

Rational Approach to Vetero-legal Cases in Field

K Dua

Department of Veterinary Medicine, GADVASU, Ludhiana

The study of Veterinary jurisprudence/ Veterinary forensic medicine is completely different from other subjects. There are a host of criminal cases and situations where the problem can only be solved through an intelligent application of medical principles. The common vetero-legal situations which the veterinarians come across are wound examination, poisonings and the postmortem examination.

WOUND EXAMINATION

Wound examination is of prime importance in veterinary jurisprudence and it is desirable to establish a wound examination system in order to evaluate and record the nature of wound more accurately and objectively. A veterinarian may be asked to examine an animal that has been wounded and give a report whether wounds are serious or trivial, and whether the injured animal is alive or dead

It is also necessary to determine whether a wound has vitality, and, if ante mortem, how long before death the wound has been sustained. In human forensic medicine modern diagnostic techniques and devices as well as advanced cell-biological methods are introduced as the means for this aim. For example, radiological, endoscopic or magnetic resonance imaging (MRI) examination have been used in addition to examination with the naked eye.

The identification and description of wounds may have serious vetero-legal implications. It is therefore essential that different types of wounds can be correctly identified and described, with a full description being made in notes taken at the time of, or shortly after the examination ('contemporaneous notes').

TYPES OF INJURIES AND ITS COMPLICATIONS

Type	Etiology	Example
Direct	Haemorrhage	Internal or external
	Injury to vital organ	Injury to lung or heart
	Shock	Severe blow on head or heart
Indirect	Inflammation, Septicemia	Tetanus infection gaining entry through wound

PROVING SEQUENCE OF EVENTS

It is important to try and determine the sequence of injuries which re-creates the crime scene events.

The veterinarian's knowledge of animal behavior, clinical experience, and common sense must be used to evaluate injuries.

There are several considerations to make this determination depending on the type of injury. In deceased victims, the first thing to determine is the fatal injury and then back track from there.

For contusions and areas of hemorrhage, one must remember that hemorrhage requires a beating heart.

In multiple stab wounds, there may be little to no hemorrhage around an injury that was made when or after the heart stopped beating. But, if there is minimal blood supply to the area then it could account for the minimal amount of hemorrhage.

With multiple fractures or injuries, a diagram can help in the evaluation of the number of blows and determining sequence of events.

With multiple fractures of the skull, one blow may cause concentric or radiating fractures.

Evaluation of where these lines stop and start can help determine the number and type of impacts.

Consideration must be given to the impact each injury would have had to the animal.

This includes how the injury would have compromised the animal such as severe pain, the ability to move, vocalize, or fight back. In addition, the veterinarian must consider what the animal's response would have been to each injury.

This is critical in courtroom where the veterinarian must testify about the expected reaction and vocalization to each event/injury as part of their expert witness testimony.

POISONING

Cases of malicious poisoning are common in livestock due to personal enmity in the villages. The forensic investigator may encounter cases that range from intentional poisoning of pest species and secondary exposure of non-target species, to accidental exposure of animals by labeled use of pesticides.

Toxins most commonly used include carbamates, organophosphates (OP's), strychnine, anticoagulant rodenticides, thallium, and cyanide. Carbamates and OP's comprise the greatest percentage of toxicosis cases. Many of these chemicals are or have been used in agriculture and are available through distributors as well as other sources.

Procedures on suspicion

Several factors may clue investigators into a suspicion of toxicosis. For example, a dead animal or localized group of dead animals in an apparently good nutritional state is highly suspicious of a toxin, especially if multiple species are involved. In some cases, investigators may locate a poisoned bait or have a good indication of agricultural pesticides commonly used in a given area.

- ❖ Take careful history, which may indicate changes of feed composition, exposure to poison or administration of potentially toxic preparation.
- ❖ Make a careful examination of the environment to look for the potential pathogens.

- ❖ Note the symptoms carefully and the time of their occurrence.
- ❖ When there is illness of large number of animals at a time and showing the same symptoms and post-mortem lesions.
- ❖ Carefully examine dead animals for signs of struggling, frothy nasal discharge etc.

Primary poisonings vs. Secondary poisoning

Identification of crop or stomach contents may help determine whether a case was caused by primary or secondary toxicosis. Gross comparison of ingested tissues with other carcasses found in the vicinity may help determine the sequence of toxicosis.

It may be necessary to separate the contents from different organs (i.e. crop from proventriculus) and analyze portions or food items separately. There are many keys available for identification of animal hair, and tissues can be positively identified by serologic methods. Technology is being standardized in which, animals can be positively linked by DNA analysis.

TIME OF DEATH (TOD)

Establishing TOD is not an exact science. There are guidelines extrapolated from our human counterparts but more research is needed. In order to determine TOD we have to figure out the Post Mortem Interval. It is imperative that environmental conditions are recorded whenever a dead body is found as well as the condition of the body.

Liver mortis:

This refers to the discoloration of the body due to gravitational blood settling after the heart stops.

Lividity is not often seen in the external skin of dogs and cats. It is more likely to be seen on the buccal mucosa, internal organs and body walls.

This can help determine the position of the body after death.

Algor mortis:

This refers to the body cooling. It is more accurate in the first 24 hours after death.

It can be affected by temperature prior to death, size of the body, dehydration, obesity, edema, body position (curled vs. recumbent), hair coat, humidity, wind, cover and water immersion.

When taking the temperature a special thermometer is needed to register low temperatures.

Readings may be taken rectally or in the liver.

You can make a small cut in the skin and insert the thermometer into the liver or under a lobe to avoid damage.

There is an initial temperature plateau that occurs in the first 30 minutes to 5 hours.

The normal rate of cooling is 1.5 degrees Fahrenheit loss/hr (rectal) at 75 degree environmental temperature.

Take two readings in an hour to get the rate of cooling and confirm you are past the plateau.

Rigor mortis:

This refers to a stiffening of the muscles and freezing of the joints.

It involves the formation of locking chemical bridges of the muscle proteins actin and myosin.

When an animal dies the muscles are initially flaccid, then stiffen (rigor) then they become flaccid again. The onset is faster and duration is shorter in animals that have decreased glycogen levels seen with starvation, exhaustion, seizures and sepsis and in high environmental temperatures.

Rigor sets first in the smaller muscle groups and joints, usually the head, and then moves to the larger muscles. It then dissipates in the same order.

Rigor can be forcibly broken with manipulation and will not recur unless it is

broken before full development. It is important to ask how the body was handled prior to you receiving it.

Time of Death Estimates in Animals (Dr. Annette Rauch, Tufts University)

Warm, not stiff	0-3 hours
Warm, stiff	3-8 hours
Cold, stiff	8-36 hours
Cold, not stiff	>36 hours

Forensic Entomology:

Insect analysis is also a good method for determining TOD.

Maggots can aid in determining location of death and provide DNA and toxicology evidence. Maggots can help determine the time of death by providing the post mortem interval.

Flies lay eggs during certain environmental conditions, at certain times of day after an animal has died depending on the species of fly.

These eggs then hatch into maggots based on environmental conditions.

The larvae develop at a certain rate, depending on the species and environmental conditions, and can be aged by a forensic entomologist.

Blow flies are attracted to the body postmortem so by dating the time of colonization (laying of eggs), the time of death can be estimated.

It is important to note that in some cases, maggots may be found on live animals, known as myiasis.

This is usually due to fecal soiling or wound necrosis present on the animal that attracted the flies. In this case, the time estimate will be for the time of trauma.

Other insects are forensically important such as beetles which feed at different times post mortem. A sample of all insects, pupae and pupa casings on the body should be collected noting the location on the body they were found.

We need to work on it and standardize the results with the entomology people.

POST MORTEM EXAMINATION

The vetero-legal postmortem examination is made in order to ascertain the cause of death and is done after receiving inquest report. A necropsy report generated for a forensic case is different from that of a standard necropsy. Here veterinarian concentrate on findings significant to animal crimes; however, general principles of a post-mortem examination apply which are as follows.

- ❖ Data given on the evidence tag should be noted in the report including the name of the submitting officer and agency.
- ❖ History, age, nutritional state, concurrent disease or injury, etc. should be documented.
- ❖ All descriptions should be concise and non-technical terminology used when possible because necropsy report ultimately may have to be understood by non-medical people.
- ❖ All conclusions should be supported by relevant information and alternatives discussed when results are equivocal.
- ❖ All organ systems should be examined and all abnormalities described, even those usually regarded as incidental in a standard necropsy. Finally, normal findings should be described as well.
- ❖ An important consideration in forensic necropsy is the use of experts in other disciplines to perform necessary analyses. For example, a pathologist would not want to make conclusions about ballistics or projectile character that would be better assessed by a forensic firearm specialist.
- ❖ A significant time period may occur between the submission of specimens and the prosecution of a case. Thus, if necropsy findings are documented meticulously and readily after examination, it will be easier for a Veterinarian to recall details about a case should his/her testimony be required.

Post-mortem artefacts

While conducting the post mortem it is very necessary to keep in mind the probability of developing the artefacts which can be introduced in the dead animals after their

death. Due to these artefacts, there can be error in concluding the cause of death, which may result in injustice. These artefacts can be classified as follows:

Putrefaction

It includes changes in the carcass due to decomposition, which includes distension of thoraco-abdomen, protrusion of tongue, swelling of vulvar lips, eyelids and nose.

Environmental artefacts

Burning: Normally the location of burns is indicative of postmortem burns. Living animal may not tolerate the burning on back, body or face etc.

Third party artifacts

- ❖ Damage to the carcass can be done by dogs, birds, rodents, maggots etc. Normally the first organs to be attacked are vulva, anus, udder, eyes, nose and mouth.
- ❖ Sometimes some surgery is attempted just before the death of the animal, which may leave some unnatural marks over the body resulting in misinterpretation of the cause of the death.

Photo documentation

Photo documentation is an important part of forensic necropsies. Throughout the entire necropsy, significant findings should be photographed. These photos could provide visual support as to the identity of this specimen

Cause of death

After completing the postmortem examination of the animal, based on all the observations veterinary officer will form an opinion and compile a report to be forwarded to the investigating officer as soon as possible and latest by two days. In the report, the use of words probably may cause unnecessary bad impression, so try to avoid it.

COLLECTION OF SPECIMENS FOR EXAMINATION

During the course of the necropsy, it is important for the pathologist to have the foresight to collect the appropriate samples in the correct manner.

In the suspected cases of poisoning, the stomach and the upper part of the intestine with its contents, a portion of liver, kidney and spleen should be collected in a wide mouthed glass bottle and sent to the forensic laboratory.

Any evidence collected, such as projectiles or tissue samples, must be given their own numbers and the chain of custody continued as these samples are sent to other laboratories or experts.

COLLECTION OF SAMPLES FOR HISTO-PATHOLOGICAL EXAMINATION

Tissue for the histo-pathological examination can also be collected for confirmation of the disease. Small piece of tissues are collected which should be representative of the tissue and the lesion. The tissues can be collected in a glass container having 10 percent formalin. The bottles are labeled and packed carefully.

PROCEDURE FOR DISPATCHING OF MATERIAL FOR CHEMICAL EXAMINATION

- ❖ Complete the report forms for pathological specimens
- ❖ Enter the name and address of the submitter.
- ❖ Enter full name and address of the owner of the stock.
- ❖ Describe the full history along with ante and post-mortem findings if any.
- ❖ A separate container should preferably be used for each case.
- ❖ Put a frozen coolant pad, into each container or pack these specimens in ice before dispatching.
- ❖ Specimens must be packed so that they do not contaminate each other, or leak in transit.
- ❖ If any specimens are to be maintained by the forensic pathologist, they must be kept in a secure area to avoid risk of contamination, mix-ups, or tampering.

REPORT FORMAT

Heading:

Include name of the agency,
the officer/investigator,
your name,
address,
contact info,
date of exam

Subject of Exam:

Accurately describe the animal – color, sex, intact or not, estimated age

Reason for Exam:

Why the animal was brought to you

Crime Scene/Forensic Information:

What the investigator told you or information from his report

Medical History:

Any pertinent medical history

Examination Findings:

Details of your findings using medical terminology; separate subheadings are:

External Exam (weight, coat condition, body condition score, decomposition, ectoparasites, head, chest, abdomen, legs, feet);

Evidence of Medical/Surgical Intervention;

Radiograph Interpretation;

Internal Exam (necropsy- head, thoracic cavity, abdominal cavity, neck, respiratory tract, cardiovascular system, gastrointestinal tract, biliary tract, pancreas, spleen, adrenals, urinary tract, reproductive tract, musculoskeletal system);

Evidence of injury (list all pertinent evidence of injury)

Procedures and Results:

List all procedures, treatments, samples taken, test results or if they are pending

Entomology Findings:

List of insects found, location of what collected, entomology report findings

Summary of Findings:

List all pertinent findings

Survival Period:

If there was evidence the animal survived for any period after injury

Time of Death:

estimate of the time of death based on all findings

Mechanism of Death/Injury:

The biochemical or physiological abnormality that resulted in death (e.g. shock, sepsis, cerebral edema)

Cause of Death/Injury:

This refers to the injury or disease which began a sequence of events that ultimately lead to the death of the animal (e.g. gunshot to the head)

Contributory Cause:

Any contributing causes towards the cause of death (e.g. clotting disorders)

Manner of Death:

Natural

Accidental

Non-Accidental

Undetermined

Conclusion:

Where you state your opinion of all the evidence including crime scene findings. You should use lay terms for the investigator and prosecutor to understand.

Supplemental reading

Veterinary forensics: investigation of animal cruelty by melinda merck, catdvm@bellsouth.net

Acknowledgement:

Authors whose given information on the internet is collected for the preparation of this manuscript are duly acknowledged.