Guidelines for Co-Housing Multiple Species of Laboratory Animals

General

Animals should not be housed with or near another species of animal that might compromise the health or welfare of either species.

The *Guide for the Care and Use of Laboratory Animals* states "Physical separation of animals by species is recommended to:

- prevent interspecies disease transmission,
- to eliminate the potential for anxiety, and
- physiologic and behavioral changes due to interspecies conflict."

Animals must have an appropriate level of separation during quarantine/conditioning periods. The following recommendations refer to quarantined or conditioned animals which are considered free of transmissible diseases, unless otherwise specified.

Rodents and Lagomorphs

Mice and Rats:

The literature on the co-housing of mice and rats is equivocal. In the wild, rats can be predators of mice, and this predatory behavior has been reproduced under experimental conditions. Some studies have shown that co-housed mice and rats can exhibit signs of acute and chronic stress. Other studies have found negligible stress-related effects. In general:

- Loud or sudden noises may have a negative effect on rodents and sounds inaudible to humans are perceptible and may be stressful to rodents. Therefore, rodent housing and study areas should be away from noisy animals (e.g. pigs, dogs, and non-human primates) and noisy activities (e.g. cage wash, intercom systems, etc.).
- Rodents should not be transported with any other animal, substance, and/or device that may be expected to be injurious to their health or welfare.

Given the potential negative impact on animal welfare associated with co-housing, efforts should be made to house mice and rats in separate rooms. If co-housing is necessary, it should be reviewed by the Institute/Center Animal Care and Use Committee (IC ACUC). If approved by the IC ACUC, mice and rats held in the same room should be in individually ventilated caging and consideration should be given to visual separation or barriers between the two species.

Lagomorphs and Other Rodents:

Due to the potential for disease transmission as well as olfactory and visual cues between animals, efforts should be made to house other small laboratory animal species such as guinea pigs, hamsters, and rabbits, in single-species rooms or cubicles. Guinea pigs and hamsters should never be housed together in the same primary enclosure. These species are typically housed in static and/or open cages, therefore if co-housing of these species in the same room is desirable due to low census and/or space constraints, the intermingling of species should be reviewed by the IC ACUC. In general:

- Loud or sudden noises may negatively impact rabbits. Therefore, they should be housed in areas where minimal noise is present (e.g. away from noisy species like dogs or non-human primates and away from cage wash operations).
- Guinea pigs should be housed separately from rabbits due to the potential transmission of *Bordetella bronchiseptica* between these species. Rabbits can carry *Bordetella bronchiseptica* asymptomatically, but this agent is pathogenic for guinea pigs.

- Rabbits should not be transported with any other animal, substance, and/or device that may be expected to be injurious to their health or welfare.

Carnivores

Dogs:

Dogs should be housed in separate wings of a building from other species or in quarters designed to provide visual and auditory separation from other species.

Dogs should be transported separately from other species because of the disturbance created by their barking. Ideally, compartmentalized areas should be provided for dogs held in close proximity by necessity during short term restraint, e.g., pre- and post-surgical holding. Interspecies conflict in these situations should be minimized by the use of physical barriers, chemical restraint, visual separation, assignment of different species to different locations, etc.

Cats:

Cats should be housed in separate rooms from all other species except ferrets. These two species have been found to do well in the same room provided a visual barrier is present to decrease possible anxiety.

Cats can be transported with compatible species i.e., ferrets, equidae, and ruminants as long as they are held in a compartmentalized area where a physical barrier is present to prevent direct contact or contact with body fluids or wastes. Cats should not be transported with dogs.

Ferrets:

The policy for housing and transporting ferrets is similar to that for cats.

Farm Animals

Background:

Historically, different species of farm animals have been housed in the same pastures and in the same barn but usually in separate pens. Goats are frequently used as companion animals for horses, burros are housed with sheep to minimize predators, and it has been shown that pastures are more efficiently utilized when sheep and cattle are together. A precedent has therefore been established for housing different species together.

Facilities for housing farm animals used in biomedical research range from farm-type operations to laboratory animal facilities. Separation of species varies according to the facility. The following is from the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching* and applies to the use of farm animals in biomedical research; "Agricultural animals of different species are typically kept in different enclosures to reduce interspecies conflict, meet the husbandry and environmental needs of the animals, and facilitate research and teaching." Thus, it is recommended that mixing of different species of farm animals used in biomedical research be kept to a minimum.

Guidelines:

- In a farm-type operation, swine may be housed in pens or pastures adjacent to other species. The housing of swine in the *same* pen with any other species is discouraged. Measures should be taken to reduce nose-to-nose interspecies contact by use of a double fence or solid wall separation.
- All domesticated ungulates except pigs may be housed in the same pasture. There is a risk associated with housing pigs with other ungulates due to potential disease transmission. Pigs are the natural reservoir for pseudorabies and main source of infection for other species.
- All domesticated ungulates may be housed in adjacent indoor/outdoor pens provided animals are free of transmissible disease. The same applies to box stalls.

- When pigs and other ungulates are housed in adjacent runs, solid physical barriers such as concrete or block construction should separate them.
- Farm animals should not be housed in runs next to carnivores. Carnivores and farm animals should be separated by a solid physical barrier, in order to achieve, visual segregation, and to reduce the passage of sounds, odors, potential infections, and to minimize anxiety/excitement in either species.
- Poultry should be housed in an area separate from all other animals.
- Farm animals undergoing quarantine must be separated from animals of the same or different species that are not in quarantine to prevent disease transmission until health status is known.
- When possible, farm animals should be housed with a companion of the same species.
- Different species of farm animals may be shipped in the same truck, but must be in separate shipping containers.

Nonhuman Primates

General:

Primates should be housed in separate rooms from non-primate species (rodents, carnivores, farm animals, etc.).

Prosimians, simians, and apes should be housed separately by group.

New World primates should be housed separately from Old World primates.

The tables below indicate those primates which can and cannot be housed together for disease transmission considerations.

It is recommended that when animals of different species are mixed in the same room, they be clustered to provide conspecific visualization for behavioral considerations.

Short Term Holding (one to ten days):

For short term housing or restraint and pre- and post-surgical areas and in transportation, it is necessary to separate primates from non-primate species and to maintain separation of primates by genus as required for disease prevention (see attached tables).

Isolator caging, moveable barriers, separate holding areas in corridors, and air flow patterns can be utilized on a temporary basis to prevent disease transmission during short term restraint and pre- and post surgery areas.

Tables: NHP Housing Comparison, from: Bennett, T.; Abee, C.; Henrickson R. Nonhuman Primates in Biomedical Research. Academic Press, 1995.

Exceptions

Any exceptions to these recommendations must be reviewed and approved by the appropriate IC ACUC.

Animals of different species may be housed in proximity or in the same room for short term holding (1 to 10 days) if specialized containment or isolation equipment is utilized or if practices and procedures provide adequate segregation. Housing multiple species in one room for the purpose of post-op monitoring, medical care and emergency treatment can occur at the discretion of the IC veterinarian and Institute policies. The administration of care in this circumstance is based on current standards of best veterinary practice taking account species specific behavior, and infectious disease control.

References

Animal Welfare Act and Animal Welfare Regulations, USDA

Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching, Federation of Animal Science Societies, 2010.

Guide for the Care and Use of Laboratory Animals, NRC, 2011.

Research Animal Transport for the NIH Clinical Center, 01/24/13

Laboratory Animal Medicine, 2nd edition, Eds. Fox, Anderson, Loew, and Quimby, 2002.

Ferrets, Rabbits, and Rodents, Clinical Medicine and Surgery, second edition, Quesenberry and Carpenter, 2004.

Planning and Designing Research Animal Facilities, Eds. Hessler and Lehner, 2009.

Arndt SS et al. 2010. Co-species housing in mice and rats: Effects on physiological and behavioral stress responsivity. Hormones and Behavior 57: 342-351.

Greene TM et al. 2014. Effects of Rat Visual, Olfactory or Combined Stimuli during Cohousing on Stress-Related Physiology and Behavior in C57BL/6NCrl Mice. JAALAS 53(6): 647-652.

Pseudorabies (Aujeszky's Disease) and Its Eradication, A Review of the U.S. Experience. USDA, 2008.

Approved - 05/08/96, 06/14/06
Revised - 01/13/99, 10/10/01, 03/10/04, 05/12/10, 11/14/12, 06/10/15

NHP HOUSING COMPARISON TABLES

New World NHPs	Aotus spp	Ateles spp	Callicebus spp	Callithrix spp	Cebuella spp	Cebus spp	Lagothrix spp	Saguinus spp	Saimiri spp
Aotus spp	✛	o		o		o	o	o	o
Ateles spp	o	✛		o				o	o
Callicebus spp			✛						✛
Callithrix spp	o	o		✛		o	o	✛	o
Cebuella spp					✛				
Cebus spp	o			o		✛		o	o ✛
Lagothrix spp	o			o			✛		o
Saguinus spp	o	o		✛		o	o	✛	o
Saimiri spp*	o	o	✛	o		o ✛	o	o	✛

✛ - Safe to house together in the same room.

o - Do not house together in the same room.

Blanks - There is not enough information available. It is recommended not housing together unless other information can be found showing safety in housing together.

*_Saimiri spp_ can be housed with _Callicebus spp_, but it may not be safe to house _Callicebus spp_ with _Cebus spp._ These three species should not be housed together in the same room.

Old World NHPs	Asian macaques	Chlorocebus aethiops	Erythrocebus patas	Papio spp
Asian Macaques	✛	o	o	o
Chlorocebus aethiops	o	✛	/	o ✛
Erythrocebus patas	o	/	✛	/
Papio spp	o	o ✛	/	✛

✛- Safe to house in the same room.

o - Do not house in the same room.

/ - *Erythrocebus patas* may carry Simian Hemorrhagic Fever (SHF) virus. *Papio spp* and *Cercopithecus spp* may develop mild disease from SHF virus or may also become carriers.