

Methods of Euthanasia by Species

(Last updated December, 2004)

The goal of euthanasia, by definition, is the achievement of a “painless death”. As such, euthanasia should cause as little pain or distress as possible. The euthanasia methods listed below are in accordance with the **2000 Report of the AVMA Panel on Euthanasia** <http://www.avma.org/resources/euthanasia.pdf>. *Acceptable* methods of euthanasia are those that are recommended. Scientific justification for their use is not required by the IACUC. *Conditionally acceptable* methods of euthanasia may be used in cases where acceptable means may confound experimental results. Scientific justification for the use of these methods is required by the IACUC. In addition, investigators must provide assurance of proper training in the use of these methods, and the maintenance of equipment in proper working order. Methods that are not listed are not generally acceptable.

Acceptable and conditionally acceptable agents and methods of euthanasia

Species	Acceptable	Conditionally acceptable
Amphibians	Barbiturates, inhalant anesthetics, CO ₂ , tricaine methane sulfonate (TMS, MS 222), benzocaine hydrochloride, double pithing	Stunning and decapitation, decapitation and pithing
Birds	Barbiturates, inhalant anesthetics, CO ₂	N ₂ , Ar, cervical dislocation, decapitation
Cats	Barbiturates, inhalant anesthetics, CO ₂ , potassium chloride in conjunction with general anesthesia	N ₂ , Ar
Dogs	Barbiturates, inhalant anesthetics, CO ₂ , potassium chloride in conjunction with general anesthesia	N ₂ , Ar
Fish	Barbiturates, inhalant anesthetics, CO ₂ , tricaine methane sulfonate (TMS, MS 222), benzocaine hydrochloride, 2-phenoxyethanol	Decapitation and pithing, stunning and decapitation/pithing

Monkeys	Barbiturates	Inhalant anesthetics, CO ₂ , N ₂ , Ar
Rabbits	Barbiturates, inhalant anesthetics, CO ₂ , potassium chloride in conjunction with general anesthesia	N ₂ , Ar, cervical dislocation (<1 kg), decapitation
Rodents/Small mammals	Barbiturates, inhalant anesthetics, CO ₂ , potassium chloride in conjunction with general anesthesia, microwave irradiation	N ₂ , Ar, cervical dislocation (rats < 200g), decapitation
Ruminants	Barbiturates, potassium chloride in conjunction with general anesthesia	Chloral hydrate (IV, after sedation)
Swine	Barbiturates, potassium chloride in conjunction with general anesthesia	Inhalant anesthetics, chloral hydrate (IV, after sedation)

Specific recommendations and suggestions

1. Barbiturates

- a. The most commonly used barbiturate is sodium pentobarbital, used in a dose of 150 mg/kg for mice, and 100 mg/kg for other species.
- b. Routes of administration are IP in rodents and small mammals, and IV in other species.

2. CO₂

- a. Administration of CO₂ from dry ice is no longer acceptable according to the AVMA. Use of a compressed gas source is required.
- b. There are several ways to reduce the stress associated with CO₂ euthanasia:
 - Administer an inhalant anesthetic prior to administration of CO₂.
 - Administer the CO₂ in the animals' home cage.
 - Do not pre-fill the chamber. Rather, place the cage in an empty chamber and fill it at a moderate rate (flow rate should be 20% of chamber volume per minute).
- c. While CO₂ is currently an acceptable means of euthanasia, there is evidence to show that it is distressful, and it is possible that future AVMA panels may place it in the conditionally acceptable category.

[Return to Main](#)

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