inner core and cavity of insignificant size	Pale white to mottled color and nodules seem to run together. Cut surface shows larger cavity-like opening. Also may contain a granular material and pus	Kidney infection due to bacterial organisms
		Some changes to a more mottled color, but mainly enlarged and granular appearance with large cavity when cut open	Calculi
Liver	Deep red in color, smooth surface, cut surface mahogany red and firm	Very pale in color and very friable (seems to fall apart when cut)	In fresh carcass indicates acidosis or enterotoxemia
		Blotchy uneven covering with some white areas on cut surface and these filled with pus	Abscesses
Gall bladder	Soft sac attached to under surface of liver, contents pale green homogenous fluid	Thick walled sac, contents thick green to black tarry material	Animal has not been eating
		Enlarged, contents thick and dark colored, ducts leading to intestine enlarged and may see parasites	Flukes

### Lesions of Bloat

One of the most difficult questions to answer when doing a necropsy on a feedlot pen dead animal is, did the bloat occur before or after death? To help answer this question, one should keep in mind two basic facts: 1. With time, bloat occurs in all animals under the proper environmental conditions (autolysis), and 2. There are certain lesions to look for that will help in making a proper diagnosis.

#### Autolysis

Changes due to autolysis (self-lysis) is defined as digestion of tissues by their own enzymes and is recognized by tissue softening and friability. At the same time, the tissue usually becomes pale. Autolysis proceeds rapidly in tissues such as intestinal mucosa, pancreas, and in liver, but slowly in bone skin. The changes include:

1. General distention of the body with gas accumulation under the skin.

2. Marked discoloration of all tissues and organs.
3. Rupture and displacement of the gastrointestinal tract.

#### Bloat

Changes due to bloat:

1. Numerous hemorrhages over the shoulders and neck.
2. Congested neck muscles with dark, partially clotted or unclotted blood in tissues.
3. Muscles of the hindquarters normal to pale in color.
4. Gas distended rumen and intestine.
5. Rupture of diaphragm may or may not be observed.
6. Hemorrhages present the entire length of the trachea.
7. Lungs pressed into anterior part of thoracic cavity.