

The Case of the



Barn Bucks

TEACHER'S PAGE

The Case of the Barn Bucks activity is designed to give students a practical look into the science of wildlife forensics. Pennsylvania Wildlife Conservation Officers use these and other techniques to solve crimes related to wildlife across the state each year. Wildlife cannot speak for itself, so Conservation Officers and concerned citizens of the Commonwealth try and do it for them. This activity allows your students to sample some of the interesting techniques that real Conservation Officers use in the field.



**Pennsylvania
Game Commission**



Objective:

Students will gather and analyze evidence relating to a wildlife crime.
Students will define the role that the Pennsylvania Game Commission plays in protecting wildlife in the Commonwealth.

Materials Needed:

Note: All materials needed are one per student.

- Student Worksheets. When photocopying the worksheets, it is suggested to set the copier on the "photo" setting. This will yield the best results for the photos. If you are printing the worksheets from a .pdf file, set the printer to use the maximum size of the paper. This will help to maintain the true size of the pictures and diagrams included in the activities.
- Student Worksheet Answers
- Clipboards and pencils
- Metric rulers

Background information on determining time of death in white-tailed deer:

The following background information is provided for you to understand more about different techniques used in wildlife forensic cases. Some of the techniques are used in this activity and others are listed for your knowledge.

Time of death or TOD in deer hunting law enforcement cases is usually used to try and establish when a particular deer was killed to determine if it was harvested during the legal hunting hours. The following techniques are used to help establish TOD. Wildlife investigators from across North America have gathered data to establish guidelines for determining TOD in deer. This data has been compiled in a field manual of wildlife forensic techniques.

Temperature: A normal healthy live deer has a body temperature of around 102 ° F. Investigators can use a long (8-10") calibrated thermometer inserted up the deer's nostril or nasal cavity to take its temperature. They also use a shorter (3-5") pointed, meat thermometer to insert into the deer's inner thigh muscle. In addition to these measurements, the following temperatures are also usually taken: air (or ambient temperature), maggot mass, body surface, underbody and soil. After death, most mammals will start to decrease their body temperature. How fast that happens is determined by many factors including those found on this information sheet.

Decomposition: Determine if the deer is freshly killed, bloated or in a state of active or advanced decay.

Evidence of wounds or trauma: Describe wounds on animal's body.

Evidence of scavengers: Describe trauma to the animal due to vultures, small mammals and insects like flies or beetles.

Pupil diameter: Vertical pupil diameter is measured in millimeters.

Rigor mortis: Appendages checked include: jaw, knee, elbow, ankle, neck and wrist. (These are human terms but are also used for animals like deer). Categories are None, Partial and Full.

Electrical Stimulus: This technique involves using probes at the ends of jumper cables that are connected to a vehicle's engine. Within four hours of death, when touched by the probes, different muscle groups will react to the electricity by twitching.

A description of the crime scene is also important to forensic cases. The investigator needs to identify what the habitat is like and whether or not the animal was found in a building, partially buried, out in the open or in the water. All of these external factors can affect the accurate determination of time of death.

An expanded glossary of forensic terms is included on the last two pages of this worksheet.

Activities:

Students can work through the activity alone, in pairs or teams. To begin, tell the students that they are all now "Honorary" Wildlife Conservation Officers (WCOs) and they are about to work on a wildlife investigation involving white-tailed deer. They will need to read the introduction of the "Case of the Barn Bucks" found on page two of their worksheet to get some background information. Besides the worksheet, the only other tool they will need is a metric ruler that you will need to provide to each one of them.

After students have the opportunity to work through both worksheets, answers should be reviewed and discussed.

PDE Standards:

This activity relates to the following Pennsylvania Department of Education's Environment and Ecology Standards:

- 4.7.12 C Examine the influence of wildlife management in preserving different species in Pennsylvania.
- 4.8.7 D Define the roles of Pennsylvania agencies that deal with natural resources.
- 4.9.7 A Explain the role of local and state agencies in enforcing environmental laws and regulations.
- 4.9.10 A Analyze the role of local and state agencies in enforcing environmental laws and regulations.
- 4.9.12 A Research and describe the effects of an environmental law or regulation and how it has impacted the environment.

Expanded Glossary of Forensic Terms:

Algor mortis: The decrease in corpse body temperature after death. Usually will be at ambient temperature between 18-24 hours post mortem.

Ambient temperature: The current air temperature.

Antemortem: Prior to death.

Arthropod: Invertebrate animals like insects, crustaceans and arachnids that have jointed bodies and usually a chitinous shell or exoskeleton that they will molt at intervals.

Blood spatter: Scattered spots of blood.

Blow fly: A family of flies known as the Calliphoridae, also commonly called bottle flies.

Carcass: A dead animal.

Carrion: Decaying animal flesh.

Circumstantial evidence: That evidence which only suggests an association with a past occurrence.

Corpse: A dead human body.

Crop: Pertaining to an animal's gut or stomach.

Decomposition: Postmortem degenerative rotting of the corpse or carcass.

District Magisterial Justice: A local judge in a lower court.

Eclosion: The process of hatching from the egg or of emerging as an adult.

Edema: The swelling of tissues due to excess accumulation of fluids.

Emergence: The process of leaving the pupa by the new adult insect.

Expert witness: One who testifies in a court of law on matters pertaining to their field of expertise.

Fasting: A time period without eating.

Fauna: Any organism in the animal kingdom.

Forensic: pertaining to the law.

Forensic entomology: The study of insects and related arthropods from a legal aspect.

Gelatinous: A substance mixed into a Jelly-like form.

Halteres: The small, rodlike, modified hind wing in flies. (diptera family)

Holometabolous: That type of metamorphosis where the young and adults are completely different and make their living differently.

Informant: One who provides information to law enforcement like WCOs or the police.

Instar: Each of the successive incremental growth steps terminated by a molt.

Larvae: The primary feeding and growth stage of invertebrates. Usually it is the stage following hatching of the egg.

Livor mortis: The gradual discoloration of skin surfaces due to gravitational settling of

blood in the corpse or carcass.

Maggot: The larva of the fly. It sheds its skin twice and has three growth instars prior to pupariation.

Maggot-mass: The collectively, closely packed mass of fly larvae occurring in decomposing carrion.

Myiasis: The invasion of any living vertebrate animal, including people, by fly larvae especially maggots.

Nasal: Pertaining to the nose or nostril.

Necropsy: A physical examination of the carcass through dissection to determine cause of death. (autopsy is done on humans)

Ocellus: A simple isolated light sensitive organ among arthropods, usually found on the head near the eyes.

Oviposition: The act of depositing eggs.

Postembryonic: The stage after birth.

Postfeeding larva: The wandering, fasting phase of the third instar-maggot, terminating in pupariation.

Postmortem: After death.

Postmortem interval: PI. The period of time between death and carcass or corpse recovery.

Pupa: That immature stage between larva and adult in insects having complete metamorphosis. In flies, the pupa is found inside the puparium.

Pupariation: The immobilization of the postfeeding maggot with the shrinking, hardening and darkening of its outer skin.

Puparium: The hardened outer shell or skin of the final larval instar within which the pupa of the fly develops.

Rigor mortis: The progressive rigidity of a carcass or corpse following death caused by an accumulation of lactic acid in dying muscle tissues. This is a temporary condition lasting 12 to 36 hours.

Spiracle: The external openings of the arthropods tracheal system whereby the animal breathes or respire.

Subpeona: A legal order to appear in court.

Trace evidence: Physical evidence in small amounts.

Warrant: A legal document allowing law enforcement to enter a private residence or vehicle.

Wildlife Forensics: The study of wildlife crimes or cases from a legal aspect.