

Guidelines for Co-Housing Multiple Species of Laboratory Animals

Overview: This guideline describes separation and co-housing of animals within research facilities and during transportation.

In general, according to the *Guide for the Care and Use of Laboratory Animals*(1):

1. Animals should not be housed or transported with or near another species of animal that might compromise the health or welfare of either species.
2. "Physical separation of animals by species is recommended to:
 - prevent interspecies disease transmission,
 - eliminate the potential for anxiety
 - prevent physiologic and behavioral changes due to interspecies conflict."
3. 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:

Efforts should be made to house mice and rats in separate rooms given the potential negative impact on animal welfare associated with co-housing mice and rats due to their predator-prey relationship in the wild. Some studies have shown that co-housed mice and rats can exhibit signs of acute and chronic stress while other studies have found negligible stress-related effects(2-7).

If co-housing is necessary, it should be reviewed by the Institute/Center Animal Care and Use Committee (IC ACUC). And if approved by the IC ACUC, mice and rats held in the same room should be housed in individually ventilated caging and consideration given to visual separation or barriers between the two species. Additionally, the use of a biosafety cabinet or cage change station that allows for containment of species-associated excrement, pheromones, etc., during cage changing is recommended to decrease the potential for exposure of one species to another within the general room environment.

Additional considerations include:

- Loud or sudden noises may have a negative effect on rodents and sounds inaudible to humans are perceptible by 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 (NHP)) and equipment and activities that produce vibration or noise, including sounds inaudible to humans (e.g., cage wash, intercom systems, light sensors, mechanical areas, etc.)(8).

Lagomorphs and Other Rodents:

Efforts should be made to house other small laboratory animal species such as guinea pigs, hamsters, and rabbits in single-species rooms or cubicles due to the potential for disease transmission and stress-inducing olfactory and visual cues between animals.

If co-housing of these species in the same room is desirable due to low census and/or space constraints, the arrangement should first be reviewed and approved 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 NHP 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 *B. bronchiseptica* asymptotically, but this agent is pathogenic for guinea pigs(7, 8).

Carnivores:

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 in the conveyance (i.e., ferrets, equids, and ruminants) if they are held in a compartmentalized area where a physical barrier is present to prevent direct contact or contact with body fluids or wastes.

Ferrets:

The policy for housing and transporting ferrets is like that for cats.

Farm Animals:

In general:

A precedent has been established for housing different species together as historically, different species of farm animals have been housed in adjacent pastures and in the same barn but usually in separate pens. Goats are frequently used as companion animals for horses, burros and llamas are housed with sheep to minimize predators, and it has been shown that pastures are more efficiently utilized when sheep and cattle are 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. Housing of farm animals in a farm setting should follow the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*(9), whereas biomedical research on using farm animals should follow the *Guide for the Care and Use of Laboratory Animals*(1).

Guidelines:

- 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.
- It is recommended that mixing of different species of farm animals used in biomedical research be kept to a minimum, "to reduce interspecies conflict, meet the husbandry and environmental needs of the animals, and facilitate research and teaching"(9).
- In a farm setting, 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 interspecies nose-to-nose 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 the main source of infection for other species(10).
- 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, 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. Poultry of different species, such as chickens and turkeys, should be housed separately to prevent disease transmission.
- When possible, all farm animal species 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.).

The International Primatological Society (IPS) International Guidelines for the Acquisition, Care, and Breeding of Nonhuman Primates (11) state, “physical separation of animals by species is generally recommended to prevent inter-species disease transmission and to reduce stress caused by inter- species conflict. New World, Old World African, and Old World Asian primate species should be housed separately as latent infections in one group can cause serious clinical disease in others.” However, housing of multiple species within the same broader category, such as more than one macaque species, is not uncommon, nor is pairing of disparate species. Therefore, the decision to house different species within the same housing room should be at the discretion of the veterinary staff of each IC and be based upon best practices and information available within the literature regarding species compatibility (12, 13).

Short-Term Holding (one to ten days):

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 in pre- and post-surgery areas.

- Squirrel monkeys (natural host) should be housed separate from owl, tamarin, and marmoset monkeys due to fatal transmission of *Saimiriine herpesvirus 1*.
- Old World African primate monkeys (e.g., Patas monkey and Sooty mangabey, should never be housed with macaques due to possible transmission of fatal Simian Hemorrhagic Fever Virus or Simian Immunodeficiency Virus, respectively.

Other Species:

Different species may have different susceptibility to diseases and health statuses, and it is important to verify compatibility of species before co-housing with shared equipment or water. For example, *Xenopus laevis* frogs may asymptotically carry the fungus *Batrachochytrium dendrobatis* (chytrid), which can be deadly to other species of frogs including *Xenopus tropicalis*. Wild caught or pet store obtained fish may pose a risk to colony raised fish based on their health status.

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 (one to ten days) or longer with veterinary approval. Depending on the situation, a veterinarian, investigator, or the ACUC may suggest specialized containment or isolation equipment or practices and procedures to provide adequate segregation. However, these may not be necessary in every situation and may be more impactful for successfully housing animals on different studies together than housing animals of certain species together. Housing multiple species in one room for the purpose of post-operative monitoring, medical care, and emergency treatment can occur at the discretion of the IC veterinarian and IC policies. The administration of care in this circumstance is based on current standards of best veterinary practice considering species specific behavior and infectious disease control.

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