

Digital Necropsy Examination of Sheep and Goats

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Much useful information about the individual dead animal and health issues in the flock can be gleaned by performing a necropsy. However, autolysis (rotting) occurs rapidly and makes interpretation of lesions difficult. A veterinarian may be unable to examine the body within a few hours after death or may be unsure of the significance of the necropsy findings because of inexperience with a particular problem. This paper describes a protocol for performing a necropsy and documenting it by digital photography. A trained producer could do the necropsy and forward the images to his veterinarian. If necessary, a veterinarian could then submit the images, with or without collected specimens, to a diagnostic laboratory for evaluation by a trained pathologist.

Videos of various necropsy techniques are available on the internet, in various languages. An example for a sheep necropsy can be found at <http://gpvec.unl.edu/videos/Sheep.asp>

while a complete cattle necropsy, also applicable for sheep and goats, is available at <http://w3.vet.cornell.edu/virtualvet/bovine/default.aspx>

Your veterinarian may suggest a different internet source.

1) Contact your veterinarian to discuss the case and arrange for transfer of the photos and payment for professional service. Most importance should be placed on diagnosis of conditions that can be managed or that represent flock problems. Your veterinarian may request additional photographs or samples, depending on the animal being examined and the diseases for which it was at risk. For instance, the bladder and penis should always be checked in males for evidence of urinary obstruction. Emaciated adults should have photographs taken of the molar teeth and samples taken of the area where the small intestine enters the cecum, to monitor for paratuberculosis (Johne's disease). Do NOT open the body if your veterinarian is concerned about **anthrax**. Do NOT open the body if on farm necropsy is illegal in your country. If you live in a country where **rabies** occurs, please contact your veterinarian before proceeding with necropsy examination for animals with neurologic signs.

A complete set of photographs might total 16 to 20 images, but often fewer will be needed for neonates or young animals.

2) Assemble waterproof gloves, a knife and sharpener, foot trimmers for opening the chest of young lambs or kids and pruning shears for opening the chest of older animals. Also have a ruler and several watertight jars or ziplock bags for taking samples. Ideally, an assistant should take the photos. If this is not possible, wrap all of the camera except the lens in saran wrap or a plastic

bag to keep it clean.

3) Print the form at the end of this protocol and record in dark ink the owner's name, veterinarian, ID of animal (name, tag, or 'lamb from xxxx'), breed, sex, age, approximate weight, body condition score, date of exam, and interval from death until necropsy. **Photograph this sheet.**

4) **Photograph the head and any ear tags or tattoos** present. Check for a cleft palate or malformed jaws and photograph if found. **Photograph incisors** if they don't match reported age of the animal or if the age of an adult is unknown.

5) Examine both sides of the animal and its limbs for wounds, enlarged lymph nodes, or externally visible abnormalities and **photograph** any that are found.

6) Spread the eyelids open and **photograph the sclera (white part of eyeball), cornea (central, normally clear part of eyeball), and conjunctiva (tissue lining the inner surface of the lower eyelid) of the palest eye** or any eye with an obvious lesion [anemia (very white conjunctiva), icterus (yellow or muddy brown sclera), keratitis (blood vessels or ulcers on the part that is normally clear)]. The conjunctiva is normally more congested/reddened on the eye that was down when death occurred.

7) Place the body left side down in a location where clean-up will be easy.

8) **Photograph the body next to a ruler**, measuring tape, or other item of known size.

9) Examine the perineum (region around the anus and vulva or down the backend to the top of the scrotum) and underside of the tail and **photograph** if abnormalities seen. [maggots, scours, prolapses, fetal parts protruding, placenta, intestines hanging out]

10) Take a **close-up photo of the udder of females or of the scrotum and prepuce** (where the male urinates), if visible. Cut into these tissues if they feel abnormal and repeat the photograph.

11) Insert the knife into the axilla (armpit) and cut skin (from the inside) and muscle to completely fold back the front limb. Insert the knife into the hip joint, being careful to not enter the abdomen, and cut skin and muscle to fold back the hind limb. Connect the two skin openings. Reflect (fold back) the skin from the lateral side of the body, cut carefully through the muscle layer along the last rib to enter the abdomen, and reflect/remove the abdominal body wall to expose internal organs.

12) Cut the diaphragm (muscular sheet between chest and abdomen) where it attaches to the rib cage. Use the knife, foot trimmers, or pruning shears to cut all of the ribs along the costochondral junction (cartilage part of the ribs close to the sternum or breast bone). Depending on the age of the animal, break or cut the ribs near the back to reflect or remove the rib cage. Note/photograph preexisting rib fractures.

- 13) **Photograph the exposed organs and fat of the chest and abdomen**, with closeups of anything that appears abnormal. [fat or lack thereof and yellow color of fat, fluid or blood in abdomen, fluid in chest, liver lesions, lung lesions]. Reflect the fat-filled or filmy sheet (omentum) for a better view of the stomachs, intestines, and kidneys. **Take another photograph of the deeper organs** now exposed.
- 14) Open the pericardial sac (heart sac) in place, photograph its contents if fluid or clots present.
- 15) **Slice the right kidney** (the one farther towards the head) lengthwise and **photograph**. Find and examine the other kidney and photograph if it seems abnormal/different.
- 16) Move organs as necessary to expose the bladder and uterus. This may require releasing gas from the rumen with the tip of the knife. **Photograph these organs in place if a problem** or pregnancy is suspected. Open the uterus if large enough to be in the abdomen and photograph if abnormalities or fetuses are discovered. Open the bladder if it contains urine and save a sample of the contents if not clear and yellow.
- 17) Cut the skin along the ventral neck from the chest to the head and check for wounds [predator attack], abscesses or large thyroid glands [goiter].
- 18) On thin adults, examine the incisor teeth and slit the cheeks with the knife to expose the molar teeth. **Photograph if teeth are missing or irregular**.
- 19) Cut across the trachea (windpipe) and esophagus behind the jaw and pull/cut them loose from the neck as you pull towards the chest. Remove the attached heart and lungs from the chest, cutting the aorta (large blood vessel next to the backbone), esophagus at the diaphragm, and attachments of the heart sac (pericardium). Open the esophagus lengthwise and check for obstructions, damaged lining, or a bloat line, photographing any abnormalities found. **Spread out the lung lobes and photograph the view from the top**. This step is not necessary if a lamb was stillborn, confirmed by failure of a piece of lung to float. Slice into any parts of the lung that feel firm and **photograph the slices**.
- 20) Open both halves of the heart if a problem is suspected or no cause of death has yet been identified. Examine all heart valves and check for any defects in the wall between the left and right sides of the heart.
- 21) Go back to the **abomasum** (4th stomach) and open it **to examine/photograph contents** (amniotic fluid, milk or solid feed) and look for *Haemonchus* (barberpole worms) if the animal was old enough to have been on pasture or if the conjunctiva was pale.
- 22) Open the rumen and examine the contents for color, consistency, presence of grain or identifiable plant fragments or foreign material, and measure pH if appropriate pH paper is available. **Photograph rumen contents if they do not appear normal**. Save rumen contents frozen in a watertight container if poisoning is suspected.

- 23) Save frozen a piece of liver and half of the right kidney if poisoning is suspected or trace mineral analysis may be needed.
- 24) Save fecal material from the rectum or cecum (pouch of intestine between small intestines and large intestine) in case it is needed for parasitological exam [if scours, anemia, or emaciation or for herd monitoring purposes]
- 25) Skin the head and use the foot trimmers to open the skull of neonatal lambs with malformed limbs or neurologic signs noted. **Photograph** if the brain seems abnormal or does not appear to be present. Do not open the skull of older animals unless proper precautions can be taken to avoid human exposure if the animal might have died of rabies.
- 26) Retain the body in a cool place until you have contacted your veterinarian and determined that no further samples are needed. Dispose of all body parts properly (legal methods vary with state and country).
- 27) Record your preliminary diagnosis or questions on the original paper form and photograph it again, as evidence that the exam of this animal is complete. Send the history and photos to your veterinarian (e-mail or dropbox or website). The veterinarian may forward the images to the diagnostic lab if cause of death is not obvious.

Frozen samples should be held in a deep freezer that is not frost free, if possible.

Sheep or Goat Necropsy Record

Owner's name: _____

Owner's phone number: _____ email _____

Veterinarian: _____

Animal ID, including name, number and color of all tags, tattoos.
For neonates indicate "lamb or kid from xxxx"

Breed: _____ Age: _____ Sex: _____

Approximate weight: _____ pounds or _____ kg

Body condition score (1 to 5 scale, where 5 is fat): _____

Signs of disease observed before death: _____

Date and time of death: _____

Date and time of exam: _____

Postmortem interval: _____ hours or _____ days

Tentative diagnosis or concerns after necropsy: _____

Samples taken: _____