



# Johns Hopkins University

## Animal Care and Use Committee

---

### Mouse Breeding Colony Management<sup>1</sup>

#### General Information:

- Optimal reproductive age span: 2-10 months<sup>2</sup>; some males can be productive longer
- Estrus cycle: 4-5 days<sup>2</sup>
- Postpartum estrus: A period within 24 hours after parturition when females are fertile and receptive to mating. After this period, they are not fertile until the pups reach weaning age.
- Gestation period: 19-21 days<sup>2</sup>
- Weaning age: 21-23 days old
- Delayed weaning: >23 days old
- Dam: female breeder
- Sire: male breeder
- Adult: defined as 6 weeks of age or older, based on the average age of sexual maturity

#### Breeding Schemes: Only one male per cage allowed in all schemes

- **Monogamous**
  - **Pair-breeding:** One adult male and one adult female
  - **Pros/Cons:**
    - Preferred method to minimize overcrowding
    - Allows for identification of the dam and sire of the litter
    - Utilizes post-partum estrus
- **Polygamous**
  - **Trio:** One adult male and two adult females
  - **Harem:** One adult male and three or four adult females
  - **Pros/Cons:**
    - Produces the maximum number of offspring per male mouse
    - Females may share task of rearing offspring
    - Utilizes post-partum estrus
    - More complicated record keeping
    - May not know which pups belong to which female
    - Can be more time consuming and difficult to manage due to record keeping and the need to separate pregnant dams or dams with litters to avoid overcrowding

## Policies for Colony Maintenance:

- **Contact information:** All cages must have a cage card with the Principal Investigator's name, current protocol number, and a contact person's name & phone number that is responsible for managing the breeding. Investigators are responsible for updating this information. The facility animal care staff use this information to contact the laboratory if a cage is overcrowded or needs attention.
- **Maximum mice/cage:** The maximum number of adult mice per cage is 5 (five). This is based on the average weight of an adult mouse and the size of the caging used in our animal facilities. Recommended spaces for commonly used group-housed animals are indicated in the *Guide for the Care and Use of Laboratory Animals*<sup>3</sup>. The maximum number of weanlings in a 75-square-inch cage is 9 (nine).
- **Birth/wean dates:** Investigators are responsible for recording the birth and/or weaning dates on their breeding cages. These dates are critical for breeding programs with tight timelines for the weaning of pups and the birth of subsequent litters. The typical weaning age is 21-23 days. In some cases, genetically modified mice may need to remain with their mothers for a longer period due to inability to use the lixit or to consume the chow; thus, separation may need to be delayed up to 28 days of age. When breeding mice with these constraints on weaning, it is recommended that labs do not use post-partum estrus. That is, the male must be removed from the cage during the female's pregnancy.
- **Post-partum estrus pregnancy:** If a dam has a litter and is pregnant due to breeding during post-partum estrus, then toward the end of gestation, daily monitoring by the lab is required to watch for the birth of the litter and welfare concerns, such as trampling of neonates and fighting. When post-partum estrus is used, the current litter of the pregnant dam must be weaned at 21-23 days of age to avoid overcrowding and high levels of filth in the cage.
- **Weanling housing:** Mice are not considered adults at weaning, as they are not yet six weeks old. The maximum number of weanlings per cage is 9 (nine). If there are more than five young mice in a cage, the date of birth must be written clearly on the cage card, to indicate they are not adults. If the animals' age is unclear, they must be housed at a maximum of 5 (five) per cage. In some cases, it is beneficial to provide weanlings with gel packs to ensure hydration. These are available in the animal facilities.
- **Trio breeding:** If both females have litters, one dam with her litter must be separated before the older litter is moving about the cage, which begins at about 10 days of age. A cage will be marked as overcrowded when the oldest litter begins to move about the cage. The male may be kept with one of the females and her pups. Litters must be weaned when the pups are between 21-23 days of age. Note, one dam with her pups must be moved to another cage if any animal welfare concerns are observed, such as trampling, fighting, very high levels of filth, or if overcrowding is inevitable. Also, the mice must have enough space to express normal postural adjustments<sup>3</sup>. Alternatively, all visibly pregnant females are moved to their own cage to prevent housing multiple pre-weanling litters in one cage.
- **Harem breeding:** Pregnant dams will be separated until a trio breeding setup remains, then "Trio breeding" will be followed. Alternatively, all visibly pregnant females are moved to their own cage to prevent housing multiple pre-weanling litters in one cage.

For information regarding our overcrowded cage policy, go to:  
<http://web.jhu.edu/animalcare/policies/overcrowded-cages.html>

### Mouse Identification Methods:

Method	Pros	Cons
<b>Ear punching</b>	Simple, inexpensive, and easy to read; tissue may be used for genotyping	Subject to tearing; limited numbering system, up to 399
<b>Ear tagging</b>	Relatively inexpensive; customized numbering available	Can become detached; potential for infections; can be hard to read
<b>Tattooing</b>	Permanent; can be done on neonates and adults; inexpensive equipment is available	Mechanical equipment is expensive; aged animals may require re-tattooing
<b>Microchip</b>	Permanent; unlimited numbers	Expensive; may require anesthesia; mice must be sufficient size to tolerate implant
<b>Toe clipping</b>	Permanent; inexpensive; tissue may be used for genotyping	Requires scientific justification in the animal protocol (see guideline on the ACUC website)

### Resources:

For training in mouse breeding colony management or identification methods, contact the ACUC Office by e-mail to [acuc@jhmi.edu](mailto:acuc@jhmi.edu).

<sup>1</sup> Approval by the IACUC on: July 21, 2011; reviewed 1/31/18, 8/18/2022

<sup>2</sup> American Association for Laboratory Animal Science 2011 Reference Directory

<sup>3</sup> *Guide for the Care and Use of Laboratory Animals*, National Research Council, National Academy Press, 2011, 8<sup>th</sup> ed., p75.