

UNIVERSITY ANIMAL CARE COMMITTEE

Policy on Humane Killing of Animals Used in Science

Experimental animals are humanely killed when study endpoints have been met and disposition has been approved by the University Animal Care Committee (UACC) in the Animal Use Protocol (AUP).

Whenever an animal is humanely killed, it must be done with the upmost respect and in a way that ensures death is as painless and free of distress as possible. The common definition of euthanasia is *a painless death*, and while complete absence of pain or stress cannot be guaranteed in the context of animals used in science, humane killing refers to doing what is humanly possible to minimize pain and distress, given the circumstances under which it is performed. The most important criteria for acceptance of a method of humane killing is that it has a rapid initial depressive action on the central nervous system to ensure immediate insensitivity to pain, and that steps are taken to minimise distress. In short, humane killing should result in rapid loss of consciousness, followed by respiratory and cardiac arrest and ultimate loss of all brain function.

Personnel responsible for humanely killing animals must be trained so that they can execute the appropriate and approved methods both effectively, humanely and with demonstrated competency; are able to recognize signs of pain and distress in relevant species; and recognize and confirm unconsciousness, and death.

The UACC is responsible for the approval of the method of humane killing for any study involving the use of animals. All AUPs involving humane killing must include a description of the methods to be used. The UACC will consider the method(s) on a case-by-case basis according to appropriateness in a given situation, taking the scientific literature and scientific goals of the research into account, and in consultation with the University Veterinarian, researcher and animal care staff as appropriate.

The recognised methods of humane killing are listed as either *acceptable* or *conditionally acceptable* based on the *CCAC Guidelines on: euthanasia of animals used in science* (2010). The use of conditionally acceptable methods may be acceptable by the UACC in certain circumstances where there is scientific justification. Conditionally acceptable methods are listed as such, because there is a greater potential for operator error or safety hazards, they might not consistently produce humane death, or they are not well documented in the scientific literature.

Table 1: Acceptable Methods of Humane Killing:

Classification and Common Name	Acceptable Methods
Class <i>Amphibia</i> (Amphibians)	
Frog, Toad, Salamander	<ul style="list-style-type: none"> • Immersion or injection of buffered tricaine methane sulfonate (TMS; also known as MS222, tricaine) (<i>*pharmaceutical grade product strongly encouraged (i.e.: Syncaïne)</i>) • Immersion or injection of benzocaine • SC injection of barbiturates into lymph sac • Overdose of inhalant anesthetics (for species that do not breath hold), followed by another method to ensure death
Class <i>Reptilia</i> (Reptiles)	
Turtle, Snake, Lizard	<ul style="list-style-type: none"> • IV or IP injection of barbiturates • Penetrating captive bolt (for larger species)
Class <i>Osteichthyes</i> (Bony Fishes) Class <i>Chondrichthyes</i> (Cartilaginous Fishes)	
Fish	<ul style="list-style-type: none"> • See also CCAC guidelines on: the care and use of fish in research, teaching and testing • Immersion or injection of buffered tricaine methane sulfonate (TMS; also known as MS222, tricaine) (<i>*pharmaceutical grade product strongly encouraged (i.e.: Syncaïne)</i>) • Benzocaine • Clove oil • Maceration (for fish less than 2cm in length)
Class <i>Aves</i> (Birds)	
Chicken, Pigeon, Wild Birds etc.	<ul style="list-style-type: none"> • IV or IP injection of barbiturates with local anesthetic • Overdose of inhalant anesthetics (for species that do not breath hold), followed by other method(s) to ensure death
Class <i>Mammalia</i> (Mammals)	
Order <i>Rodentia</i> Mouse, Rat, Hamster, Gerbil, Guinea Pig	<ul style="list-style-type: none"> • IP/IV injection of barbiturate or anesthetic overdose • Overdose of inhalant anesthetics using a calibrated vaporizer (for species that do not breath hold), followed by a secondary method to ensure death • CO2 asphyxiation with prior sedation (i.e.: Isoflurane)
Order <i>Lagomorpha</i> Rabbit	<ul style="list-style-type: none"> • IV injection of barbiturates • Overdose of inhalant anesthetics, followed by another method(s) to ensure death
Order <i>Carnivora</i> Dog	<ul style="list-style-type: none"> • IV injection of barbiturates • Overdose of inhalant anesthetics, followed by another method(s) to ensure death
Order <i>Artiodactyla</i> (<i>Hoofed animals</i>) Swine	<ul style="list-style-type: none"> • IV injection of barbiturates • Overdose of inhalant anesthetics, followed by another method(s) to ensure death

Order <i>Primates</i> (Non-human primates) Monkeys	<ul style="list-style-type: none"> • IV injection of barbiturates • Overdose of inhalant anesthetics, followed by another method(s) to ensure death
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Table 2: Conditionally Acceptable Methods of Humane Killing:

Species	Conditionally Acceptable Methods
Fish	<ul style="list-style-type: none"> • Concussion (emergency killing for other species)
Birds	<ul style="list-style-type: none"> • CO2 • Cervical dislocation without prior sedation • Decapitation without prior sedation • Thoracic compression (in suitably sized birds)
Rodents	<ul style="list-style-type: none"> • Cervical dislocation without prior sedation • Decapitation without prior sedation • CO2 asphyxiation without prior sedation
Rabbits	<ul style="list-style-type: none"> • Cervical dislocation without prior sedation

Reference:

CCAC Guidelines on: euthanasia of animals used in science.

<http://www.ccac.ca/Documents/Standards/Guidelines/Euthanasia.pdf>

Revision History:

Date	New Version
08/21/2012	Policy Created
01/28/2016	Triennial Review; Clarification of CO2 asphyxiation in rodents being acceptable at Queen's (gradual fill method) despite conditionally acceptable at CCAC; Acceptable methods for dogs, swine and non-human primates added
04/23/2020	Triennial Review; Shift of CO2 asphyxiation in rodents to a conditionally acceptable method; Addition of thoracic compression in suitably sized birds as a conditionally acceptable method
01/25/2023	Triennial Review; Clarification that the acceptable method of overdose of inhalant anesthetics in rodents is using a calibrated vaporizer; Replacing term Euthanasia with Humane Killing throughout; New Template
04/23/2026	Triennial Review; Reference to Syncaine for MS222; CO2 with prior sedation clarified as acceptable