Euthanasia of research animals in the field policy

The euthanasia of any animal must be achieved in the shortest time possible, with the minimum of distress. Intravenous (into a vein), intracardiac (into the heart – only suitable in a previously sedated animal) or intrahepatic (into the liver) injection of specially formulated euthanasia solutions offers almost instantaneous death. Where these routes are not available, suitable alternatives may be considered. These include intraperitoneal (into the abdominal cavity) injection if a non-irritant solution is used, except in birds.

The recommendations in this Policy are intended for remote or field situations. Where full veterinary facilities are available, there may be more appropriate alternatives (such as inhalant anaesthetics), which should be used in preference to the methods outlined here.

Any person involved in euthanising animals must be familiar with the anatomical aspects associated with the particular species with which they are dealing. All operators need to have sufficient familiarity with the properties and required doses of the drugs with which they are dealing, and an ability to accurately estimate body weights to ensure suitable doses administered.

Sedation
In medium and larger mammals, birds and reptiles, sedation prior to euthanasia is strongly recommended, as it reduces stress to both animal and researchers and facilitates the use of the preferred routes for injection. Sedation requires specific veterinary expertise.

Small birds (e.g. wren, finch, miner, starling)
Intravenous (or intrahepatic) injection of Pentobarbitone solution. An intraperitoneal route is not recommended due to the presence of abdominal air sacs. Use a fine needle (25-27G). Carbon dioxide used in a sealed environment is suitable for small birds (up to 300 grams).

Medium sized birds (e.g. galah, kookaburra, duck, ibis)
Intravenous or intrahepatic injection of Pentobarbitone solution. In a previously sedated or moribund animal, an intravenous or intracardiac route can be used (see Wildlife Ethics Committee (WEC) Policy on Collection of Blood for recommended veins). Use a 23-27G appropriate to the size of the bird. Carbon dioxide used in a sealed environment is acceptable where large numbers of birds are involved and where disposal of contaminated carcasses would present a hazard. Refer to the relevant Code of Practice (COP) listed below. A firearm is acceptable where injectable anaesthetics are not possible. Refer to the relevant COP listed below for appropriate firearms and shot sizes.
**Large birds** (e.g. goose, emu, pelican)
In a previously sedated or moribund animal, an intravenous or intracardiac injection of Pentobarbitone solution can be used (see WEC Policy on Collection of Blood for recommended veins). Use a 23-27G appropriate to the size of the bird. A captive bolt or firearm is acceptable where injectable anaesthetics are not possible. Refer to the relevant COP listed below for appropriate firearms and shot sizes.

**Small mammals** (e.g. mouse, rat, dunnart, insectivorous bat)
Intrahepatic injection of Pentobarbitone solution (or intraperitoneal if a non-irritant solution is used). Use a fine needle (25-27G). Carbon dioxide used in a sealed environment is suitable for small mammals (up to 300 grams).

**Medium sized mammals** (e.g. possum, cat, fox, rock wallaby, echidna, koala)
Intrahepatic or intravenous injection of Pentobarbitone solution (or intraperitoneal if a non-irritant solution is used). In a previously sedated or moribund animal, an intravenous or intracardiac route can be used (see WEC Policy on Collection of Blood for recommended veins). Use a 23-27G appropriate to the size of the animal. A captive bolt or firearm is acceptable in the absence of injectable anaesthetics, or where use of a firearm will avoid the distress of capture and handling. Refer to the relevant COP listed below.

**Large mammals** (e.g. wombat, dingo, kangaroo, pig)
In a previously sedated or moribund animal, an intravenous or intracardiac injection of Pentobarbitone solution can be used (see WEC Policy on Collection of Blood for recommended veins). Use a 19-24G needle appropriate to the size of the animal. A captive bolt or firearm is acceptable where injectable anaesthetics are not possible. Refer to the relevant COP listed below for appropriate firearms, shot sizes and point of aim.

**Reptiles**
Intrahepatic or intravenous injection of Pentobarbitone solution (or intraperitoneal if a non-irritant solution is used). In a previously sedated or moribund animal, an intracardiac injection of Pentobarbitone solution can be used. Diluted solutions should be used for small reptiles killed for museum specimens, as concentrated solutions result in muscle spasms after death which may distort the specimen. Use a 23-30G needle depending on the size of the animal. For very small reptiles, where even small gauge needles may cause undue pain, suitably diluted Pentobarbitone may be administered orally.

**Frogs and tadpoles**
Intrahepatic injection of Pentobarbitone solution (or intraperitoneal if a non-irritant solution is used). In a previously sedated or moribund animal, an intracardiac or intravenous (see WEC Policy on Collection of Blood for recommended veins) injection of Pentobarbitone solution can be used. Note that dose rates for amphibians need to be much higher than for reptiles. Use a 26-30G needle depending on the size of the animal. Buffered Tricaine methane sulphonate (MS-222) is also a suitable euthanasia agent for adults or tadpoles, either intraperitoneal or via prolonged immersion. Ventral application of a 20% benzocaine over-the-counter oral gel is acceptable. Placing a frog in a shallow bath of a 3% solution of chloral hydrate is another acceptable method. Tadpoles may be euthanised with clove oil as for fish.
Fish
Clove Oil (available from pharmacies) may be used at a dose rate of 10 drops per litre of water (0.65 ml per litre). Dissolving it in a little ethanol improves its solubility. Tricaine Methane Sulfonate (MS-222) is very effective but must be neutralised with buffering agents to prevent irritation. Dose rates for MS-222 vary with species, but generally 250 mg/litre is appropriate. The fish should be left in the clove oil or MS-222 solution for at least 10 minutes following the last observed movement. Wherever possible, this should be followed by decapitation, cervical dislocation or exsanguination (e.g. by severing gill arches) to ensure that death has occurred. If a physical technique of euthanasia is used, it should entail the physical destruction of brain tissue by pithing or crushing the brain.

Dosing and dilution rates for Pentobarbitone
The formulation of choice is anaesthetic grade pentobarbitone sodium 60 mg/ml (Ilium pentobarbitone). Lethabarb (325 mg/ml pentobarbitone sodium solution) is not preferred due to its highly irritant nature, but is acceptable where an intravenous route is used, or if appropriately diluted.

Sodium pentobarbitone is used for euthanasia at a dose rate of approximately 150 mg/kg bodyweight. For small animals, it may be diluted with water or normal saline.

When administering pentobarbitone intraperitoneally (into the cavity between the body wall and the gut), a non-irritant solution must be used, and every effort should be made to avoid injection directly into the intestine as this slows the absorption and subsequent effect of the drug.

Humane killing of pest animals
Most feral animals have a high reproductive capability, and killing a few individuals will have no significant impact on local populations, and thus no conservation benefit. The use of euthanasia drugs results in problems disposing of carcasses, which need to be incinerated or deeply buried. Carbon dioxide may be impractical or hazardous to use in the field. For these reasons, the position of the Department for Environment, Water and Natural Resources is that the routine killing of feral animals is not recommended. However, if the killing is to prevent the establishment of feral animals in a region where they do not currently occur, or it will have a direct conservation benefit to native species, or it will result in useful knowledge (e.g. from stomach contents) and it can be carried out humanely by suitably skilled operators, then it can be considered in ethics approval applications. Researchers should also be aware that under the Natural Resources Management Act 2004 it is an offence to release non-native animals unless an exemption has been provided.

Emergency situations
It may be necessary to euthanise an animal in the absence of appropriate drugs. For example, in remote areas, or where an animal is suffering acutely and cannot be immediately transported to a veterinarian. In these instances, a method should be employed that achieves rapid loss of consciousness and death in the shortest time as is possible, with the minimum of distress. If a firearm is available, then the animal should be killed with a head shot, although a chest (heart) shot may be used if a head shot is not possible. For smaller animals, a blow to the rear of the skull delivered with sufficient force to immediately destroy the brain may be used. Whatever method is employed, the euthanasia must be carried out by a suitably skilled and experienced operator.
Unacceptable Methods

- It is not appropriate to use Lethabarb or equivalent solutions directly into the abdomen due to their irritant nature unless suitably diluted. For this route the non-irritant anaesthetic-grade solutions are preferred.
- Intrathoracic (into the chest) injections are not a suitable route for euthanasia. Fluids of any nature given into lung tissue are likely to cause the animal distress as anoxia and drowning will be involved.
- Ether and Chloroform are both irritant and not considered appropriate as inhalant anaesthetics. Their volatile nature makes them unsafe.
- Exsanguination (bleeding) is only suitable with an already anaesthetised animal.
- The use of car exhaust fumes is not generally an acceptable method of euthanasia. While car exhaust does contain carbon monoxide, the concentration of this gas is not usually adequate to cause a rapid death. In addition, car exhaust is hot and contains other gases which are highly irritating to the respiratory tract. Cooled exhaust from four-stroke petrol engines may be appropriate for some species.
- The euthanasia of reptiles, amphibians or fish is not to be done via freezing (except where the animal has first been anaesthetised). A review of scientific literature has failed to provide adequate evidence that reptiles, amphibians or fish become insensitive to pain during the cooling/freezing process, and the formation of ice crystals within the body is likely to cause pain.
- Carbon dioxide or other inhalants are not appropriate for use in reptiles or amphibians due to their relatively low respiratory rates, ability to breath-hold and resistance to the effects of hypoxia.

Operator Responsibilities

Euthanasia solutions are not selective in their actions and operators carry a public health responsibility to ensure the correct use and safe storage of all material in their possession. A Licence from the SA Department of Health is required to possess controlled substances. Suitable logbooks should be maintained to monitor drug usage, in accordance with Health Department requirements.

Great care should be taken to avoid exposing operator or assistants to any euthanasia solution, as it will be absorbed orally or through the eye. Less than 1 ml can result in symptoms of narcosis (drowsiness) in an adult person. Appropriate protection methods (eye protection; face mask) should be used where necessary.

References


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Wildlife Ethics Committee Collection of Blood from Wildlife Policy. 26/09/2013.

Relevant codes of practice for the humane destruction of wildlife can be found on the Department of Environment, Water and Natural Resources website:


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