

Guidelines for the Social Housing and Environmental Enrichment of Laboratory Rodents and Rabbits

The University of Texas at Austin
Institutional Animal Care and Use Committee

These guidelines have been written to assist faculty, staff, and students in performing vertebrate animal procedures in a humane manner and complying with pertinent regulatory requirements. Under some circumstances deviations from these procedures may be indicated but such variances must be approved in advance by the IACUC.

This document provides information regarding the social housing and environmental enrichment of laboratory rodents and rabbits used for research, teaching, or other purposes at The University of Texas at Austin. This guideline is applicable to all locations where laboratory rodents or rabbits are maintained as part of University research and/or teaching projects. It is organized into five sections:

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Section A – Background

Humane considerations and current policies require that research animals, whenever possible, must have the opportunity to interact with conspecifics and to benefit from environmental enrichment (EE). According to the *Guide for the Care and Use of Laboratory Animals* (National Research Council, 2011):

The primary aim of EE is to enhance animal well-being by providing animals with sensory and motor stimulation through structures and resources that facilitate the expression of species-typical behaviors and promote psychological well-being through physical exercise, manipulative activities, and cognitive challenges according to species-specific characteristics (pp. 52-53).

Housing systems for laboratory animals have often been designed on the basis of economic and ergonomic aspects, with little or no consideration for the behavioral aspects of animal welfare. Laboratory housing conditions can deprive animals the possibility of performing a full repertoire of normal behavior. As a response to this lack of stimulation, animals may show abnormal behaviors,

such as stereotypies or passiveness (Smith & Taylor, 1995). Non-enriched housing for rodents (e.g., a shoe box-type cage using only wood chips for bedding) restricts various behaviors (O'Donoghue, 1993) and it is recommended that the cage environment should be improved to cater for physiological and ethological "needs" such as resting, grooming, exploring, hiding, searching for food, and gnawing.

In addition to the physical environment, social interactions are an important factor in the overall well-being of laboratory animals. Because rats, mice, gerbils, voles, guinea pigs, and some rabbits are considered social species, the *Guide* states that they should be maintained in social groups whenever possible. If there is a requirement to keep them individually housed, the provision of environmental enrichment becomes even more important.

However, it also must be appreciated that changes to the animal's environment, including social housing and environmental enrichment, can alter both physiological and behavioral responses in research animals. Such changes can result in undesirable variation between animals or groups of animals that can confound data collection, interfere with the interpretation of research results, and/or lead to false conclusions. For this reason, the Principal Investigator (PI) has the option to request exemption from these guidelines for specific situations based on scientific justification. Such requests must be documented in the animal use protocol to be considered for approval by the IACUC. Likewise, there may be instances where a health issue or social incompatibility could require animal isolation or a change from enriched housing. In these cases, an ARC veterinarian will be consulted and would make the formal determination, which will be documented in the medical record of the animal(s) involved.

Section B – Implementation: General Objectives

The goal is provide an optimum environment for its research animals. The University (acting through the IACUC and Attending Veterinarian) will continue to periodically modify this plan in response to the evolving best practices in the field based on what has been scientifically demonstrated to benefit the animals.

If a protocol exception to limit or exclude enrichment or social housing is to be included in an IACUC submission, the PI should consult with veterinary staff during protocol development to discuss the special circumstances that might limit social housing or participation in the enrichment program. The PI will need to include the specific study requirements and scientific justification for the exemption request in the IACUC protocol, including the duration of single housing and/or the EE exemptions. If no exemptions are requested and approved within the protocol, then this guideline will be followed. Once the protocol is approved, the PI must inform animal facility personnel of the approved exceptions to this policy and coordinate the system for identifying which particular cages will be included in the exemption.

Enrichment Devices

- Several vendors provide an assortment of enrichment devices and treats. These may include wooden chew sticks, Nyla bones, nesting material, plastic tubes, or other devices that fit in the cages without crowding the animals and can be either discarded at cage change or sanitized. All enrichment provided must either be clearly described in an approved IACUC protocol or be evaluated by an ARC veterinarian BEFORE it is provided to the animals.
- In ARC managed areas, the ARC animal attendants will be responsible for the administration of approved environmental enrichment. In satellite areas, the laboratory staff providing animal care will be responsible for providing enrichment. If novel enrichment is involved as part of particular research studies, this will be the responsibility

of the research personnel.

- If a PI has received approval in a protocol that the rodent or rabbit on study will receive edible treats for enrichment, this is best given by the PI or research staff as part of the study. The administration of these edible treats should be clearly documented in the animal's records.

Section C – Implementation: Species Specific

C1. Mice

- Compatible mice will be pair- or group-housed if space and body weight allows. Males from aggressive backgrounds (e.g., BALB/c, FVB, etc.), however, may require individual housing since they may show aggression towards other males. Housing in groups of three and providing nesting material that is handled appropriately during cage changing is a recommended option to maximize success when housing male mice.
- If scientifically justified in an approved IACUC protocol, mice may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed mice should be provided housing that allows visual, auditory and olfactory contact with other mice.
- Certain medical or compatibility conditions may require that mice be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this guideline do not require IACUC approval.
- Singly housed mice are presumed to need more environmental enrichment than pair- or group housed mice and will be provided with extra cage enhancements unless an exception to limit or exclude EE is justified in an IACUC approved protocol for scientific reasons. Enrichment should include either nesting material or a shelter- type object such as a hut or a tube. Shelters should be used cautiously in cages holding multiple mice because they may increase aggression. Other devices can be utilized as needed for specific projects, but all items used must be screened by the ARC to verify safety and compatibility with disinfection requirements, etc.

C2. Rats

- Compatible rats will be pair- or group-housed if space and body weight allows. Retired male breeders, however, may require individual housing since they may be aggressive towards other males.
- If scientifically justified in an approved IACUC protocol, rats may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed rats should be provided housing that allows visual, auditory and olfactory contact with other rats.
- Certain medical or compatibility conditions may require that rats be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to

this policy do not require IACUC approval.

- Singly housed rats are presumed to need more environmental enrichment than pair- or group housed rats and will be provided with extra cage enhancements unless an exception to limit or exclude EE is justified in an IACUC approved protocol for scientific reasons. Enrichment should include either a shelter-type object (e.g., PVC pipe) or a gnawing device. Other devices can be utilized as needed for specific projects, but all items used must be screened by the ARC to verify safety and compatibility with disinfection requirements, etc.

C3. Hamsters

- In the wild, hamsters typically live as solitary adults or as a dam with litter. Limited group housing of compatible animals may be possible if they are kept together from birth, but in general, hamsters are NOT considered a social animal. They express significant hoarding behavior, and to facilitate this it is acceptable to provide a portion of their diet pellets on the cage floor. They should also be provided with nesting material. A shelter device (e.g. PVC tube) may also be provided, especially for breeding cages.
- Certain medical or compatibility conditions may require that elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this guideline do not require IACUC approval.

C4. Gerbils

- Compatible gerbils will be pair- or group-housed if space and body weight allows. As a burrowing species, gerbils should always be provided with a shelter device (e.g. PVC tube).
- If scientifically justified in an approved IACUC protocol, gerbils may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed gerbils should be provided housing that allows visual, auditory and olfactory contact with other gerbils.
- Certain medical or compatibility conditions may require that gerbils be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this policy do not require IACUC approval.
- Singly housed gerbils are presumed to need more environmental enrichment than pair- or group housed gerbils and will be provided with extra cage enhancements unless an exception to limit or exclude EE is justified in an IACUC approved protocol for scientific reasons. Since they typically have a shelter device present, supplemental enrichment should be a gnawing device. Other devices can be utilized as needed for specific projects, but all items used must be screened by the ARC to verify safety and compatibility with disinfection requirements, etc.

C5. Voles

- Compatible voles will be pair- or group-housed if space and body weight allows. Retired (or temporarily separated) breeding pairs or other older animals, however, may require individual housing. Animals should be housed in standard rat cages supplemented with cotton bedding material and shelter-type objects. Animals will be provided alfalfa as added

enrichment.

- If scientifically justified in an approved IACUC protocol, voles may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed voles should be provided housing that allows visual, auditory and olfactory contact with other voles.
- Certain medical or compatibility conditions may require that voles be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this policy do not require IACUC approval.
- Because their standard housing is already quite enriched (as compared to some other species), additional enrichment is not required for singly-housed animals. However, if signs of maladjustment (such as stereotypic behavior) are seen in isolated animals, the researcher and veterinary staff should determine if additional enrichment or other change to the environment is warranted.

C6. Singing Mice and Pygmy Mice

- Compatible singing mice or pygmy mice will be pair- or group-housed if space and body weight allows. Retired breeders or other older animals may require individual housing to avoid incompatibility. These wild species will be kept in cages that include one or more shelter devices and moss or nestlets in addition to the standard bedding. In addition, singing mice are provided with a varied diet including seeds, nuts, and insects.
- If scientifically justified in an approved IACUC protocol, singing mice or pygmy mice may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed singing mice or pygmy mice should be provided housing that allows visual, auditory and olfactory contact with other singing mice.
- Certain medical or compatibility conditions may require that singing mice or pygmy mice be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this policy do not require IACUC approval.
- Because their standard housing is already quite enriched (as compared to some other species) additional enrichment is not required for singly-housed singing mice or pygmy mice. However, if signs of maladjustment (such as stereotypic behavior) are seen in isolated animals, the researcher and veterinary staff should determine if additional enrichment or other change to the environment is warranted.

C7. Guinea Pigs

- Compatible guinea pigs will be pair- or group-housed if space and body weight allows. Retired breeders or other older animals may require individual housing to avoid incompatibility. This species will be kept in cages that include one or more of the following enrichment items: PVC tubing or rectangular boxes that provide shelter or a gnawing device. Other devices can be utilized as needed for specific projects, but all items used must be screened by the ARC to verify safety and compatibility with disinfection requirements, etc. Additional dietary enrichment, such as vegetables or other dietary treats, may periodically be provided in addition to standard enrichment devices if it does

not conflict with experimental conditions.

- If scientifically justified in an approved IACUC protocol, guinea pigs may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed guinea pigs should be provided housing that allows visual, auditory and olfactory contact with other guinea pigs.
- Certain medical or compatibility conditions may require that guinea pigs be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this policy do not require IACUC approval.
- Because they would already have the same enrichment provided to pair- or group-housed animals, additional enrichment is not required for singly-housed guinea pigs. However, if signs of maladjustment (such as stereotypic behavior) are seen in isolated animals, the researcher and veterinary staff should determine if additional enrichment or other change to the environment is warranted.

C8. Rabbits

- Male rabbits are generally not group housed; however, female or juvenile male rabbits can be housed in pairs or small groups if temperament, space, and body weight allows. Males or other older animals may require individual housing to avoid incompatibility. This species will be kept in cages that include one or more of the following enrichment items: hard plastic chains or balls or a gnawing device. Other devices can be utilized as needed for specific projects, but all items used must be screened by the ARC to verify safety and compatibility with disinfection requirements, etc. Additional dietary enrichment, such as vegetables or other dietary treats, may periodically be provided in addition to standard enrichment devices if it does not conflict with experimental conditions.
- If scientifically justified in an IACUC approved protocol, female or juvenile rabbits may be individually housed in specific situations outlined in the IACUC protocol. When possible (depending on the caging system used) individually housed rabbits should be provided housing that allows visual, auditory and olfactory contact with other rabbits.
- Certain medical or compatibility conditions may require that rabbits be individually housed or that other elements of the enrichment program be changed. These determinations will be made by a veterinarian and documented in the animal's record. Veterinary exemptions to this policy do not require IACUC approval.
- Because they would already have the same enrichment provided to pair- or group-housed animals, additional enrichment is not required for singly-housed rabbits. However, if signs of maladjustment (such as stereotypic behavior) are seen in isolated animals, the researcher and veterinary staff should determine if additional enrichment or other change to the environment is warranted.

Section D – References

“Assistant Laboratory Animal Technician Training Manual.” Assistant Laboratory Animal Technician Training Manual, American Association for Laboratory Animal Science, 2010, pp. 151–156.

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O'Donoghue PN. 1993. The Accommodation of Laboratory Animals in Accordance with Animal Welfare Requirements. Proceedings of an international workshop, Berlin 1993.

Smith CP and Taylor V. 1995. "Environmental Enrichment in Rodents." Environmental Enrichment Information Resources for Laboratory Animals: 1965 - 1995: Birds, Cats, Dogs, Farm Animals, Ferrets, Rabbits, and Rodents.

Section E – Acknowledgements

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