Institutional Animal Care & Use Program - UTEP	
Title: Rodent Breeding and Weaning	
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A. RESPONSIBILITIES

It is the responsibility of all personnel using animals at The University of Texas at El Paso (UTEP) to abide by this policy. It is the responsibility of the Institutional Animal Care and Use Committee (IACUC) to review for approval, properly justified requests for an exception to this policy.

B. BACKGROUND

The *Guide for the Care and Use of Laboratory Animals* (the *Guide*, NRC 2011) lists the minimum space recommendations for laboratory animals. The recommended cage size for female mice with litter is 51 in^2 and female rats with litter is 124 in^2. Environmental changes can impact fecundity, it is important to maintain an appropriate light cycle (12:12) and reduce noise/vibration exposure. Breeding records should be maintained when appropriate and standard nomenclature is used when applicable.

C. POLICY

Compliance with these guidelines is required unless a written exception has been approved by UTEP's IACUC on the grounds of accomplishing scientific objectives. Divergences from this policy should be discussed with the veterinary staff. Mice are routinely housed in three different size microisolator cages (ventilated or static).

- Small Mouse Static: 67 in^2 floor space
- Small Mouse Ventilated: 77 in^2 floor space

- Large Mouse Static: 144 in^2 floor space

Rats are routinely housed in large static or ventilated cages (140-143 in^2 floor space).

D. BREEDING

1) Age of Breeders

Rodents can breed as young as 6 weeks of age, however LARC recommends setting up breeders no less than 8 weeks old. To maintain breeding efficiency, and help prevent loss of irreplaceable lines, it is best practice to replace breeding rodents at 9-12 months of age. Additionally, breeders may need to be retired when they have not produced a litter in 6 weeks or the litter size has dropped below average for that strain. The breeding lifespan varies by strain and should be evaluated using your breeding records to determine the best time to retire breeders.

2) Mouse Breeding Schemes

a) Breeding pair (1 male:1 female): The male, female and the resulting litter of pups may be kept together in a small mouse cage (static or ventilated) continuously until the pups are weaned.

b) Breeding trio (1 male: 2 females): Mice *should be* kept in a large mouse static microisolator.

If the trio is in a small mouse cage (static or ventilated), one of the following options must occur:

- The trio is placed into a large mouse static cage when one female is observed to be pregnant (at day 18 if conception date is known), which helps to promote compliance with housing standards throughout the period of weaning.
- One of the two females is removed to a separate small mouse cage (static or ventilated) when observed to be pregnant (at day 18 if conception date is known), which helps to promote compliance with housing standards throughout the period of weaning and assists with pedigree documentation.

3) Other breeding schemes:

- Harem ratios of 1:3 are not recommended unless justified in the protocol; however, when implemented the mice must be in a large mouse static cage. Pregnant females must be moved to another cage to maintain a ratio of 1:1 or 1:2, as described above.
- No breeding ratios other than 1 male to 1/2/3 females are allowed.
- No more than two visibly pregnant females are allowed to be housed together at one time.
- Pregnant females cannot be housed with non-pregnant/non-breeding females.
- Never co-house multiple breeder males in the same cage this will result in fighting.

4) Rat Breeding Schemes

Breeding pair (1 male:1 female): The male must be removed, upon detection of pregnancy in female. Female and the resulting litter of pups may be kept together in a cage continuously until the pups are weaned. Breeding trios and other schemes are not permitted with the current size of rat caging at UTEP.

E. WEANING RODENT PUPS

1) Weaning of pups is recommended by 21 days of age. Most rodents can be satisfactorily weaned at 17-18 days of age.
2) In cages where the male and female(s) are kept together continuously, all mouse pups must be weaned by 21 days of age or immediately upon observation of the second litter in the cage. This prevents the older pups from injuring the neonates or interfering with the dam's care of the neonates.
3) When pups are weaned or breeders are separated, a new cage card must be created. Cage cards cannot be re-used as the original information on the card will be inaccurate for the new cage/mice. Cage cards should include genotype information, when applicable, and consistent unambiguous abbreviations may be used when full genotype nomenclature is too lengthy.
4) Colony management is the responsibility of the research staff, which includes weaning. LARC will wean the animals after 22 days old. This does incur a fee.

F. DELAYED WEANING:

1) There may be reasons for the delayed weaning of rodents past 21 days, typically due to smaller sized rodents. Weaning can be extended up to 28 days after birth. If an individual litter needs to have delayed weaning, this needs to be approved by LARC Veterinary staff. If there are genetic lines that consistently produce small pups necessitating delayed weaning, this MUST be outlined in the animal use protocol.
2) If delayed weaning is planned, animals must only be pair bred, and the male must be removed prior to parturition. This prevents the dam from becoming pregnant while nursing the existing litter that needs to have a delayed weaning. This prevents overcrowding and unnecessary loss of pups.

G. CROSS-FOSTERING:

If the dam fails to provide maternal care, is unable to produce adequate milk supply, must be humanely euthanized due to illness, or dies, then pups younger than 17 days of age must be cross-fostered or humanely euthanized. Exceptions must be approved by a LARC Veterinarian.

When selecting a dam to foster an orphaned litter:

- Her litter should be no more than 48 hours older than the orphaned litter.
- Select dams that have successfully weaned 2-3 litters previously or are of a strain/stock that are known to exhibit good maternal care include BALB/c, FVB, or Swiss Webster strains.
- Selection of a dam with a litter of a different coat color will aid in differentiation of the litters.

Steps for cross-fostering:

- The number of pups in the litter should not change.
    - Milk production will suffer if the total pup number varies by more than two from the foster mother's litter size.

    - Remove as many of the foster dam's pups that you wish to replace with the orphaned pups. Complete removal of the foster mother's litter is not recommended as this can cause rejection of the orphaned litter.
    - Humanely euthanize any remaining pups from the orphaned litter.
- Introduction of the orphaned litter:
    - Remove any adult males housed with the foster dam.
    - Briefly remove the foster mom from her home cage and place in a new cage.
    - Replace the foster mother's pups with orphaned pups in the nest. Be sure to gently rub the orphaned pups with dirty bedding and nesting material to obtain the scent of the dam and litter. Return the foster dam to the cage with the new litter.
    - Leave the foster dam and litter in a secluded, quiet place and monitor periodically over the next 2-3 hours. Avoid opening the cage as much as possible.
    - If the foster dam removes the pups from the nest, drags them around the cage, or cannibalizes them, remove the remaining pups immediately and attempt to foster with a new female or humanely euthanize them.
    - A successful foster should occur within 12 hours, otherwise, a new dam may be attempted. Be sure to follow all of the same steps.

H. RECORDKEEPING

Accurate breeding records should be maintained when managing a rodent breeding colony. These records will help to ensure the maintenance of rodent stocks/strains and provide further information to investigate breeding problems. Records should include the following information:

- Strain
- Generation number

- Animal identification
- Genotype
- Pedigree information - Parents, number of litters/birth date/number of pups born
- Weaning information (number/gender, genotype)

I. GENETIC CONSIDERATIONS

Preventing genetic drift and sub-strain:

When breeding rodents, it is important to reintroduce rodents from the original source or background strain after 10 generations to prevent genetic drift and unwanted phenotypes. If a rodent breeding colony goes beyond 20 generations without reintroducing original animals, a sub-strain has been created. It should be noted that the generation gap is cumulative, if the vendor breeds for 10 generations and your laboratory breeds for 10 generations there is now a total of 20 generations between your animals and the original founders.

Review History	
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