Johns Hopkins University
Animal Care and Use Committee

Rat Housing Density Guidelines[1]

Purpose: To establish guidelines for appropriate rat housing density to promote animal health, welfare, and reliable research outcomes while adhering to current performance standards and recommendations.

Responsible Personnel:

- Animal Care and Use Committee (ACUC), ACUC office, and veterinarians – review and implement the guidelines
- Researchers - maintain appropriate housing densities according to the guidelines as a part of routine colony management
- Research Animal Resources (RAR) and Oncology Animal Research Services care staff – report and follow up on overcrowded cages

Regulatory Guidelines:

The Guide for the Care and Use of Laboratory Animals (8th ed., 2011) indicates the following:

- At a minimum, rats must have enough space to express their normal species-specific behaviors, natural postures, and make postural adjustments without touching the enclosure walls or cage top, and have ample access to food and water. Social animals should be housed in stable pairs or groups of compatible individuals unless they must be housed alone for experimental reasons or because of social incompatibility. Breeding animals will also require more space, as neonatal animals will be raised together with their mother or as a breeding group until they are weaned.
- The space recommendations presented here are based on the *Guide*[1], professional judgment, and experience. They should be considered the minimum for rats housed under conditions commonly found in laboratory animal housing facilities. Exceptions to the amount and arrangement of space recommended in the following tables should be reviewed and approved by the IACUC. Exceptions should be based on performance indices (e.g., health, reproduction, growth, behavior, activity, and use of space) and special needs determined by the characteristics of the rat strain or species (e.g., obese, hyperactive, or arboreal animals) and experimental use (e.g., rats in long-term studies may require greater and more complex space).
- Minimum space requirements (NOTE: Larger animals may require more space to meet the performance standards.)

Animals	Individual Animal Weight, g	Floor Area/Animal, in.^{2} (cm2)	Cage Height (cage floor to top), in. (cm)
Singly housed or group housed rats	<100	17 (109.6)	7 (17.8)
	Up to 200	23 (148.35)	7 (17.8)
	Up to 300	29 (187.05)	7 (17.8)
	Up to 400	40 (258.0)	7 (17.8)
	Up to 500	60 (387.0)	7 (17.8)
	>500	≥70 (≥451.5)	7 (17.8)
Female + litter		124 (800)	7 (17.8)

JHU Guidelines:
Based on the *Guide* space requirements mentioned above, rat cages at JHU animal facilities can house 1-2 animals over 500 g per cage. JHU recognizes that rats are highly social animals. A study performed at JHU showed that microenvironmental parameters and clinical presentation of pair-housed rats weighing over 500g were not significantly different than those in cages containing individually housed rats. Based on the performance indices and data from this study, JHU will pair-house rats over 500g. However, the ACUC, veterinarians, and animal care staff maintain the right to make adjustments to housing density, including possibly singly-housing animals.

Considerations:

- **Group housing**: Group housed rats may require more than the applicable floor space per animal when detrimental effects are noted that may be related to housing density. Such effects can include inability for postural adjustments, clinical manifestation of respiratory distress, and other animal welfare concerns.
- **Single housing:** Animals can be singly housed based on breeding status, attrition, experimental design, or veterinary judgment.
- **Breeding cages**: sufficient space should be allocated for females with litters to allow for the pups to develop to weaning without detrimental effects occurring in the dam or the litter.[1] Growth characteristics of strain/stock, sex, life stage of rats should be considered when establishing rat housing densities. For example, juvenile rats are highly active and show increased play behavior as well as rapid weight gain, so it may be preferable to initially provide greater space in anticipation of these animals' future size.[1]
- **Exceptions**: Any exemptions to this guideline must be approved by the JHU ACUC in consultation with RAR veterinarians prior to implementation.

Related documents:

1. RAR Rat Cage Density SOP
2. SOP for Identifying Singly Housed Rodents

Reference:

1. Institute for Laboratory Animal Research. 2011. Guide for the Care and Use of Laboratory Animals, 8th ed. Washington (DC): National Academies Press.

[1] Approved by the JHU Animal Care and Use Committee on: 10/21/2021