

# “Ain’t doin’ right” – The value of necropsy in diagnosis

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## Abstract

Veterinarians and producers often underestimate the amount of useful information that can be gained through necropsy of small ruminants that die or are euthanized following puzzling clinical signs. Necropsy is a valuable tool for identifying underlying health problems in the herd as well as discovering the cause of an acute or unexpected death. Thorough examination of the body as soon as possible after death allows for collection of multiple samples for diagnostic purposes, while information gathered about body condition, nutritional status, and subclinical diseases may alter management and treatment choices for cohorts on the same premise.

**Key words:** necropsy, diagnosis, small ruminants

## Résumé

Les vétérinaires et les producteurs sous-estiment souvent la mine d’informations utiles qu’engendrent une nécropsie minutieuse des petits ruminants morts ou euthanasiés après des signes cliniques déroutants. La nécropsie est un outil précieux pour l’identification de problèmes de santé sous-jacents dans le troupeau de même que pour découvrir la cause d’une mort rapide ou inattendue. Un examen minutieux du corps le plus tôt possible après la mort permet la cueillette de plusieurs échantillons pour les besoins du diagnostic. Quant à elle, l’information recueillie sur la condition corporelle, le statut alimentaire et les maladies sous-cliniques peut modifier la prise en charge et le choix de traitement des cohortes dans le même établissement.

## The Case for Field Necropsy

Due to the smaller carcass size of small ruminants, on-farm necropsy is easier to perform than in larger livestock species. Postmortem examination may reveal previously undiagnosed management problems in the herd such as failure of passive transfer in neonates, insidious diseases such as caseous lymphadenitis or Johnes disease, and may provide valuable information regarding the nutritional status of the rest of the animals in that environment. Always take advantage of dead or slaughtered small ruminants in order to obtain liver samples for trace mineral analysis, as this method is the most accurate way to determine copper status. Because microbial populations in the digestive tract begin decomposition immediately following death, necropsy should be performed as soon as possible. If the animal cannot be examined immediately, then refrigeration is necessary

to slow decomposition, but freezing should be avoided to protect the tissues.

External examination of the carcass in situ may yield clues as to cause of death that would not be in evidence if the body was moved prior to examination. For example, position of the body, evidence of discharge from body orifices, alteration of the ground surface, and presence of available feed or toxic plants may provide helpful clues leading to a cause of death. The ability to observe other animals in the same environment may reveal early stages of the same disease process, and presence of normal, unaffected animals may rule out some diagnoses.

## Neonatal Puzzles

Gross necropsy of young small ruminants may demonstrate congenital defects such as cleft palate, ventricular septal defect or atresia ani, evidence of in utero viral infection due to Cache Valley virus or bovine viral diarrhea, and bacterial infections causing navel ill and liver abscesses. Some of the more common causes of sudden death in neonates include enterotoxemia, pneumonia, malnutrition, and failure of passive transfer.

Most small ruminant producers are aware of the need to vaccinate pregnant females against *Clostridium perfringens* types C&D and *Clostridium tetani* prior to parturition to protect both the dam and neonates through consumption of colostrum. In spite of periparturient vaccination and observation of neonatal colostrum consumption, enterotoxemia is a major cause of death in neonates. Clinical signs include hypothermia or hyperthermia, vocalization, dyspnea, and appearance of abdominal pain. Prompt treatment with penicillin to kill *Clostridia* sp, flunixin or meloxicam to relieve pain and reduce fever, and *Clostridial* antitoxin is not always effective in treating neonates suspected of experiencing enterotoxemia. Necropsy of affected neonates may confirm the diagnosis or may lead to sampling that yields an alternative etiology.

Examination of several animals from 1 premise may be helpful in establishing a diagnosis, especially when young stock are involved. One sheep producer reported winter-born lambs were weak at birth, unable to rise or suckle, and developed severe dyspnea before dying suddenly. Necropsy revealed significant hemorrhage in the thorax and abdomen, diffuse congestion of the lungs, and white streaks in cardiac and skeletal muscle. Liver samples revealed normal selenium levels with very little vitamin E present. Treatment of the remaining pregnant ewes with D-alpha-tocopherol and increasing the level of vitamin E in the diet ended the neonatal deaths.

A Nubian producer reported several kids were unable to nurse at birth, and all examined had bilateral, golf-ball sized firm masses under the mandible. Necropsy revealed congenital goiter, and kids born after the remaining pregnant does were treated with topical administration of 7% strong iodine did not exhibit goiter.

### **Farm Visits are Necessary**

Sometimes a visit to the farm is necessary to find the answer to sudden death in young stock. A long-wool sheep producer reported lambs were healthy and vigorous at birth but developed dyspnea, fever, and death by 7 days of age. Necropsy revealed severe diffuse pneumonia that did not yield viral or bacterial pathogens. Observation of the overcrowded housing with urine-soaked bedding revealed elevated ammonia levels at lamb level that caused the fatal pneumonia. The doors and windows on the closed barn were opened, the pens were cleaned, and the deaths stopped.

Neonates consuming inadequate levels of colostrum may fail to thrive, while dams with mastitis or chronic disease such as CAE, OPP, or Johne's disease may not produce sufficient volume of milk for their offspring to gain weight. Thin neonates wandering aimlessly while producing small volumes of urine and minimal feces characterize failure of passive transfer and malnutrition. Unless these young animals are caught early, protected from the harsh environment, and supplemented with appropriate quantities of milk or high quality replacer, they will quickly weaken and die. Necropsies of "starve-out" young stock reveal thin carcasses with no visible fat in either the thorax or abdomen. Once aware of this condition, the producer can improve nutritional management of other neonates to prevent further loss.

### **Unusual Etiology for Pregnancy Toxemia**

Dullness, decreased appetite, weakness, anorexia, teeth grinding, recumbency, neurologic symptoms, convulsions, and death characterize pregnancy toxemia in sheep and goats. Necropsy may reveal multiple fetuses, poor body condition, dehydration, fatty liver, and concentrated urine in the bladder. A memorable case of pregnancy toxemia in an older multiparous Saanen doe resulted from the goat's bad habit of eating plastic. Upon necropsy, her rumen was filled with plastic wrap, trash bags, wall sheathing, and even a 4-foot by 6-foot irrigation dam. She had 4 very large, near-term fetuses and could no longer consume adequate feed to support her or her 4 fetuses due to the large volume of plastic occupying space in the rumen. An older pregnant Suffolk ewe developed anorexia, listlessness, and inability to stand. External palpation of the abdomen revealed a large gravid uterus, and pregnancy toxemia was suspected. Medical therapy was administered and parturition was induced with systemic dexamethasone, but she died before giving birth. Necropsy revealed multiple large liver abscesses caused by

*Corynebacterium pseudotuberculosis* that interfered with liver function, causing toxemia.

### **External Masses**

Not all external masses are abscesses, and not all abscesses are caused by *Corynebacterium pseudotuberculosis*. Masses of unknown etiology should be examined and aspirated or biopsied to determine the cause of enlargement. Many small ruminant producers realize *C. pseudotuberculosis* causes enlarged external lymph nodes, but they may be unaware that internal abscesses interfere with normal organ function and can be life-threatening. When lymph nodes around the heart, lungs, liver, and mesentery become infected, the enlarging mass interferes with cardiovascular, respiratory or digestive function. An adult ram hemorrhaged to death due to an abscess eroding a pulmonary artery in 1 lung, while a rapidly growing show lamb died from hemorrhage from a ruptured abscess on the pole of 1 kidney.

### **Chronic Weight Loss**

Necropsy may confirm the diagnosis of chronic insidious diseases such as caprine arthritis-encephalitis, caseous lymphadenitis, Johne's disease, mycoplasma, ovine progressive pneumonia and scrapie, and management practices could be altered to prevent future cases in affected herds. An unusual case of chronic weight loss in spite of good nutrition occurred in a 5-year-old Saanen buck sharing pasture with 2 other adults. Over several weeks, the buck began losing weight, demonstrated increased respiratory rate, developed a pendulous abdomen, and exhibited a strange blue color around the anal sphincter. Neither physical examination nor clinical pathology led to diagnosis, and the buck was euthanized for humane reasons. Necropsy revealed dilated cardiomyopathy of unknown etiology.

### **Interesting Tumors**

Thymoma is 1 of the most common tumors occurring in goats, and often appears as a mass on the ventral neck between the mandible and the chest that is filled with red, viscous fluid. These fluctuant masses are often misdiagnosed as a hematoma due to aspiration of bloody fluid. However, hematomas eventually heal and resolve, while a thymoma continues to enlarge and secrete fluid. Some affected goats exhibit increased respiratory rate and exercise intolerance as the thymoma spreads into the thoracic cavity. Thymomas are commonly slow-growing and not contagious between animals, but affected goats eventually lose weight and decline over several months, leading to death from respiratory failure. One unusual thymoma occurred in an 8-year-old Saanen doe that experienced sudden onset of respiratory distress. When neither flunixin nor meloxicam could relieve her discomfort, she was humanely euthanized and a massive white lobulated

tumor was discovered impinging on the heart and lungs. The pathologist creatively referred to this tumor as lymphoepithelial thymoma with carcinomatosis since thymomas are not known to be metastatic, and this massive tumor invaded the ribs, lung, and heart.

Tumors are not uncommon in goats over 7 years of age. An afebrile 9-year-old Nubian doe presented with rapid respiration, exercise intolerance, and slow weight loss in spite of good nutrition. Thoracic auscultation revealed muffled lung sounds, but no abnormalities were noted on auscultation of the abdomen. Treatment with antibiotics and antipyretics for suspected pneumonia did not alter the doe's condition and she was found dead. Necropsy revealed mucometra with leiomyosarcoma of the cervix that metastasized to the lungs, heart, liver, spleen, and kidney. An important lesson learned from this case is that afebrile goats with pulmonary involvement will probably not respond to antibiotic therapy.

Not all tumors occur in older goats. A 6-month-old Nubian wether failed to grow at the same rate as his well-fed pen mates, and examination of the subdued youngster revealed multiple enlarged external lymph nodes. A clear, colorless fluid was aspirated from a parotid lymph node and no bacteria were isolated. Biopsy of a prescapular lymph node revealed lymphosarcoma, and the wether was humanely euthanized when his body condition declined. Necropsy

revealed enlarged parotid, submandibular, retropharyngeal, prescapular, prefemoral, and popliteal lymph nodes, while the internal lymph nodes around the heart, liver, and digestive tract were normal. Note that when both popliteal lymph nodes are palpably enlarged, the differential diagnosis includes both caseous lymphadenitis and lymphosarcoma.

Squamous cell carcinoma is not uncommon in light-skinned goats raised at higher elevations with extended periods of bright sunlight. Small red, raised sores develop in thin hairless skin on the ear tips, mammary gland, anal sphincter, and vulva of light colored goats. Over time, the lesions enlarge, flatten, and ulcerate before invading underlying tissues. Progression of the obvious lesions may be slow, but lesions in the perineum often metastasize throughout the pelvis. Most affected animals are eventually euthanized due to inability to successfully remove the tumors, poor quality of life, and recurrent fly strike.

Necropsy of animals found dead and those that fail to respond to appropriate therapy may yield an accurate diagnosis while obtaining information about the body condition, nutritional status and presence of subclinical diseases in the herd that may lead to changes in management practices or nutrition to prevent disease in the herd mates.