

Guidelines for Social Housing of Rodents and Aquatic Species

Background

The *Guide for the Care and Use of Laboratory Animals* provides the following statements regarding rodent and aquatic species and their social housing needs:

- “Appropriate social interactions among members of the same species (conspecifics) are essential to normal development and well being (Bayne et al. 1995; Hall 1998; Novak et al. 2006).” (*page 64*)
- “Single housing of social species should be the exception and justified based on experimental requirements or veterinary-related concerns about animal well-being. In these cases, it should be limited to the minimum period necessary...” (*page 64*)
- “The need for single housing should be reviewed on a regular basis by the IACUC and veterinarian” (*page 64*)
- “Generally schooling fish species are housed with conspecifics, and many amphibians, especially anuran species, may be group housed” (*page 83*)

Standards

In the NIH Intramural Research Program, social housing (pairs or groups) should be considered the default method of housing rodent and aquatic species. Exceptions to this standard as a result of study design should be justified in the Animal Study Proposal (ASP) and approved by the Institute/Center Animal Care and Use Committee (IC ACUC). In addition, animals may be single housed at the discretion of the veterinarian, or due to breeding strategies or genotyping methods, as examples.

Single housing resulting from incompatibility among animals, or other veterinary concerns, should be handled on a case-by-case basis using the professional judgment of the qualified veterinary staff. When necessary, single housing of social animals should be limited to the minimum period necessary. In the absence of other animals, additional environmental or other enrichment should be offered, and will vary depending on the species.

Rodents

All rodents should be group housed regardless of age with the following exceptions:

- Study Design - If rodents cannot be housed in single-sex compatible pairs or groups for all of, or a portion of, the study, a written scientific justification for this exception to social housing must be listed in the ASP and subsequently reviewed and approved by the IC ACUC. Consideration should be given for animals following surgery or other procedures where the animal must be individually housed to protect the incision, sutures, or implant. The social housing exception in the ASP must address the justification for single housing, the group(s) of animals that will not be socially housed, and the frequency and duration of this single housing.

The following exceptions DO NOT require ongoing or repeated prior approval by the IC ACUC:

- Attrition During a Study - Rodents originally group housed may eventually become individually housed as a result of cage mates being removed during the course of an experiment. While consideration should be given to re-housing with other animals, study duration and potential introduction of variables may preclude re-housing socially. If the experimental design precludes the re-housing of an animal to protect the integrity of the research, treatment group, or line (e.g. genetic, scientific, etc.), it should be clearly noted and justified in the ASP.

- Social Incompatibility – The aggressive nature of individual animals/sex/strains may justify single housing. This incompatibility would be noted if fighting or trauma to cage mates is observed.
- Breeding
 - The territorial behavior of many male rodents, especially mice, requires them to be individually housed to ensure breeding efficiency when females are introduced into the male's cage/territory. Therefore, male rodents may be housed individually when designated for breeding. Once a male rodent has been used for breeding, he should not be returned to group housing as severe fighting will likely ensue. These animals should be identified as socially incompatible.
 - Bred females may be singly or group housed during their gestation as determined by the ACUC-approved standard operating procedures for the holding facility and caging styles available.
- Veterinary Concerns - The veterinary staff, under the authority of the attending veterinarian, may exempt an individual animal from participation in social housing due to concerns such as social aggression, animal health, or other medical veterinary reasons.
- Single Individuals at Weaning – Single rodents that have no littermates of the same gender (e.g. one female or male in the litter) may be individually housed if other animals of the same genetic background and age are not available for pairing. Pairing recently weaned animals with markedly older animals, especially males, often results in the younger animals being severely barbered or injured. Consideration should be given however to re-housing single weaned female rodents together.

Aquatics

All aquatic species should be group housed regardless of age. The exceptions for Study Design (requiring description in the ASP), Social Incompatibility, Breeding, Veterinary Concerns and Attrition are the same as for rodents. If single housing is adopted, additional enrichment items can be introduced into the tank environment as appropriate.

The following exception, unique to aquatic species, does not require description in the ASP:

- Genotyping – Because long-term marking of individual fish or frogs is impractical, animals that have been sampled for genotype analysis may be single housed to ensure identification. Methods of identification of amphibians are available and should be considered and implemented when possible (Collymore 2015; Keck, 2015; Williams, 2009).

Serial surgical oocyte collection in *Xenopus sp.* – this method is normally approved with a limit on how many surgeries can be performed on any one female frog. After the first oocyte collection, these frogs may be singly housed so that the number of surgeries performed can be easily recorded, though new methods of identifying frogs should be considered and adopted if appropriate for the study

References

[Guide for the Care and Use of Laboratory Animals](#), ILAR, NAS, Eighth Edition, 2011

<https://www.nal.usda.gov/awic/symposium-social-housing-laboratory-animals-2016>

Collymore, C; Tolwani, RJ; Rasmussen, S (2015). The Behavioral Effects of Single Housing and Environmental Enrichment on Adult Zebrafish (*Danio rerio*). JAALAS 54(3): 280-285.

Keck, V.A.; Edgerton, D.S.; Hajizadeh, S.; Swift, L.L.; Dupont, W.D.; Lawrence, C.; Boyd, K.L. (2015). Effects of habitat complexity on pair-housed zebrafish. JAALAS 54(4): 378-383.

Williams, TD; Readman, GD; Owen, SF. (2009). Key issues concerning environmental enrichment for laboratory-held fish species. Laboratory Animals 43(2): 107-120.

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