

# A practical guide for performing a bovine necropsy

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## Abstract

Bovine veterinarians are often afforded the opportunity to determine the cause of death based on grossly visible pathological changes alone, without the need for additional diagnostic testing. In some production systems (e.g., feedlot, stocker, and some cow/calf operations) this opportunity is capitalized upon for almost every mortality. However, for 1 reason or another, some veterinarians are reluctant to consistently take advantage of performing this procedure. Once the appropriate equipment is employed, and a standardized procedure is followed, practitioners will be pleasantly surprised at how efficiently and effectively a postmortem diagnosis can be determined. Furthermore, with the implementation of commonly used technologies, the same principles can be utilized to assist with expanding the geographic area in which diagnoses are made.

**Key words:** bovine, necropsy, diagnosis

## Résumé

Les vétérinaires bovins ont souvent l'opportunité de déterminer la cause de la mort en se basant uniquement sur des changements pathologiques macroscopiques visibles sans avoir recours à d'autres tests de diagnostic. Dans certains systèmes de production (e.g. parc d'engraissement, parc d'élevage et certains élevages de veaux allaitants), cette opportunité se présente pour presque tous les cas de mortalité. Toutefois, pour une raison ou pour une autre, certains vétérinaires sont peu disposés à profiter systématiquement de cette procédure. Lorsque l'équipement approprié est utilisé et qu'une méthode normalisée est suivie, les praticiens seront agréablement surpris de voir comment un diagnostic post-mortem peut être établi rapidement et efficacement. De plus, avec la mise en place de technologies couramment utilisées, les mêmes principes peuvent être utilisés pour étendre le service diagnostic à une plus grande région.

## Introduction

Performing bovine necropsies is an essential part of understanding the progression of pending and ongoing disease outbreaks in feedlot, stocker, cow/calf, and dairy operations. The information garnered from this procedure not only assists with decisions required to attenuate disease outbreaks, but is also instrumental in designing rational preventative and therapeutic animal health strategies. Given the value of the information that this procedure can provide, it behooves

practitioners to be equipped with the proper equipment and procedures to effectively and efficiently determine the cause of death in bovines. Additionally, the use of digital imagery and remote diagnostics can enhance scalability for practitioners, extending their practice area and expertise associated with gross pathological changes.

## Equipment

Considering the objective of making a postmortem diagnosis based on grossly visible pathological changes, there is a limited amount of equipment required to perform a bovine necropsy. Rubber gloves, boots, appropriate outerwear, and eye protection are all recommended, but the equipment that is essential to efficiently and effectively prosect a carcass includes a knife and an instrument to cut through the ribs, especially for older animals in which the costochondral junctions have ossified.

There is no shortage of the types of knives available in the marketplace (e.g., sticking, skinning, trimming, carving, butcher, etc.). The type of knife selected is largely dependent on the preference of the prosector and the job required. However, in our collective experiences, the most versatile knives are those that are straight-backed, made of stainless steel, and a minimum of 6 inches in length. Paramount to the type of knife utilized is sharpening the knife often and maintaining a sharp knife edge. A stationary commercial knife sharpening tool is an essential piece of equipment for any clinic that performs a modest number of necropsies, and a sharpening steel or mobile sharpening device should be available in every mobile unit.

Ribs are most effectively cut with 1 of 4 instruments: reciprocating saw; pruning shears; an axe; or a knife (dependent on animal age). A reciprocating saw is fast and easy to operate, but a power source must always be present, or battery-operated units must be kept sufficiently charged. In addition, the many moving parts require regular cleaning and maintenance in order to extend the longevity of the unit and maintain professional image with clients. Pruning shears are the slowest of the 4 methods, and have limited effectiveness in animals with a moderate degree of ossification. An axe is very versatile but its effectiveness is commensurate with experience. Lastly, in young bovines (approximately less than 30 months of age), a good knife is sufficient to open the ribcage in the hands of a skilled operator.

## Outline of the Procedure

The following procedures have been adapted from those previously published.<sup>1</sup> The animal is placed in left

lateral recumbency to position the internal organs, namely rumen and lungs, in a position that is most conducive to performing the exam. After a thorough examination of the external carcass, a single, ventral paramedian, incision is made from the mandibular symphysis to the anus. The hind limb is reflected following an incision through the subcutaneous tissue of the flank, the medial thigh muscles, and the coxofemoral joint. The skin is then removed distally down the limb until the stifle joint is exposed. Incisions proximal, medial, and distal to the patella will allow the patella to be reflected as the synovial fluid is examined. Next, the forelimb is reflected dorsally by incising through the axillary tissue and skinning back over the abdomen and neck.

The esophagus and trachea are removed after severing of the hyoid apparatus and the dorsal pharynx, a dissection that occurs medial to each half of the mandible. An incision is made down the dorsal aspect of the trachea to expose the lumen. The abdominal cavity is then opened utilizing an incision that follows the caudal aspect of the ribcage, and then extended along the dorsal and caudal aspects of the abdomen. The musculature can then be reflected ventrally. Lining and contents of the various stomachs are examined, and the lymphoid tissue associated with the distal ileum are examined following an incision into the lumens of the respective organs.

Moving to the thoracic cavity, the ventral aspect of the ribs are disarticulated from the sternum through the costochondral junctions. The dorsal aspect of each rib is then severed immediately ventral to the transverse processes, and the entire ribcage is reflected cranially. Prior to examination of the lungs and heart, the caudal vena cava is identified and inspected.

The surface and cross-section(s) of the different lung lobes are examined for abnormalities. The pericardial sac is then incised and the heart is extracted. A cross-section incision is made across the apical aspect of the heart. Incisions are

then made to examine the papillary muscles, interventricular septum, and various heart valves.

Gross pathological changes indicative of the cause of death are often observed following the aforementioned procedures. However, in some cases no visible lesions are observed, at which times it is necessary to extract and(or) examine the list of tissues that includes, but is not limited to: tongue, esophagus, lymph node(s), liver, gall bladder, kidney(s), uterus, mammary glands, and extremities, including joints and musculature, and gonads.

While the order of prosection outlined here is what we have found to be most efficient, personal preference may dictate in what order the carcass is prosected. The key point here is to use the same procedure every time to ensure that no tissues are missed.

### Remote Diagnostics

The first validation of utilizing digital images to accurately categorize grossly visible pathological changes was reported just under 20 years ago.<sup>2</sup> Since that time, the quality of images and ability to transfer and store images has been enhanced exponentially. A key factor in having images collected with diagnostic potential is a systematic approach to image capture, which focuses on the organs oriented in such a way that both common, and uncommon, disease processes can be readily identified. With a systematic approach and periodic validation of the method(s) being employed, diagnostic services are readily scalable.

### References

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