



INDIANA UNIVERSITY
Office of Research Compliance (ORC)
Institutional Animal Care and Use Committee (IACUC)

Rat Breeding and Housing Density

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Office(s)

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Scope

This policy applies to all personnel involved in activities involving the care and/or use of live vertebrate animals in IU SOM facilities regardless of the funding source.

Reason for Policy

The purpose of this policy is to address the health and well-being of rats by ensuring safe population densities. Limiting breeding cage capacity to a single generation serves to reduce the incidence of morbidity and mortality due to trampling by older animals in the cage. Overcrowding can be a significant animal welfare issue and is in direct violation of federal and University policies on the humane care of animals as well as *The Guide for the Care and Use of Laboratory Animals*.

Policy

The research staff has primary responsibility for checking for pregnancy and birth and for recording these events on the cage card(s).

After pups are born, the cage is left undisturbed for at least three (3) days except for replenishing of food and water as needed. In case the bedding gets very dirty or wet and the cage must be changed sooner, the following procedure will be followed. The female is transferred first, and then the litter plus a small amount of the dirty bedding (so the smell in the new cage will be familiar) is scooped up altogether with a gloved hand and transferred to the new cage. The same procedure is followed until the pups start moving around the entire cage.

Multiple different breeding schemes are acceptable and should be included in the IACUC protocol. In any case, the research staff is responsible for carefully monitoring pregnancies.

Monogamous pairs

Postpartum estrus occurs within 24 hours of parturition; thus if a male is left in the cage, the female is likely to become pregnant again while lactating and nursing the new litter.

1. Monogamous continuous

Male and female left in cage with pups: pups must be weaned on a timely basis (19 to 21 days) to prevent overcrowding, which would occur with 2 litters of different ages in the cage with the parents.

- A preferred method to prevent overcrowding
- Offers an extended nursing time for inbred strains known to be small and slow growing
- Maximizes productivity of females by utilizing post-partum estrus; allows for the identification of the dam for the litter

2. Monogamous non-continuous: Male is removed AFTER the litter is born.

One male and one female are housed together for mating. Nesting material is provided in the cage. The rats are not separated when the female becomes pregnant or delivers the pups. To provide more space for the pups, the male is removed at first cage change after parturition. This model takes advantage of postpartum estrus and allows the female to become pregnant and nurse at the same time. Litters are born approximately 21 days apart. The 3-week old litter must be weaned prior to the birth of the new litter.

3. Monogamous non-continuous: Male is removed BEFORE the litter is born

One male and one female are housed together for mating. Nesting material is provided in the cage. When the female is noticeably pregnant the male is removed from the cage.

- A preferred method to prevent overcrowding
- Offers an extended nursing time for strains known to be small and slow-growing
- Maximizes energy available for support of lactation

Trio mating

This method houses two (2) females in a cage with one male.

During routine health/breeding checks, each noticeably pregnant female is removed and placed in her own cage. When the pregnant female is separated from the cage, she is given nesting material in her delivery cage to make a nest for her pups. Female delivers her pups and nurses them for 21 days. Only one nursing female and litter is allowed per cage. After the pups are weaned, the female may be returned to a trio breeding cage.

WEANING PUPS

Weaning age for rat pups is routinely 21 days of age. In the case of some inbred, genetically modified or mutant strains, it may be advantageous to allow the pups to remain with the female for 28 days. This must be approved in the protocol, or on a case-by-case basis by the facility veterinarian.

Allowing a 3-week old litter to stay in the cage with a lactating female that also has a newborn litter is **NOT** permitted.

Monogamous pairs - Assuming the lactating mother is pregnant, pups are weaned at 20-21 days of age, just before the new litter is born. This will prevent trampling of newborn pups by the weanling pups, and prevent the cage from being overcrowded.

Trio mated females - If a singly housed lactating female is alone in a cage with her litter, rat pups are routinely weaned at 21 days of age unless an exception has been approved by the IACUC or the facility veterinarian (based on medical necessity).

Separation of sexes at weaning - Male and female pups are separated at the time of weaning, rats of each sex being placed in a separate cage. It is recommended that sexing of the pups be verified one week later.

DEFINING RESPONSIBILITY FOR SEPARATING AND WEANING RATS

The research staff is responsible for cage card documentation and for separating and weaning according to the above guidelines unless previous arrangements have been made with LARC.

Non-breeding experimental rats are separated as needed by the research staff, unless technical support has been arranged with LARC in advance.

LARC ACTIONS WHEN PI-MANAGED CAGES HAVE BECOME OVERCROWDED (O/C)

The LARC Staff checks for O/C and pregnancy when changing cages. Any cages that are overcrowded according to the standards defined above are marked with a Sick/Dead/Other or Please Wean card, dated and initialed.

When overcrowding is noted, the Research Staff is contacted via email and is given 48 hours to correct the problem, depending on the severity of the overcrowding

* NOTE: WEEKENDS AND HOLIDAYS COUNT AS DAYS AND ARE **NOT** EXEMPT.

If overcrowding is not addressed within the allotted time, LARC staff separates the rats and charges the PI.

When two litters, one newborn and one previous litter, are in one cage separation is performed as soon as possible. In such a case, the LARC Staff separates the older pups into a separate cage and provides food on the cage floor. Female and new pups are left in the breeding cage.

*Any time a cage is significantly overcrowded and the welfare of the animals is at stake (Emergency O/C), the animals are promptly separated into acceptable group sizes and Research Staff is notified via email. Please see the LARC on Overcrowded Cages for more details.

HOW MANY RATS ARE ALLOWED PER CAGE

Rats are social animals and because male rats rarely fight, with the notable exception of retired breeders, every effort must be made to group-house rats whenever it does not interfere with the experimental design. Post-operative rats may or may not be group-housed, again depending on their postoperative needs and the experimental design.

Note that the following table is based on the recommendations set forth in the 7th edition of the Guide for the Care and Use of Laboratory Animals, as the benefits gained from social housing of the larger animals are felt to outweigh the benefits gained from additional space. Cages will be spot changed as necessary to maintain sanitation standards.

Exemptions can be made to these guidelines in which the animals are heavier than allowed upon approval of the IACUC as well as upon consultation with the facility veterinarian.

Guidance for Housing Rats

TABLE 2.1 Recommended Minimum Space for Commonly Used Laboratory Rodents Housed in Groups

Animals	Weight, g	Floor Area/Animal in. ²	# animals/cage			
			LARC caging and sizes			
			Steel			Plastic
			62 in ²	91 in ²	143 in ²	190 in ²
Rats in groups	<100	17	3	5	6	7
	Up to 200	23	2	3	6	5
	Up to 300	29	2	3	4	4
	Up to 400	40	1	2	3	3
	Up to 500	60	1	1	2	2
	>500	≥70	1	1	2	2
Female + litter		124			2 + litter	2 + litter

Sanctions

Personnel that are found to be in violation of this policy may be subject to sanctions relating to their participation in activities involving the use of live vertebrate animals.

Additional Contacts

<i>Subject</i>	<i>Contact</i>	<i>Phone</i>	<i>Email</i>
Policy Implementation	IACUC Administrator	317-278-1826	somiacuc@iupui.edu
Policy Contents	LARC	317-274-8649	larc@iupui.edu

Related Information

PHS Policy on Humane Care and Use of Laboratory Animals
<http://grants.nih.gov/grants/olaw/references/phspol.htm>

The Guide for the Care and Use of Laboratory Animals, 7th Edition
http://www.nap.edu/openbook.php?record_id=5140

The Guide for the Care and Use of Laboratory Animals, 8th Edition
http://www.nap.edu/catalog.php?record_id=12910

USDA Policy #3: Veterinary Care
http://www.aphis.usda.gov/animal_welfare/policy.php?policy=3

References

<http://www.bu.edu/orcccommittees/iacuc/policies-and-guidelines/rodent-breeding-colony-management-rats/>

The Guide for the Care and Use of Laboratory Animals. 1996. NRC ILAR. P.27. Table 2.1. Recommended Space for Commonly Used Group-Housed Laboratory Rodents.

LARC Standard Operating Procedures (SOPs).

UMDNJ New Jersey Medical School Comparative Medicine Resources Rodent Breeding Policy and Standard Operating Procedures (SOPs).

iacuc.ufl.edu/.../Overcrowded%20Rodent%20Cages%20Web.pdf