

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 the body rots quickly, which makes interpretation of lesions difficult. A veterinarian may be unable to examine the body within a few hours after death or the loss may occur on a weekend, making a professional examination expensive. The purpose of this presentation is to describe 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, or a veterinarian could submit the images, with or without collected specimens, to a diagnostic laboratory for evaluation by a trained pathologist. A complete set of photographs might total 16 to 20 images, but often fewer will be needed in neonates or young animals. A **video of the necropsy of a cow**, also applicable to sheep and goats, is available at <https://secure.vet.cornell.edu/virtualvet/bovine/default.aspx>.

Most importance should be placed on diagnosis of conditions that can be managed or that represent flock problems. If possible, contact the flock veterinarian in advance. That 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 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**.

- 1) Assemble waterproof gloves, a knife and sharpener, foot trimmers for opening the chest of young lambs 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.
- 2) Print the linked form and record in dark ink the owner's name, veterinarian, ID of sheep (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 now and at the end of the necropsy, after filling in a tentative diagnosis.**
- 3) **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.
- 4) Examine both sides of the animal and its head and legs for wounds, enlarged lymph nodes, or externally visible abnormalities and **photograph** any that are found.
- 5) 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 (cornea not clear)]. The conjunctiva is normally more reddened on the eye that was down when death occurred.

- 6) Place the body left side down in a location where clean-up will be easy.
- 7) **Photograph the body next to a ruler**, measuring tape, or other item of known size.
- 8) Lift the tail and examine the area around the anus and vulva or down the back end to the top of the scrotum and **photograph if abnormalities seen**. [scours, prolapses, fetal parts protruding, placenta, intestines hanging out]
- 9) Take a **close-up photo of the udder of females or of the scrotum and prepuce** (where the male urinates), if visible. Feel these tissues; cut into them and repeat the photograph if they feel abnormal.
- 10) Insert the knife into the axilla (armpit) and cut skin (from the inside out to avoid dulling the knife) and muscles to completely fold back the front leg. Cut the skin along the ventral midline, forward up the neck towards the head and check for wounds [predator attack], abscesses or large thyroid glands [goiter]. Cut the skin backwards along the abdomen towards the pelvis. Insert the knife into the hip joint, being careful to not enter the abdomen, and cut skin and muscle to fold back the hind leg. Peel back the skin from the side of the body. Cut carefully through the muscle layer along the last rib to enter the abdomen without cutting stomach or intestines, and fold back/remove the abdominal body wall to expose internal organs.
- 11) 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 through the cartilage part close to the sternum (breast bone). Depending on the age of the animal, break or cut the ribs near the spine to fold back or remove the rib cage. **Note/photograph preexisting rib fractures**.
- 12) **Photograph the exposed organs and fat of the chest and abdomen**, with close-ups 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]. Fold back or remove 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**.
- 13) Open the pericardial sac (**heart sac**) in place, photograph its contents if fluid or clots present.
- 14) **Slice the right kidney** (the upper one, farther towards the head) **lengthwise and photograph**. Find and examine the other kidney and photograph if it seems abnormal.
- 15) 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 the bladder or uterus in place if a problem or pregnancy is suspected**. Open the bladder if it is full. Open the uterus if large enough to be in the abdomen and photograph if abnormalities or fetuses are discovered.
- 16) Remove and slice/examine the **liver and gall bladder** and photograph anything that seems abnormal. Check for abscesses between the umbilicus and the liver of lambs.
- 17) 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**.
- 18) Cut the tongue free from the lower jaws and small supporting bones and pull on it while freeing the trachea (windpipe) and esophagus from the neck down to the chest. Continue pulling and cutting to remove the heart and lungs from the chest, cutting the aorta and esophagus at the diaphragm and the attachments of the heart sac (pericardium). Open the trachea and

esophagus lengthwise. If the body was severely bloated, **photograph the lining of the esophagus** in the neck and chest. Spread out the lung lobes and photograph the view from the top if parts of the lung feel firm. 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**.

- 19) Open 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.
- 20) Go back to the **abomasum** (4th stomach) and open it to **examine/photograph contents** and look for milk in lambs and *Haemonchus* (barberpole worms) if the animal was old enough to have been on pasture or if the conjunctiva was pale.
- 21) 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 in a watertight container if toxicology might be needed.
- 22) Save frozen a piece of liver and half of the right kidney if toxicology or trace mineral analysis may be needed.
- 23) Save fecal material from the rectum or cecum (pouch of intestine between small intestines and large intestine) in case needed for parasitological exam [if scours, anemia, or emaciation or for herd monitoring purposes].
- 24) Skin the head and use the foot trimmers **to open the skull of neonatal lambs** with malformed limbs or neurologic signs noted. 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.
- 25) Dispose of all body parts properly (legal methods vary with state and country).
- 26) Record your **preliminary diagnosis or concerns** on the **original paper form and photograph it again**. Forward the history and photos to your veterinarian. If possible discuss the findings with the veterinarian before disposal of the body, in case laboratory testing is needed. The veterinarian may forward the images to the diagnostic lab if cause of death is not obvious and the animal represents a herd problem.

