



Guidelines for Ferret Inhalant Anesthesia

The expectation is that IACUC Guidelines will be followed as best practice. They allow the Animal Care & Use Program to attain acceptable performance outcomes to meet the intent of the regulations. As such, any planned variation from the guidelines requires prior IACUC approval and must be based on a scientific rationale.

Isoflurane, a halogenated anesthetic gas, is commonly used to anesthetize research animals, including ferrets. Please refer to the IACUC Guidelines on the Use of Isoflurane for safety and best practices information.

NOTE: These guidelines are for healthy, adult ferrets. Special considerations apply for unhealthy and/or young and geriatric ferrets. Please contact the University Research Animal Resources veterinarians with questions, concerns, or for consultation.

I. Training and Proficiency Requirements

All individuals involved with performing inhalant anesthesia with ferrets are required to review this document, participate in a training session with the University Research Animal Resources veterinary staff or designated trainer, and demonstrate proficiency prior to engaging in study related activities.

II. Anesthesia Procedure

Anesthetizing animals one at a time is typically safer than anesthetizing two ferrets simultaneously as full attention can be paid to a single animal. When anesthetizing two ferrets for study purposes, please adhere to the guidelines below to ensure an adequate level of anesthesia and animal safety. The number of animals that may be anesthetized at one time will be dependent on the number of individuals available to assist and their training and proficiency. All steps below must be completed each time an animal undergoes anesthesia.

1. Leak-check the anesthetic circuit using oxygen (not isoflurane) to ensure it is functioning appropriately and anesthetic gas is not being released into the procedure room.
2. Ensure adequate levels of oxygen and isoflurane are available.
3. Weigh passive charcoal waste anesthetic gas (WAG) scavenging canisters, if used, to ensure they are adequate for use. If more than 50 or 100 grams over baseline weight (depending on product – see label for guidance), discard and replace with new canister before anesthesia.
4. Place the ferret into an anesthetic induction chamber. If simultaneously anesthetizing two animals, place one animal in each of the two anesthetic induction chambers. DO NOT place 2 ferrets in the same anesthetic chamber.

Guidelines for Ferret Inhalant Anesthesia

5. Turn oxygen to 1 L/min and isoflurane to 5%. Note: This may induce excitement and struggling as the inhalant anesthetic accumulates in the chamber.
6. Each animal should be monitored and the anesthesia adjusted accordingly. Monitoring during the induction phase should include spontaneous movements and respiratory rate. As the animal increases in depth of anesthesia, it will stop moving around the chamber. At this time, turn the isoflurane down to 2-3%. It should take no more than 5 minutes at 5% for the animal to achieve a sufficient level of anesthesia for handling.
7. While animal #1 undergoes a procedure, animal #2 may be maintained at 2-3% in the chamber as long as within direct view. Respiratory rate should be monitored during this time and should be maintained above 10 breaths/minute. If the respiratory rate goes below this limit, decrease the isoflurane by 0.5-1%.
8. Prior to opening the chamber containing animal #1, turn off the isoflurane and flush the chamber with oxygen for at least 5 seconds to avoid releasing isoflurane into the room.
9. Once the chamber has been flushed, open chamber, remove animal #1, close and seal the chamber to minimize the release of inhalant into the procedure room.
10. Place animal #1 on a nose cone. Turn oxygen to 1 L/min and isoflurane to 2-3%.
11. Complete necessary procedures.
12. Turn off the isoflurane prior to removing the nose cone.
13. If additional procedures are to be completed prior to recovery, they should be done immediately as recovery from inhalant anesthesia is rapid.
14. Place the animal in the recovery cage when procedures are complete.
15. Repeat steps 8-14 with animal #2 while monitoring animal #1 during recovery.

III. Monitoring

Pre-Anesthesia Assessment: Ensure animal appears healthy for anesthesia. A 3-4 hour fast is required; longer fasting times may lead to hypoglycemia.

Anesthesia Monitoring: Animals must be monitored for the duration of the anesthetic period through recovery. This includes animals undergoing a procedure as well as those in the anesthesia chamber awaiting the procedure. At a minimum, animals shall be continually monitored for appropriate respiratory rate (i.e., breaths/minute) in the induction chamber, respiratory rate, heart rate (beats/minute), and character (e.g., depth, inspiratory/expiratory effort, muscle tone, eye position). Additional monitoring must be performed as outlined in the AUP.

Other parameters that may be monitored include:

- Capillary refill time
- Mucous membrane color
- Anesthetic depth: toe pinch (i.e., withdrawal reflex), palpebral reflex

Post-Procedural Monitoring & Recovery: In addition to the above parameters, animals must be monitored for an appropriate recovery. If the animal is not recovering from anesthesia, please contact a URAR veterinarian for assessment and assistance. While waiting for assistance, keep the animal warm, extend the neck to maintain an open airway, and provide 100% oxygen through nose cone (make sure

Guidelines for Ferret Inhalant Anesthesia

isoflurane is off). The animal must be monitored until fully recovered, as indicated by the ability to maintain sternal recumbency, respond to touch, and move around the cage.

Normal Values for Reference:

Parameter	Value
Heart Rate (awake)	200 – 400 beats / min
Heart Rate (anesthetized)	180 – 250 beats / min
Respiratory Rate	30 – 40 breaths / min
Temperature	100 – 104 F

IV. References

Laboratory Animal Medicine: Third Edition.

Anesthesia & Analgesia in Laboratory Animals: Second Edition. Chapter 16 – Anesthesia and Analgesia in Ferrets.