

Space is required for

- Animal housing, care, and sanitation.
- Receipt, quarantine, and separation of animals.
- Separation of species or isolation of individual projects when necessary.
- Storage.

Most multipurpose animal facilities also include the following:

- Specialized laboratories or space contiguous with or near animal-housing areas for such activities as surgery, intensive care, necropsy, radiography, preparation of special diets, experimental procedures, clinical treatment, and diagnostic laboratory procedures.
- Containment facilities or equipment, if hazardous biologic, physical, or chemical agents are to be used.
- Receiving and storage areas for food, bedding, pharmaceuticals, biologics, and supplies.
- Space for washing and sterilizing equipment and supplies and, depending on the volume of work, machines for washing cages, bottles, glassware, racks, and waste cans; a utility sink; an autoclave for equipment, food, and bedding; and separate areas for holding soiled and clean equipment.
- Space for storing wastes before incineration or removal.

PHYSICAL PLANT 73

- Space for cold storage or disposal of carcasses.
- Space for administrative and supervisory personnel, including space for training and education of staff.
- Showers, sinks, lockers, toilets, and break areas for personnel.
- Security features, such as card-key systems, electronic surveillance, and alarms.

CONSTRUCTION GUIDELINES

Corridors

Corridors should be wide enough to facilitate the movement of personnel and equipment. Corridors 6-8 ft wide can accommodate the needs of most facilities. Floor-wall junctions should be designed to facilitate cleaning. In corridors leading to dog and swine housing facilities, cage-washing facilities, and other high-noise areas, double-door entry or other noise traps should be considered. Wherever possible, water lines, drainpipes, electric-service connections, and other utilities should be accessible through access panels or chases in corridors outside the animal rooms. Fire alarms, fire extinguishers, and telephones should be recessed or installed high enough to prevent damage from the movement of large equipment.

Animal-Room Doors

For safety, doors should open into animal rooms; however, if it is necessary that they open toward a corridor, there should be recessed vestibules. Doors with viewing windows might be preferable for safety and other reasons. However, the ability to cover viewing windows might be considered in situations where exposure to light or hallway activities would be undesirable. Doors should be large enough (approximately 42 x 84 in) to allow the easy passage of racks and equipment. Doors should fit tightly within their frames, and both doors and frames should be appropriately sealed to prevent vermin entry or harborage. Doors should be constructed of and, where appropriate, coated with materials that resist corrosion. Self-closing doors equipped with recessed or shielded handles,

threshold sweeps, and kickplates are usually preferred. Where room-level security is necessary or it is desirable to limit access (as in the case of the use of hazardous agents), room doors should be equipped with locks. Doors should be designed to be opened from the inside without a key.

Emergency, Weekend, and Holiday Care

Animals should be cared for by qualified personnel every day, including weekends and holidays, both to safeguard their well-being and to satisfy research requirements. Emergency veterinary care should be available after work hours, on weekends, and on holidays.

In the event of an emergency, institutional security personnel and fire or police officials should be able to reach people responsible for the animals. That can be enhanced by prominently posting emergency procedures, names, or telephone numbers in animal facilities or by placing them in the security department or telephone center. Emergency procedures for handling special facilities or operations should be prominently posted.

A disaster plan that takes into account both personnel and animals should be prepared as part of the overall safety plan for the animal facility. The colony manager or veterinarian, responsible for the animals should be a member of the appropriate safety committee at the institution. He or she should be an "official responder" within the institution and should participate in the response to a disaster (Casper 1991).

POPULATION MANAGEMENT

Identification and Records

Means of animal identification include room, rack, pen, stall, and cage cards with written or bar-coded information; collars, bands, plates, and tabs; colored stains; ear notches and tags; tattoos; subcutaneous transponders; and freeze brands. Toe-clipping, as a method of identification of small rodents, should be used only when no other individual identification method is feasible and should be performed only on altricial neonates. Identification cards should include the source of the animal, the strain or stock, names and locations of the responsible investigators, pertinent dates, and protocol number, when applicable. Animal records are useful and can vary in type, ranging from limited information on identification cards to detailed computerized records for individual animals.

Clinical records for individual animals can also be valuable, especially for dogs, cats, nonhuman primates, and farm animals. They should include pertinent clinical and diagnostic information, date of inoculations, history of surgical procedures and postoperative care, and information on experimental use. Basic demographic information and clinical histories enhance the value of individual animals for both breeding and research and should be readily accessible to investigators, veterinary staff, and animal-care staff.

Prolonged restraint, including chaining of nonhuman primates, should be avoided unless it is essential for achieving research objectives and is approved by the IACUC. Less-restrictive systems that do not limit an animal's ability to make normal postural adjustments, such as the tether system for nonhuman primates and stanchions for farm animals, should be used when compatible with protocol objectives (Bryant 1980; Byrd 1979; Grandin 1991; McNamee and others 1984; Morton and others 1987; Wakeley and others 1974). When restraint devices are used, they should be specifically designed to accomplish research goals that are impossible or impractical to accomplish by other means or to prevent injury to animals or personnel.

The following are important guidelines for restraint:

- Restraint devices are not to be considered normal methods of housing.
- Restraint devices should not be used simply as a convenience in handling or managing animals.
- The period of restraint should be the minimum required to accomplish the research objectives.
- Animals to be placed in restraint devices should be given training to adapt to the equipment and personnel.
- Provision should be made for observation of the animal at appropriate intervals, as determined by the IACUC.
- Veterinary care should be provided if lesions or illnesses associated with restraint are observed. The presence of lesions, illness, or severe behavioral change often necessitates temporary or permanent removal of the animal from restraint.

The trauma include bites & scratches, trips & falls, equipment related injuries and chemical exposures. One of the most important measures for the safe use of nonhuman primates is proper restraint, either in the way of chemical (anesthesia) or physical methods. The best and safest way is with chemical restraint. There are several types of physical restraint. Tying down the animal or having manual assistance to hold and immobilize the animal properly are the most common methods. The primate chair is useful if you must do repeated procedures on the animal, and the pole and collar are less frequently used methods. A pole and collar is often used to get a conscious monkey to the primate chair.

Another method that we rarely think about in terms of working safely with animals is to train them. If you have a procedure that's going to require repeated practices on the same animal, the time necessary to train the animals may pay big dividends for long term studies. The result is that you save labor, it is safer, and the procedures are less stressful for the animal. Most investigators are surprised at how trainable the monkey can be.

The one piece of equipment that has done the most for the safe handling of monkeys is the squeeze back cage. Those cages have taken much of the risk away from doing experimental procedures on monkeys. They are commonly used in most laboratories where research is done with nonhuman primates.

Personnel protection include the caps, the gowns, the masks, the face shields, gloves, and foot covers. It is good practice to require the wearing of at least a minimum of protective clothing when workers are in contact with any monkey, whether or not it is experimentally infected.