

Standard Operating Procedure

Standards for cage changes in mouse housing

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1. Purpose

The SOP defines standards and criteria for changing bedding and primary enclosures for mouse husbandry.

2. Scope

The SOP applies to all personnel responsible for changing mouse cages at UCSD vivaria.

3. Responsibility

ACP personnel is responsible for ensuring that the minimum cage changing standards are maintained at all times.

4. Definitions

Cage changes refer to replacement of the cage bottom and bedding. Supplies of food and water need to be adequate at all time to ensure animal health, but are not directly impacted by the standards.

5. Procedures

5.1. Mouse cages must be changed when ANY of the following is observed:

- a. Wet bedding connects any two corners of the cage
- b. Dry bedding areas ("islands") are not large enough for all animals to sit or lie on
- c. Volume of feces exceeds volume of bedding

d. A weaned animal is found dead in the cage

5.2. These criteria constitute the minimum standards for individual cages that must be followed by default in all UCSD vivaria.

5.3. ACP may impose more frequent cage changing for veterinary reasons.

5.4. Investigators may request more frequent cage changing, which will be implemented in consultation with ACP personnel (and recharged as appropriate).

5.5. Investigators may ask ACP personnel to accommodate experimental objectives in the planning and execution of cage changes, as long as the minimum standards are met at all times.

6. Background

An IACUC subcommittee was convened at the end of 2013 to recommend new cage changing standards for mouse colonies. The subcommittee considered the regulatory and scientific environment, and had discussions with the major stakeholders (i.e., investigators, compliance personnel, and animal care providers), in developing the recommendations listed above. A brief overview of the considerations is provided to explain the reasoning behind the recommendations and to serve as a basis for future discussions and revisions.

Mice soil their cages with feces and urine, requiring regular replacement of bedding and cages to maintain and ensure animal health. Recommendations vary widely about how to best achieve this outcome. The GUIDE FOR THE CARE AND USE OF LABORATORY ANIMALS, Eighth Edition (2011) provides only general guidance, stating the following:

*“Soiled bedding should be removed and replaced with fresh materials as often as necessary to keep the animals clean and dry and to keep pollutants, such as ammonia, at a concentration below levels irritating to mucous membranes. The frequency of bedding change depends on multiple factors, such as species, number, and size of the animals in the primary enclosure; type and size of the enclosure; macro- and microenvironmental temperature, relative humidity, and direct ventilation of the enclosure; urinary and fecal output and the appearance and wetness of bedding; and experimental conditions, such as those of surgery or debilitation, that might limit an animal’s movement or access to clean bedding. **There is no absolute minimal frequency of bedding changes**; the choice is a matter of professional judgment and consultation between the investigator and animal care personnel. It typically varies from daily to weekly. In some instances frequent bedding changes are contraindicated; examples include portions of the pre- or postpartum period, research objectives that will*

be affected, and species in which scent marking is critical and successful reproduction is pheromone dependent.”

No scientific consensus exists on the most appropriate cage changing standards, with some investigators claiming superior mouse health and well-being with frequent changes, and others recommending infrequent changes to keep the cage environment as stable as possible. Furthermore, although it is clear that infrequent changes can affect the health and well-being of the animal handlers, no objective standards exist that could be readily applied at the individual cage level.

Beyond scientific considerations, further difficulties arise from different cage formats and caging systems that can affect the accumulation of moisture and ammonia. Furthermore, detailed quantitative measures for the degree of cage soiling are impractical from the compliance perspective, inviting disagreement and discontent.