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**1. PURPOSE**

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This Standard Operating Procedure (SOP) describes methods for anesthetizing swine.

**2. RESPONSIBILITY**

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Principal Investigators (PIs) and their research staff, veterinary care staff.

**3. INTRODUCTION**

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- 3.1. Perform a thorough physical exam.
- 3.2. Withdraw food (not water) for 12 hours (2 hours for neonates) prior to anesthesia in order to reduce the risk of aspiration of stomach contents.
- 3.3. Keep animals warm by providing a heat source until the animal has recovered from anesthesia.
- 3.4. Never leave an anesthetized animal unattended.

**4. MATERIALS**

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- 4.1. Material or equipment to provide or conserve body heat (e.g. warm-water circulating pad)
- 4.2. Gas anesthesia machine (calibrated within the last 12 months) with adequate gas scavenging system or filter
- 4.3. Tight-fitting mask
- 4.4. Ophthalmic ointment (natural tears)
- 4.5. Intra-venous catheter
- 4.6. EMLA cream
- 4.7. Isoflurane
- 4.8. Buprenorphine (0.3mg/mL) \*Controlled drug
- 4.9. Acepromazine (10mg/mL)
- 4.10. Atropine (0.5mg/mL)
- 4.11. Ketamine (100mg/mL) \*Controlled drug
- 4.12. Tiletamine/zolazepam (Telazol) \*Controlled drug
- 4.13. Thiopental sodium (Pentothal) powder \*Controlled drug
- 4.14. Propofol (10mg/mL)
- 4.15. Pentobarbital (54.7mg/ml) \*Controlled drug
- 4.16. Sterile isotonic saline (0.9% saline) or Lactated Ringer's Solution (LRS)
- 4.17. Xylocaine spray
- 4.18. Sterile lubricant (e.g. water soluble jelly)
- 4.19. Endotracheal tubes, cuffed, sizes 5.0 to 9.0
- 4.20. Laryngoscope
- 4.21. Plain gauze rolls

## 5. PROCEDURES

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- 5.1. Premedication:
  - 5.1.1. Administer intramuscularly:
    - 5.1.1.1. Buprenorphine: 0.05-0.1mg/kg
    - 5.1.1.2. Acepromazine: 0.2mg/kg
    - 5.1.1.3. Atropine: 0.05mg/kg
    - 5.1.1.4. Ketamine: 10-15mg/kg or Telazol: 2-5 mg/kg
- 5.2. Place an intravenous catheter (e.g. auricular vein) :
  - 5.2.1. To provide IV fluid therapy and venous access during surgery.
  - 5.2.2. It is recommended to apply EMLA cream and cover with plastic cling wrap (e.g. Saran® wrap) over the venipuncture site at least 15 minutes prior to placing the catheter. Observe the animal to prevent removing or swallowing of the plastic.
- 5.3. IV fluid administration:
  - 5.3.1. Administer isotonic saline (0.9% saline) or Lactated Ringer's Solution at a rate of 10mL/ kg//hour.
- 5.4. Induction:
  - 5.4.1. Used for induction prior to use of isoflurane anesthesia for smooth and rapid induction and to facilitate intubation.
  - 5.4.2. Administer pentothal 10mg/kg or propofol 1-2 mg/kg intravenously.
  - 5.4.3. Apply ophthalmic ointment (natural tears) to both eyes to prevent dryness and damage to the cornea.
  - 5.4.4. For non-recovery anesthesia, use pentobarbital 10-20 mg/kg intravenously.
- 5.5. Intubation:
  - 5.5.1. Placement of an endotracheal tube is recommended for delivery of isoflurane anesthesia.
  - 5.5.2. Cuffed endotracheal tubes are preferred as they reduce the possibility of aspiration of saliva or stomach contents.
  - 5.5.3. Intubation:
    - 5.5.3.1. Lubricate endotracheal tube with sterile lubricant.
    - 5.5.3.2. With the animal in sternal or dorsal recumbency, extend the neck and head so that they are in a straight line.
    - 5.5.3.3. Pull the tongue forward so that the epiglottis is visible.
    - 5.5.3.4. Use the laryngoscope to disengage the epiglottis from the soft palate, exposing the glottis and vocal chords.
    - 5.5.3.5. Spray the larynx with 2% xylocaine to help decrease laryngospasm (spasmodic closing and opening of the glottis).
    - 5.5.3.6. Insert the endotracheal tube (with the convex side facing upwards) gently into the proximal larynx.
    - 5.5.3.7. Gently rotate the endotracheal tube 180° and apply gentle pressure to insert into the trachea. Confirm proper placement by checking for the animal's breath as it exits the endotracheal tube during exhalation.
    - 5.5.3.8. Secure the endotracheal tube by tying a piece of gauze around the tube then behind the animal's head.
    - 5.5.3.9. Inflate the cuff of the endotracheal tube.
    - 5.5.3.10. Verify adequate ventilation of both lungs by auscultation.
- 5.6. Isoflurane anesthesia:
  - 5.6.1. Induction (only if injectable anesthetics cannot be used; the animal needs to be premedicated to reduce stress of induction):

- 5.6.1.1. Use a tight-fitting mask.
- 5.6.1.2. Adjust the oxygen flowmeter to 0.8 to 1.5 L/min.
- 5.6.1.3. Adjust the isoflurane vaporizer to 3% to 5%.
- 5.6.2. Maintenance:
  - 5.6.2.1. Use the endotracheal tube or mask connected to the anesthesia machine.
  - 5.6.2.2. Adjust the flowmeter to 50 ml/kg/min (recirculating system) or 100-200 ml/kg/min (for Bain system).
  - 5.6.2.3. Adjust the isoflurane vaporizer to 1.5 to 2.0% (dose to effect).
- 5.6.3. Recovery:
  - 5.6.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen for 2 to 5 minutes or longer if oxygen saturation levels are low.
  - 5.6.3.2. Remove the endotracheal tube as soon as the animal shows signs of impending arousal, i.e., when reflexes begin to return.

## SOP REVISION HISTORY

DATE	PREVIOUS VERSION	NEW VERSION
2016.09.21	5.1.1. Administer intramuscularly (can be mixed in the same syringe):	5.1.1. Administer intramuscularly ( <del>can be mixed in the same syringe</del> ):
2016.09.21	5.6.2.3. Adjust the isoflurane vaporizer to 1.5 to 2.0%.	5.6.2.3 Adjust the isoflurane vaporizer to 1.5 to 2.0% <b>(dose to effect)</b> .
2016.09.21	5.6.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen.	5.6.3.1. Turn off the isoflurane vaporizer but keep the animal on oxygen <b>for 2 to 5 minutes or longer if oxygen saturation levels are low.</b>
2016.09.21	5.6.3.2 Remove the endotracheal tube as soon as the animal shows signs of impending arousal.	5.6.3.2 Remove the endotracheal tube as soon as the animal shows signs of impending arousal, i.e., <b>when reflexes begin to return.</b>