Title: Effects of low relative humidity and treatment of ringtail in rodents

Purpose:

The weather conditions of the Palouse 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%. Low humidity can alter research parameters and can cause a medical condition commonly known as ringtail in mouse and rat pups. This SOP is to inform investigators on the potential effects of low relative humidity on animal health and research as well as authorizes and provides direction for the evaluation and treatment of rodents with ringtail by faculty, students, research staff and animal care technicians.

Effects of Low Humidity:

The following are documented alterations related to low relative humidity levels.

- Delayed sexual maturation in mice
- Altered food consumption and activity levels in rats and mice
- Altered viability and transmission of viruses (influenza, Sendai virus, & other respiratory viruses)
- Altered skin absorption of topical substances
- Altered thermoregulation
- Increased thirst
- Dry skin
- Ringtail (annular constrictions in tail skin) in young rats and mice

The Guide mandates that indoor animal housing areas have daily room monitoring of the minimum and maximum relative humidity and recommends a range of 30-70%. Room monitoring is an approximation of the humidity in animal’s microenvironment. The type of animal housing and housing density can have a significant impact on relative humidity within the animal’s microenvironment. Solid-bottom cages with micro-isolator lids will have a higher cage humidity than ventilated, wire bottom or open top cages. Investigators should be informed when the relative humidity falls outside the recommended range.
Procedures for Ringtail:

When any animal is noted as having a medical issue, the person noting the animal’s condition must do the following:

- **Notification**: The principle investigator (or his/her designee) must be informed prior to initiating treatment. All ill or injured animals should be entered into the OCV Animal Health database for case tracking.
- **Flagging of Cage**: The cage should be flagged to indicate that there is an animal receiving medical treatment.
- **Documentation**: The medical record should document animal assessment, diagnosis, treatments and case resolution (if applicable). All entries must be marked with the date and initials of the person(s) providing the care.

Symptoms of Ringtail:

This condition occurs in mid-winter and late summer during periods of low humidity (<20%). In mouse and rat pups after approximately one week of age, the skin of the tail forms dry concentric rings which do not expand as the animal grows. The result can be one or more rings of dried skin around the circumference of the tail with swelling, and increased redness in the tail distal to the ring. Severe cases can cause lack of blood flow and tissue death in the distal tail and eventually gangrene and tissue sloughing.

Treatment of Ringtail:

Treatment with frequent liberal applications of lanolin (medical grade 100% lanolin such as Lansinoh) should be initiated if any signs of ringtail occur (see pictures below). 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.

Prevention of Ringtail:

The following techniques should be used to increase relative humidity in breeding rooms. Any rat breeding room where humidity repeatedly drops to less than 20% should implement one or more of the following techniques until the humidity levels are consistently above 20%:

- 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%
- For ventilated cages, pull all cages with litters (0-21 days old) off of ventilation
- 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 nesting material and/or mist cages daily
• Examine pups (0-21 days old) daily and observe for any signs of ringtail (dry, cracked skin with constrictions (see pictures below). If any of the tails appear to look like pictures B-D below, start treating daily with lanolin. The Scoring system can be used to report severity of disease to OCV and the research staff to determine if surgical intervention is necessary and access if treatment is efficacious.

If the research staff notes any affected pups (0-21 days old) they should flag the cage and start treatment with lanolin immediately and inform the vivarium staff and OCV (health database, email or phone call if Score 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**
Contact OCV: Mice or rats with moderate to severe rings may require surgical amputation of the distal tail. Seriously affected animals will have tight rings with significant swelling and redness of the tail distally. In severe cases, the distal tail will turn black from lack of blood flow. All cases with swelling, redness or blackening of the tails must be evaluated by the OCV Veterinary Staff.

References:


Taylor DK et al. 2006. Lanolin as a Treatment Option for Ri ngtail in Transgenic Rats. JAALAS 45(1), pp. 83-87

Office of the Campus Veterinarian Contact Information: 509-335-6246

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

Approved by WSU IACUC on: 8.28. 2015