

Name: Mouse Breeding
Number: FSU-SOP-310.01
Category: Veterinary Care

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1.0 Purpose

This SOP describes the procedure for managing the breeding of mice in the vivarium.

2.0 Policy

- 2.1 Under routine circumstances, animal protocols only support housing of animals separated by gender, to prevent breeding and the growth of the colony.
- 2.2 However, breeding new animals is justified in a project if:
 - 2.2.1 the generation of new animals helps to reduce the overall cost of acquiring and housing animals for the project;
 - 2.2.2 creating the conditions by which animals engage in sexual behavior, resulting in females going through pregnancy, postpartum lactation and maternal behavior are actual goals of the project; or
 - 2.2.3 animals will be studied during developmental periods that may begin during gestation and extend into adulthood.
- 2.3 Such justifications must be presented and approved in an IACUC proposal for mouse breeding in the FSU vivarium to be acceptable.

3.0 Materials

- 3.1 Mouse houses or other forms of environmental enrichment

4.0 Procedure

- 4.1 Vital statistics about mouse reproductive physiology and behavior
 - 4.1.1 Breeding age for mice begins at about 6 weeks of age, and lasts until they are 7-12 months old.
 - 4.1.2 The estrus cycle of female mice is 4-5 days, with spontaneous ovulation by this cycle that shows no seasonal variation.
 - 4.1.2.1 A healthy male will reliably copulate with a healthy female entering the ovulatory phase of estrus, when paired with her during the early hours of the dark phase of the light-dark cycle.
 - 4.1.2.2 Copulation can usually be confirmed by checking for the presence of a semen plug in the vagina, or expelled from the vagina, at the beginning of the next light phase of the light-dark cycle, although a vaginal plug does not guarantee that conception and pregnancy have occurred.
 - 4.1.2.3 Pregnant females will be about 2 g heavier by E8 (embryonic/gestational day 8) if body weight is recorded.
 - 4.1.2.4 Pregnant females will be visibly or palpably gravid by E12.
 - 4.1.3 The gestation period is 19-21 days.

- 4.1.4 Females enter estrus again within 24 hr postpartum.
- 4.1.5 Pups are typically weaned at 21-28 days of age (postnatal days 21-28, or P21-28), meaning both separation from the dam and transition to exclusively solid food.
- 4.2 Breeding schemes
 - 4.2.1 Segregated pairing
 - 4.2.1.1 Place 1 female mouse in the cage of an isolated male.
 - 4.2.1.2 Check for vaginal plugs each day for 5 days.
 - 4.2.1.3 When signs of pregnancy appear, segregate female to new cage with mouse house or other environmental enrichment, in addition to nesting material routinely provided with corn cob bedding.
 - 4.2.1.4 Denote E1 (1st day of gestation or embryonic period) as the day after finding the vaginal plug, for purposes of timing embryonic/fetal age of conceptuses at the time of an experimental manipulation during gestation.
 - 4.2.2 Monogamous pairing
 - 4.2.2.1 Place 1 female mouse in the cage of an isolated male.
 - 4.2.2.2 Check for vaginal plugs each day for 5 days.
 - 4.2.2.3 When signs of pregnancy appear, leave the female with the male for the duration of pregnancy and lactation, increasing the likelihood that she will become pregnant again postpartum.
 - 4.2.2.4 This increases the efficiency and pace of producing new litters of pups, even though it requires greater diligence to wean pups of the older litter before the next litter is born.
 - 4.2.2.5 Denote E1 (1st day of gestation or embryonic period) as the day after finding the vaginal plug, for purposes of timing embryonic/fetal age of conceptuses at the time of an experimental manipulation during gestation.
 - 4.2.3 Caretakers should identify breeders (and the resulting litters) by ear punching or other technique (see SOP 130 and below).
- 4.3 Birth
 - 4.3.1 Caretakers conducting daily observations should record, by the day, when new litters 1st appear, on the female's cage card, the rodent room daily log, and the disposition log.
 - 4.3.1.1 A more formal breeding log should be created and maintained should the breeding program have longer-term objectives than 1 or 2 cycles of breeding, or where it is critical to maintain a strict record of parental heritage and breeding experience.
 - 4.3.2 A yellow cage card should be placed in the card holder with the cage card, to denote for caretakers the presence of a lactating dam with litter.
 - 4.3.2.1 This serves as a reminder to caretakers that routine care of this cage should be reduced only to checks for health and

adequate supplies of food and water, refraining from bedding changes until after weaning.

4.4 Weaning

- 4.4.1 As noted in 4.1.5, weaning denotes separation of pups from the dam and transition to consuming only solid food
- 4.4.2 In most cases, weaning is accomplished by moving pups to segregated groups by gender, with a maximum of 5 pups of 1 gender per cage.
- 4.4.3 Small litters of mixed gender can be weaned together to one cage, but must be segregated before reaching 4 weeks of age, to prevent interbreeding.
- 4.4.4 Males and females of different, age-matched litters can be collected together at weaning in gender-specific cages, up to 5 animals per cage, but only at weaning, as such grouping occurring much later is likely to lead to fighting amongst pups derived from the different litters.
- 4.4.5 Cage cards of weaned pups should identify their parentage.
- 4.4.6 Best practice is to regularly place food pellets freely on the cage bedding until pups show evidence of facility in accessing food from the food hopper in the cage.

5.0 References

- 5.1 Mouse breeding colony management (McGill University)
[http://www.mcgill.ca/research/files/research/608 -
 _mouse_breeding_colony_management_-_april_2016.pdf](http://www.mcgill.ca/research/files/research/608_-_mouse_breeding_colony_management_-_april_2016.pdf)

SOP REVISION HISTORY

VERSION #	APPROVED	DETAILS
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