Guidelines for Social Housing of Rodents and Aquatic Species

Background

The *Guide for the Care and Use of Laboratory Animals* states, "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...." Additionally, while "not all members of a social species are necessarily socially compatible,"[1] "appropriate social interactions among members of the same species (conspecifics) are essential to normal development and wellbeing."[1]

Standards

In the NIH Intramural Research Program, social housing should be considered the default method of housing rodent and aquatic species. Exceptions to this standard because of study design should be justified in the Animal Study Proposal (ASP), approved by the Institute/Center Animal Care and Use Committee (IC ACUC), and "limited to the minimum period necessary and where possible provide visual, auditory, olfactory…with compatible conspecifics"[2]. In addition, animals may be single housed at the discretion of the veterinarian, or intermittently socially housed due to breeding strategies or genotyping methods, as examples.

Veterinary concerns should be handled on a case-by-case basis using the professional judgment of the qualified veterinary staff and documented according to facility Standard Operating Procedure (SOP). 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 socially housed in for all, 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 may be individually housed to protect the incision, sutures, or implant[3]. 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 – Initial social housing may be altered 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.

- Breeding
    - The territorial behavior of many male rodents, and the need for sperm count recovery of stud males, requires them to be individually housed to ensure breeding efficiency when females are introduced into the male's cage/territory[4]. Therefore, stud males may be housed individually when designated for breeding. Once a male rodent has been used for breeding, he should not be returned to same sex social housing as severe fighting may 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 SOP 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.

- Social Incompatibility (Veterinary Concern) – 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.

- 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 sexually mature animals, especially males, often results in the younger animals being injured. Consideration should be given however to re-housing sexually immature younger animals or older female rodents together.

Aquatics

Schooling fish and anuran species should be group housed[1]. 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, visual exposure to conspecifics should be available[4].

The following exceptions, unique to aquatic species, do 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 temporarily singly housed to ensure identification. Methods of identification of adult amphibians are available and should be considered and implemented when possible.
- Serial oocyte collection in *Xenopus sp.* – this method is normally approved with a limit on how many collections can be performed on any one female frog. After the first oocyte collection, these frogs may be singly housed for ease of tracking, though other methods of identifying frogs should be considered and adopted if appropriate for the study.

References

1. Guide for the Care and Use of Laboratory Animals, 8th edition. 2011. ILAR, NAS
2. AAALAC Position Statement on Social Housing: https://www.aaalac.org/accreditation-program/position-statements/#social
3. Van Loo, PLP et al. 2007. Impact of 'Living Apart Together' on Postoperative Recovery of Mice Compared with Social and Individual Housing. Lab Animals. 441-455.
4. The Jackson Laboratory Blog Post. Six Steps for Setting up Timed-Pregnant Mice. September 2, 2014. https://www.jax.org/news-and-insights/jax-blog/2014/september/six-steps-for-setting-up-timed-pregnant-mice#
5. Krueger LD et al. 2020. Enrichment Preferences for Singly Housed Zebrafish (Danio rerio). JAALAS. 59: 148-155.

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