

## Environmental Enrichment –Mice

**Recommended instructor to student ratio:** NA

### Category

3. Minor conscious intervention

### Objective

The intent of this Standard Operating Procedure is to describe appropriate environmental enrichment for laboratory mice housed in Charles Sturt University designated animal holding facilities. Environmental enrichment is an area that attracts significant research investment. Therefore, every effort should be made to access the most current information relating to environmental enrichment.

In addition, this SOP should be read in conjunction with relevant Standards and Guidelines e.g. *'GUIDELINE 22: April 2012 GUIDELINES FOR THE HOUSING OF MICE IN SCIENTIFIC INSTITUTIONS ARR'*.

### Alternatives to animal use

NA

### Equipment

Variation of equipment is integral to objective of this SOP

### Safety and Risk considerations

Some lines of mice are more neophobic. Neophobia can cause stress and anxiety in the short term. There is a slight risk of injury depending on the type of enrichment that is introduced.

### Drugs, chemicals or biological agents

NA

### Procedure

1. The purpose of environmental enrichment is to provide mice with opportunities to express basic behavioural needs, to promote species-typical, non-injurious, behaviour and to promote physical and mental health thus enhancing animal welfare. The environmental enrichment should be biologically relevant (i.e.: hiding, socialising, searching) so that it does not lose its enriching value over time. Mice should be able to perform each of the five categories of behaviour:
  - a. Social interaction
  - b. Chewing/gnawing
  - c. Locomotion (e.g. climbing, exploring, playing)
  - d. Nest building, nesting, resting, hiding
  - e. Manipulating, carrying and hoarding food and objects
2. Social Contact
  - a. Pair or group house mice.



- b. Mice may be singly housed in some cases:
  - i. Incompatibility.
  - ii. Medical or research design reasons.
  - iii. Specific protocol approved by ACEC.
  - iv. Where animals are house singly this should be for the shortest timeframe possible as dictated by experimental design.
3. Housing System:
  - a. Animals should be housed with the goal of maximising species-specific behaviours and minimising stress-induced behaviours.
  - b. House mice in solid-bottom cages with contact bedding, unless specifically described in a protocol and approved by the ACEC.
  - c. Housing system should ideally exceed the minimal space recommendations for a standard mouse cage (~70cm<sup>2</sup>):
    - i. Use Trio-breeding where possible: 2 females, 1 male, and up to two litters until weaning.
    - ii. After weaning house mice in peer groups: 10 mice if <10 g; 7 mice if 10–15 g; 5 mice if 15-25 g
4. Dietary Enrichment:
  - a. No dietary enrichment is routinely provided.
  - b. Provide mice with dietary supplementation (e.g. sunflower seeds) as allowed or experimental parameters, to be confirmed by the PI, for positive reinforcement. Extra feed should be rodent-feed approved and from a reliable feed merchant. Feeding on non-rodent designated feedstuffs (e.g. horse diets) is not approved.
  - c. Gnawing and chewing are essential requirements for dental health in rodents. If the diet does not allow for adequate exercise of these functions, artificial chewing structures (e.g. chew sticks) should be provided. These must be non-toxic and incapable of causing harm to the mice.
5. Objects:
  - a. Nesting material:
    - i. Provide nesting material (e.g., NESTLET®, corn husk, or other approved nesting material) in every cage. In many cases the nesting material will provide the opportunity for the mice to manipulate objects as they build nests.
    - ii. Transfer the nest to the clean cage with the animals during cage change, add additional nesting material and provide a new shelter if necessary.
  - b. Shelter:
    - i. Provide a cellulose-based (preferable) or cardboard or plastic shelter.
    - ii. Shelter should provide enough protected space for all cage occupants. The shelter should provide opportunities for climbing as well as hiding.
  - c. In some cases the opportunity to hoard or hide foodstuffs and other items may be feasible. The shelter should provide this opportunity but care must be taken to ensure hoarding does not compromise the health and/or wellbeing of the mice.
6. Exemption Exemption from this environmental enrichment program must be justified and approved by the ACEC, or prescribed for medical / research reasons.
7. Examples  
Standard mouse cage with nesting material, cellulose-based shelter and plastic shelter:



Mouse cage with cellulose-based shelter and extra nesting material:



Two (2) cellulose-based shelters and extra nesting material:





Cellulose-based shelter and nesting material (minimum cage requirements):



## **Impact on wellbeing of animals**

The aim of all environmental enrichment is to improve the welfare state of the animals and therefore animal wellbeing.

## **Animal Care**

No animal care beyond the normal regime is required

## **Pain Relief**

NA

## **Reuse and repeated use**

NA

## **Qualification, experience or training necessary to perform procedure**

An understanding of rodent behaviour and the principles of environmental enrichment is required.

## **References and relevant links**

*GUIDELINE 22: April 2012 GUIDELINES FOR THE HOUSING OF MICE IN SCIENTIFIC INSTITUTIONS ARR.P.*