Flinders University

Safe Work Method Statement

Sheep – Anaesthesia 21-05-19

College of Medicine and Public Health Animal Facility

SWMS Number	RA Number	RA Score	
SWMS- 5.3	RA – 5.3	Medium	
Contact Person	**SWMS prepared by**	**AWC Approval Date**	**Review Date**
Roxanne Collingwood	Roxanne Collingwood	21/05/2019	May 2021

Contents

The SWMS **Sheep – Anaesthesia** contains the following sections:

Legislation

- *Australian Code for the Care and Use of Animals for Scientific Purposes 8th Ed.*
- *Animal Welfare Act 1985*
- *Animal Welfare Regulations 2012*
- *Gene Technology Act 2000* (the Act)
- *Gene Technology Regulations 2001*
- *Work Health and Safety Regulations 2012*

University Policy

- Work Health and Safety Policy 2013
- Responsible Conduct of Research Policy 2016
- NHMRC Guidelines

Local Policy

Use of the College of Medicine and Public Health Animal Facilities by all staff and researchers of the College of Medicine and Public Health, Flinders University, is subject to awareness of, and adherence to the following:

Research Involving Animals:

- The University holds a permit for the use of animals for teaching and research purposes. To satisfy the requirements of the permit, anyone wishing to undertake teaching and research using animals must submit a proposal to the Animal Ethics Review Sub-Committee. No work with animals may commence until written approval has been received from the Animal Welfare Committee. Standardised application forms for Research and Teaching can be found on the Flinders University website listed below. It is your responsibility to regularly check this site for updates to guidelines, forms etc ***http://www.flinders.edu.au/research/researcher-support/ebi/animal-ethics/animal-ethics_home.cfm***

- **All staff and students involved in animal research must complete Animal Ethics Online Training (AEOT) and must also regularly attend Animal Researcher Information Sessions (ARIS).**

Safe Work Method Statements

Refer to Risk assessments, Safe Work Method Statements for chemicals, processes and plant equipment where appropriate. All projects must have an accompanying Risk Assessment signed by the Animal Facility Manager

SWMS 5.0-Sheep Catching, Handling and Restraint
RA 5.0-Sheep Catching, Handling and Restraint
SWMS 5.1- Sheep Injection techniques
RA 5.1- Sheep Injection techniques

Personal Protective Equipment Required

- Protective clothing
- Closed toe shoes

Hazards and Controls

- **Animal kicks- training, demonstrate competency, adhere to SWMS**
- **Animal Scratches- training, demonstrate competency, adhere to SWMS**
- **Needle Stick- DO NOT recap needles, dispose of in sharps containers**
- **Chemical exposure- wear PPE and goggles if necessary**

Before Work Commences

Ensure that you are aware of the locations of the following:

- **Spill Kit**
- **Fire Extinguisher**
- **Eye Wash**
- **Exits**

Risk Assessment and SDS (Safety Data Sheet) - Ensure that you have read and understood for all the substances being used.

Equipment

- **Check for safety and electrical compliance**
- **Ensure that you have read and understood the Risk Assessment and Safe Work method Statement**
- **Obtain training before using any lab equipment**

General Information

*****IMPORTANT – Ensure all doors in the facility MUST be closed to prevent escape*****

- **Staff involved in animal anaesthesia MUST be trained by an authorised and qualified animal technician or Animal Welfare Officer on all aspects of anaesthesia and related safety issues.**
- **Staff MUST be trained to correctly place the endotracheal tube in the trachea.**
- **Staff MUST be trained in the assessment of depth of anaesthesia throughout the whole procedure and recovery process.**
- **Training is available from a trainer senior animal technician or the Animal Welfare Officer.**
- **Evidence of training is available in the "Staff Training Needs analysis".**

Information Prior to Surgery

- **Withhold food for 24 hours, and water for 12-16 hours, prior to surgery.**
- Sheep must be weighed prior to anaesthesia so that accurate drug doses can be administered.
- Once an animal is allocated to a project, the investigator is responsible for the day to day monitoring of its wellbeing.
- The roles and responsibilities of each person for other aspects (such as the extent of clipping of the fleece, preparation of the surgical site, Instrumentation – iv catheters, monitor probes, oesophageal stethoscopes, diathermy, suction, record of ECG, or blood pressure monitoring, etc) must be clear PRIOR to the commencement of the anaesthesia.

Monitoring Equipment Required

1. Induction Agent (Thiopentone)
2. Syringes (10ml, 20ml, 30ml)
3. Needle/Catheters (16G, 18G,19G)
4. Pulse Oximeter
5. Tie for Endotracheal Tube
6. Lignocaine/Anaesthetic spray
7. Vaporiser filling tube.
8. Large Filter (for attaching to ET tube)
9. Endotracheal Tubes and appropriate sized stylets (sizes 8-10 for adults or 6-7 for lambs)
10. Stomach Tube
11. Leg Ties
12. Giving set
13. 1L bags of IV saline
14. Sand bags, and padding for pressure points
15. Heat pads
16. Thermometer
17. Jaw Loops (Gauze or plastic tubing)
18. Mechanical Ventilation (optional)
19. Manual Respiration bags size 3-4L (suitable for adults or lambs)
20. Laryngoscope (appropriate size)
21. 20ml syringe for ET tube cuff
22. Medical O_2
23. Large and fine animal clippers and appropriate size blades
24. Anaesthetic Machine with fittings
25. Anaesthetic agent (Isoflurane)
26. Lubricant (KY Jelly or SurgiLube)
27. Hay bales

Preparation

1. Ensure all equipment is operating correctly.
2. A heat pad may be required if there is a possibility for the sheep to develop hypothermia due to long period of anaesthesia, extensive clipping and wool removal from back, or if surgery involves opening body cavities.
3. Using the Isoflurane (purple) filling tube, screw the keyed bottle adapter on to the Isoflurane bottle. Remove the filling port plug from the filler port. Insert the

end of the filling tube into the filler port and tighten the screw to secure the filling tube and ensure Isoflurane does not leak during filling. Fill the vaporiser by inverting the Isoflurane bottle, check the level in the sight glass. Do not overfill the anaesthetic machine. Monitor Isoflurane levels and top up as required.

4. Check tubing and re breathing bag for any splits, and set up machine for use.
5. Check O_2 supply/connections and turn on.
6. Check wall mounted waste gas scavenging unit is connected, and turn on.
7. Perform a leak test to ensure anaesthetic machine is fully operational and connected properly:
   (i) Cover the Y piece of hosing with thumb.
   (ii) Close pop-off valve.
   (iii) Inflate re-breathing bag using the O_2 flush button.
   (iv) Squeeze re-breathing bag and watch for re-breathing bag deflation, and listen for leaks.
8. Check Soda Lime and replace when ¾ of the soda lime in the canister has changed colour from white to purple approximately 4-6 hours of surgery.
9. Check endotracheal tubes (have a range of sizes available) by blowing up the cuff and checking for leaks. If leaks occur, then discard and replace with a new one. Insert the stylet, remove air from cuff, and place a tie for securing to jaw on end of tube.
10. Take note of the volume of air needed to inflate the cuff.
11. Smear the outer surface of the ET tube with lubricant (KY Jelly or SurgiLube).

Endotracheal Intubation

1. Prepare Sodium Pentothal by injecting 100ml sterile water into a bottle of Pentothal.
2. Restrain the sheep using one of the methods in *SWMS 5.0*.
3. Clip the neck area with fine animal clippers, locate the jugular vein, and administer the appropriate amount of Sodium Pentothal (25mg/kg) for the animal's weight using *SWMS 5.1*.

METHOD 1:

Sternal Recumbancy *(preferred method to reduce the chance of the sheep aspirating)*:

4.1. In the sitting position, holding the head and neck elevated and extended. Use jaw loops around the upper and lower jaw to open the mouth. Hold the tongue up and forward, use the laryngoscope to visualize the larynx.

4.2. A few sprays of local anaesthetic (i.e. Xylocaine/Lignocaine) can be used on the cords if necessary, or lignocaine can be dripped onto the larynx.

4.3. Gently insert the endotracheal tube between the cords into the trachea when

the animal inhales. Inflate endotracheal cuff immediately. Slight over-inflation is OK at this point in time. Correct cuff inflation is best assessed once the sheep is on the surgery table positioned ready for surgery.

4.4. Check for correct positioning in the trachea by compressing chest and observing air flow out of the end of the Endotracheal Tube, by feeling for airflow or by using a wisp of hair/tissue paper as an indicator. Or inflate chest using the manual respirator, compress chest, and listen for any indication of escaping air. If incorrectly placed, remove the endo tracheal tube and repeat steps 1.1 - 1.4. When correctly placed, tie the tube to the jaw.

4.5. Once anaesthetised, two or three people are required to transfer the animal to the operating table, by transferring it to the hydraulic lift trolley, which can be pumped up to the height of the operating table. Care must be taken not to lift the sheep using the fleece as this will cause bruising.

METHOD 2:

Dorsal Recumbancy:

4.1. Once anaesthetised, two or three people are required to transfer the animal to the operating table, by transferring it to the hydraulic lift trolley, which can be pumped up to the height of the operating table. Care must be taken not to lift the sheep using the fleece as this will cause bruising.

4.2. With the sheep in the dorsal position, hold the mouth open using the jaw loops, if needed. With the tongue extended and the laryngoscope introduced into the mouth, use the laryngoscope to visualize the larynx.

4.3. A few sprays of local anaesthetic (i.e. Xylocaine/Lignocaine) can be used on the cords if necessary, or lignocaine can be dripped onto the larynx.

4.4. Gently insert the endotracheal tube between the cords into the trachea when the animal inhales. Inflate endotracheal cuff immediately. Slight over-inflation is OK at this point in time. Correct cuff inflation is best assessed once the sheep is on the surgery table positioned ready for surgery.

4.5. Check for correct positioning in the trachea by compressing chest and observing air flow out of the end of the Endotracheal Tube, by feeling for airflow or by using a wisp of hair/tissue paper as an indicator. Or inflate chest using the manual respirator, compress chest, and listen for any indication of escaping air. If incorrectly placed, remove the endotracheal tube and repeat steps 2.2 – 2.5. When correctly placed, tie the tube to the jaw.

5. Once on the table (or on the trolley prior to transfer to the surgical table), the sheep is positioned in sternal or dorsal recumbancy, and held by the assistant.
6. Connect the anaesthetic hoses and maintain sheep on appropriate anaesthetic mixture for its size/procedure. Observe the spontaneous ventilation of the sheep.
7. Secure the sheep to the surgical table as required for the procedure, taking care to position the head so that secretions drain away from the mouth into a bucket.

8. Insert a jugular catheter for the administration of IV fluids at a rate of 10ml/kg/hr.
9. Check that bony prominences and pressure points are sufficiently padded to prevent compression damage to underlying tissues, nerves, and vessels. Where possible, position limbs in a natural resting position and avoid use of force or overstretching when placing ties.

Anaesthesia and Ventilator Settings

Gaseous Anaesthesia: Isoflurane:

Induction = 3-4%

Maintenance = 2-3%

Oxygen flow rate = 2-4L/min 100% O_2

Ventilator Settings:

Tidal Volume (bellows) = 10-15 ml/kg (60kg sheep = 600-900ml)

Oxygen Flow Rate L = 3L/min 100% O_2

Breaths per minute = 10-15 breaths per minute (>20kg sheep)

Monitoring During Anaesthesia

1. The anaesthetist is responsible for maintaining a record of the anaesthesia, including time and dose of anaesthetic drugs, record of fluids administered (type and rate), and recording vital signs at intervals throughout:
    (i) Heart rate (pulse rate) and pulse pressure.
    (ii) Respiratory rate and depth.
    (iii) Pupils (size) and protective blink reflexes (palpebral- eyelid- and corneal).
    (iv) Mucous membranes (colour and capillary refill rate).
    (v) Body temperature, if using a thermometer.
2. Check the sheep regularly to check the depth of anaesthesia throughout the procedure, and make any anaesthetic adjustments as need or requested.
3. The depth of anaesthesia can be determined by lightly touching the cornea and checking for palpebral reflexes. If the eyes are positioned dorso-laterally, and muscle tone in the eye lid and palpebral reflex is present, these are indications that the animal is lightly anaesthetised.
4. If lightly anaesthetised, the sheep may display active regurgitation followed by swallowing motions, compared to passive regurgitation with a continuous flow which indicates deep anaesthesia.
5. If the depth of anaesthesia is in adequate, the sheep may display chewing motions in response to painful stimuli.

Normal Physiological Parameters for Sheep Under Anaesthesia

	Conscious	**Anaesthetised** *(Very variable, values given are for guidance)*	**Recommended Critical Intervention Point**
Heart Rate (beats/min)	50- 80 (rest) to 280 (excited)	50- 80	<50-100>
Respiratory Rate (breaths/min)	15-40 (rest) to 350 (excited/overheated)	10-30	<8-40>
P O_2 (mm Hg)	95- 98 (room air) 100 (100% oxygen)	98-100 (100% oxygen)	<90
Capillary Refill Time (s)	1-2	1-2	>2
Body Temperature (rectal C)	38.5-39.5	38.5-39.5	<36

Recovery

1. On completion of surgical procedure, turn off anaesthetic agent, flush line with O_2, and maintain sheep on O_2 (3-4 L/min) until reflexes begin to return.
2. Disconnect hose from endotracheal tube, and remove any fluid lines.
3. Turn off O_2 at machine, and observe as sheep begins to recover.
4. Once the swallowing reflex returns, partially deflate the cuff of the endotracheal tube, gently remove the endotracheal tube from the mouth, and clean away any secretions.
5. Position the sheep in sternal recumbancy with legs tucked underneath. Ensure that the animals face is clear of any obstructions.
6. The sheep can be transported back into its crate or pen for full recovery. If the sheep is returned to its pen for recovery, hay bales can be used to prop the sheep until the animal gains consciousness.
7. Observe the sheep at intervals until it is conscious and standing steadily.
8. Follow any post-operative procedures as directed, including medications and Clinical Record Sheets.
9. Provide the sheep with food and water.

Daily Monitoring

- All animals are to be monitored for health disorders and changes in food intake or waste output. Any abnormalities are to be reported to the investigator/s nominated on the cage in the first instance, and also to the Senior Animal Technician or Animal Facility Manager.

- Urgent animal health and welfare matters must also be reported to the Animal Welfare Officer.

SWMS Review

This SWMS currently applies to the animals housed in the College of Medicine and Public Health Animal Facility. This SWMS will be reviewed 3 yearly, but also updated more frequently as policies, techniques and animal care requirements change.

Position	Name	Contact Details
Manager Animal Facility	Roxanne Collingwood	8204 4380 roxanne.collingwood@flinders.edu.au
Animal Welfare Officer	Lewis Vaughan	0450 424 143 awo@flinders.edu.au

Useful References

http://www.nhmrc.gov.au

http://www.adelaide.edu.au/ANZCCART/

http://www.nslhd.health.nsw.gov.au/AboutUs/Research/Office/Documents/ACEC_Guideline_Anaesthesia_Analgesia_Sheep.pdf

http://www.flinders.edu.au/research/researcher-support/ebi/animal-ethics/animal-ethics_home.cfm

Any questions regarding the above guidelines and any technical advice/ assistance required can be directed to Animal Facility Manager.