Standard Operating Procedures for the Effects of Low Humidity and Treatment of Ringtail in Rodents

1.0 Purpose:

1.1 This SOP outlines the effects of low humidity on rodents as well as prevention and treatment options for humidity related health problems.

2.0 Background

2.1 Weather conditions can result in periods of low relative humidity which fall below the Guide for the Care and Use of Laboratory Animals recommendations of 30-70% in the animal colony. Persistent low humidity (<30%) can alter research parameters and cause a number of health problems, most notably ringtail in mouse and rat pups. In addition to ringtail, low humidity (10-30%) [1,2,3,4] can cause the following conditions:

- **2.1.1** Delayed sexual maturation in mice
- **2.1.2** Altered food or water consumption and activity levels in rats and mice
- **2.1.3** Altered viability and transmission of viruses (influenza, Sendai virus, & other respiratory viruses)
- **2.1.4** Ocular irritation when combined with increased airflow
- **2.1.5** Altered thermoregulation
- **2.1.6** Stimulation of epidermal DNA synthesis and amplification of hyperproliferative response to barrier disruption

3.0 Responsibility

3.1 The Office of the Campus Veterinarian (OCV) Veterinary Services is responsible for ensuring adequate medical care for all WSU research and teaching animals. By outlining prevention and treatment options, animal care and research personnel can initiate early intervention and minimize clinical effects of low humidity. Facility management should inform investigators when the relative humidity falls outside the recommended range for prolonged periods of time (i.e., more than three consecutive day) and if it is a common issue within the facility.

4.0 Materials

4.1 100% medical grade Lanolin (such as Lansinoh®)
4.2 Water bottle with spray nozzle
4.3 Nestlets or other absorbent nesting material
4.4 Dark Green WSU OCV Veterinary Service Notification Cards

5.0 Procedures

5.1 Prevention:

5.1.1 Facilities with central or room/rack-level humidity control mechanisms:

- Relative humidity that falls below 30% for more than one day in rat or mouse breeding rooms should implement one or more of the following techniques until the humidity levels are consistently above 30%:
- Contact WSU facility operations for possible HVAC adjustment to increase relative humidity to >30%.
- Use a room or rack intake humidifier to increase relative humidity to 30%.
- If the relative humidity level remains insufficient for > 3 days, implement measures described below.

5.1.2 Facilities without humidity control mechanisms:

- The capacity for humidity control should be a consideration when determining the housing location for rodent breeding colonies
- Relative humidity that does not reach ≥30% for more than one day in rat or mouse breeding rooms should implement one or more of the following techniques until the humidity levels are consistently above 30%:
- For ventilated cages, remove cages with litters (0-21 days old) from the ventilation system.
- In open-top cage housing, wet the room floor daily to increase humidity.
- For any housing system with rodent litters (0-21 days old), add water-soaked nestlet or other nesting material either in a corner away from the nested litter or above the wire lid.
- Mist the sides of the cages with water, do not spray the pups or soak the food. Examine pups (0-21 days old) daily and observe for signs of ringtail (dry, cracked skin with constrictions (see pictures below).

5.2 Symptoms and Scoring of Ringtail[2]:

Normal Rat Tail
Score of 0

Early stage with flaking and mild constriction
Score of 1

Clear signs of advancing constriction and malformation of the tail
Score of 2

Advanced annual constrictions with necrosis of the tail
Score of 3

5.3 Treatment:

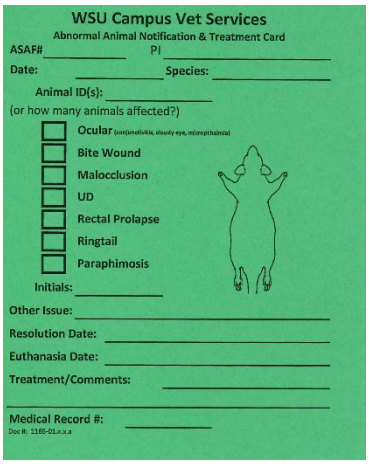
5.3.1 Treatment with frequent liberal applications of lanolin (medical grade 100% lanolin such as Lansinoh) should be initiated if signs of ringtail occur (see pictures above). Topical lanolin treatment 1-2 times per day for 7 days can loosen the skin rings and prevent loss of blood flow and subsequent gangrene of the distal tail.

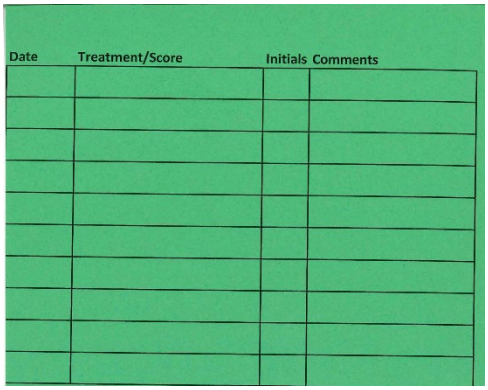
5.4 Notification

5.4.1 Personnel identifying any of rodents with clinical signs consistent with ringtail, must notify the principal investigator (or his/her designee) prior to initiating treatment, unless prior approval for treatment has been given. All animals/litters identified with ringtail must be entered on the OCV Animal Health database for case tracking.

5.5 Flagging of Cage:

5.5.1 The cage should be flagged with a WSU OCV Vet Services Card: (picture of card) with the ASAF/PI, animal ID, date flagged, mark Ringtail on the card, mark if the PI has been notified, initials of person setting up the case.


WSU Campus Vet Services
Abnormal Animal Notification & Treatment Card
ASAF#_____ PI _____
Date: _____ Species: _____
Animal ID(s): _____
(or how many animals affected?)
Ocular (conjunctivitis, cloudy eye, microphthalmia)
Bite Wound
Malocclusion
UD
Rectal Prolapse
Ringtail
Paraphimosis
Initials: _____
Other Issue: _____
Resolution Date: _____
Euthanasia Date: _____
Treatment/Comments: _____
Medical Record #: _____
Doc #: 1165-01.x.x.a


Date | Treatment/Score | Initials | Comments

(Example of card)

5.6 Documentation:

5.6.1 To initiate treatment documentation, use the back side of the green card. The card provides enough space to document 1 week of daily treatments, such lanolin application, misting the cage and observations. Once the case exceeds one week, the veterinary staff will assess treatment efficacy and develop a follow up care plan if needed or will resolve the case. If further treatment is necessary, the documentation will move to a paper medical record. When the case has resolved, either returned to normal limits, euthanasia or transferred to long term care, write the date on the front of the card.

5.7 Resolution of Case

5.7.1 Affected animals that have been assessed and treated and have improvement of clinical signs where there are no active clinical signs (score of 0) can be resolved and treatment stopped. Resolution of a case can be initiated by trained PI staff, animal care staff or the veterinary staff. Resolution date should be noted on the Vet Treatment Card or paper record. If the animal is euthanized place the date of euthanasia on the card and place the card in the Index Card Holder in the room marked "Cases".

6.0 Office of the Campus Veterinarian (OCV) Veterinary Services

6.1 All affected animals will be reviewed by veterinary staff within 4 days of notification of the issue, unless the case requires same day attention, or is resolved before the indicated time period.

6.2 Veterinary staff will make a clinical plan for each case if there is no resolution after 7 days of treatment

6.3 Veterinary staff will communicate with animal care staff and research personnel to ensure medical care and to meet the needs of the research project

6.4 The treatment medication listed above are available through OCV at 509-335-6246 or or.ocv.alert@wsu.edu

6.5 Emergency & after-hours veterinary care: 509-330-1871 http://www.campusvet.wsu.edu

7.0 References:

7.1 Petersen, K.E. 2018. Effects of relative humidity on health and wellbeing of the laboratory rat and mouse. SCANBUR

7.2 Taylor, D.K. et al. 2006. Lanolin as a Treatment Option for Ringtail in Transgenic Rats. *JAALAS 45(1), pp. 83-87*

7.3 Lipman, N.S. & Perkins, S.E. 2002. Factors that may influence animal research. *In "Laboratory Animal Medicine, 2nd Edition", p. 1148. Academic Press, San Diego.*

7.4 Dennis, M.J. 1986. The effects of temperature and humidity on some animal diseases—*A review. British Vet J 142(5) p. 472–485*