Johns Hopkins University
Animal Care and Use Committee

Guidelines for Management of Mouse Breeding Colonies[1]

General Information

- Optimal reproductive age span: 2 – 10 months[2]; some males can be productive longer
- Estrus cycle: 4-5 days[2]
- Postpartum estrus: A period within 24 hours after parturition when females are fertile and can conceive. After this period, they are not fertile until the pups' weaning age (usually ~21 days)
- Gestation period: 19-21 days[2]
- Weaning age: ≥ 19 days old
- Dam: female breeder
- Sire: male breeder
- Adult: for this policy is defined as 6 weeks of age or older, based on the average age of sexual maturity

Breeding Schemes: all schemes require only <u>one male</u> per cage. More than one male would be an exception to this policy and require a scientific justification on the Mouse Breeding Colony form.

- **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:** One adult male and multiple females
  - **Trio:** One adult male and two adult females
  - **Harem**: One adult male and more than two 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, complications of record keeping and the need to separate multiple pregnant dams or dams with their litters to prevent overcrowding

Policies for Colony Maintenance

- **Contact information:** All cages must have a cage card with the Principal Investigator's name, current protocol number, and the contact person's name & phone number. Investigators are responsible for updating this information. The facility animal care staff use this information to contact the laboratory if a cage needs attention or is overcrowded.

- **Maximum mice/cage:** The maximum number of adult mice per cage is 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*[3]. Typically the maximum number of weanlings in a 75-square-inch cage is 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 days. However, in some cases, genetically modified mice may need to remain with their mothers for a longer period of time 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. In breeding mice with these constraints on weaning, it is recommended that you do not use post-partum estrus. That is, the male must be removed from the cage during the female's pregnancy so she does not become pregnant immediately after giving birth.
- **Post-partum estrus pregnancy:** If the 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. Where this breeding scheme is used, the current litter of the pregnant dam must be weaned concurrent with the delivery of the next litter to avoid overcrowding and high levels of filth in the cage.
- **Weanling housing:** Mice are not considered adults at weaning. For the purpose of the allowable number of mice per cage, mice are considered adults at 6 weeks of age and, therefore, housed with a maximum of five per cage. Prior to 6 weeks of age they are not yet adults and when weaned prior to genotyping they may be separated by sex and housed greater than 5 per cage with a maximum of 9. In this case the date of birth must be written clearly on the cage card, to document that they are not yet adults. If the age is unclear, they must be housed at a maximum of 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 or harem breeding:** If using trio or harem breeding schemes, and more than one female has a litter, the cage must be monitored for welfare concerns such as: trampling, fighting, very high levels of filth, the ability of the animals to make normal postural adjustments[3], or overcrowding as the pups grow. To avoid these conditions one dam with her litter should be separated by the time the oldest litter is about 10 days old. The male may be kept with one of the females. If the birth date or wean date are not on the cage card the cage will be marked as overcrowded when the oldest litter begins to move about the 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
Ear punching	Simple, inexpensive, and easy to read; tissue may be used for genotyping	Subject to tearing; limited numbering
Ear tagging	Inexpensive; customized numbering available	Can become detached; potential for infection; cam be hard to read
Tattooing	Permanent; can be done on neonates in addition to adults; inexpensive equipment is available	Some fading can occur; elaborate tattooing equipment can be expensive
Microchip	Permanent; unlimited numbers	Expensive; may require anesthesia; mice must be of sufficient size to

		tolerate the implant
Toe clipping	Inexpensive; permanent; tissue may be used for genotyping	Requires scientific justification in the protocol (see the policy at the ACUC website www.jhu.edu/animalcare

Resources:

For training in mouse breeding colony management or identification methods contact the ACUC Office at phone number 443-287-3743 or by e-mail to acuc@jhmi.edu.

[1] Approval by the IACUC on: July 21, 2011, revised March 20, 2014

[2]American Association for Laboratory Animal Science 2011 Reference Directory

[3]Guide for the Care and Use of Laboratory Animals, NCR. National Academy Press, 2011. P57