| RUTGERS UNIVERSITY Office for Research **CMR STANDARD OPERATING PROCEDURE** | | |
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| **TITLE: Mouse Environmental Enrichment** | | |
| **SOP Category: Enrichment** | **CMR SOP #: 6.01** | **Page: 1 of 3** |
| **Effective Date: 01/20/2025** | **Approval:** Roseann Kehoe | |
| **Revisions: 5/9/2018, 5/1/2022, 9/3/2024** | | |

**SCOPE**:

This document describes the procedures to be followed when providing enrichment to mice. This SOP applies to all Animal Care Staff (ACS), ACS Supervisors (ACSS), Veterinary Staff (VS), and Research Staff members (RS) at the Rutgers University facilities.

**OBJECTIVE:**

The objective is to summarize mouse environmental enrichment. This SOP is concordant with the Rutgers Environmental Enrichment Program, which states that all laboratory animal species used at Rutgers **must** be provided with species-specific environmental enrichment unless scientifically justified.

**DEFINITIONS:**

**Natural Behavior:** Mice belong to the order *Rodentia* and family *Muridae*. Most of the mice used in research belong to the genus *Mus*. Mice are social animals that live in a hierarchical society. In general, the domestic mouse is not terribly aggressive and will attempt to evade rather than confront. However, within their communal groups they will aggressively defend their territories and will exhibit signaling postures to communicate intent, anxiety, dominance, and excitement. Pheromones serve as a principal mechanism for communication. Although mice are classified as nocturnal, in the laboratory environment substantial activity is also noted during daytime. Mice commonly demonstrate burrowing and nesting behavior and huddle together to sleep. These behaviors also serve to help the mouse maintain body temperature as they have a small body mass to surface area ratio. Laboratory mice are normally active and responsive to experimental intervention. They are prized for many qualities including their small size, short generation time, and ease of breeding within the research facility.

**Abnormal Behavior:**

Abnormal behaviors in mice include:

1. Stereotypical behavior (e.g., flipping, circling, bar biting, etc.)
2. Increased grooming or barbering
3. Unusually apprehensive or aggressive
4. Sudden running movement

When these behaviors are observed, VS will evaluate the need for additional environmental enrichment.

## PROCEDURES:

1. Social Grouping
    - Group housing will be practiced as the default for all laboratory mice
    - Single housing should be the exception and justified based on experimental requirements or veterinary-related concerns about animal well-being. Social grouping may be suspended upon recommendation of a CMR veterinarian or Principal Investigator for health or study-related purposes.
    - Adult male mice that have been used for breeding should not be housed with other males.
    - If single housing is necessary, it must be in the approved protocol as a husbandry exemption. In all cases, it should be limited to the minimum period necessary.
    - In the absence of other animals, a second type of enrichment **must** be offered (e.g., chew block and nesting material, igloo and nesting material, etc.).

2. Physical Enrichment
    - The following strategies are recommended, depending on behavior and study needs or limitations. Unless otherwise indicated in the protocol, all mice must have at minimum one nesting item per cage.
        i. Mice housed in solid bottom caging should have one or more of the following added to the cage to promote burrowing or nesting behaviors: paper rolls, paper towels, Nestlets®, nesting sheets, Enviro-Dri® or Enrich-o'Cobs® bedding. In sterile microisolation cages, any introduced burrowing or nesting materials must be autoclaved or sterilized in accordance with proper husbandry techniques.
        ii. Shelters: PVC or polycarbonate tubes, glass bottles, glass jars or plastic or paper shelters (e.g., BioServ® igloo, huts, Shepherd Shack®) may be placed in cages to allow animals to hide or escape from more aggressive cage mates or build a warm and secluded nest. Flat top shelters allow for increased floor space, offer a platform for smaller mice to reach food on cage wire grids and can provide a refuge against flooded cages. In sterile microisolation cages, any introduced shelters must be irradiated or sterilized in accordance with proper husbandry techniques.

3. Food Treats
    - Food treats may be provided as part of the enrichment program.
        i. Suitable food treats for mice include a variety of fruit, vegetables and seeds (e.g., sunflower, corn). Seeds will not be given more than

twice weekly to avoid dietary problems. In sterile microisolation cages, any introduced food treats must be irradiated or sterilized in accordance with proper husbandry techniques.

ii. Food treats may be mixed with bedding to encourage foraging behavior. Enrich-o'Cob®, bedding or Enrich-n'Nest®, paper rolls also encourage foraging for nesting material.

4. Gnawing Opportunities
    - Nylabones®, chew sticks/blocks, cardboard tubes, cornhusks and Critter Cubes® may be provided to promote gnawing behaviors. In sterile microisolation cages, any introduced chew treats must be irradiated or sterilized in accordance with proper husbandry techniques.

**Considerations:**

- Cost, availability of materials, safety issues for the animals and the staff, study constraints, and sanitation requirements must be evaluated for each idea.
- For novel devices or strategies, a group of animals may be selected for a pilot study to evaluate any behavioral changes, extra time needed in animal rooms, and additional steps necessary for sanitation of the devices.
- ACS assist in the environmental enrichment program by placing environmental enrichment devices in cages as directed by supervisor, investigators and veterinary staff. ACS are responsible for removing and replacing damaged or soiled devices, and sanitizing or disposing of devices as appropriate.

**Records:**

The Animal Care Staff will log provision of enrichment according to their facility specific documentation records.

**REFERENCES:**

National Research Council, Guide for the Care and Use of Laboratory Animals, ed 8 available at http://grants.nih.gov/grants/olaw/Guide-for-the-Care-and-Use-ofLaboratory-Animals.pdf

Suckow, Mark A., Peggy Danneman and Cory Brayton. *The Laboratory Mouse*. CRC Press, 2001.