Facility Design and Animal Housing

A shelter facility designed with animal health and welfare at the core can be transformative not only to the animals housed there but also to the people who care for them and to the communities they serve. At best most organizations get one opportunity every 20, 30, or more years to build a new sheltering facility; therefore, it is imperative that the design be right. If you start with this information sheet you will be well on your way.

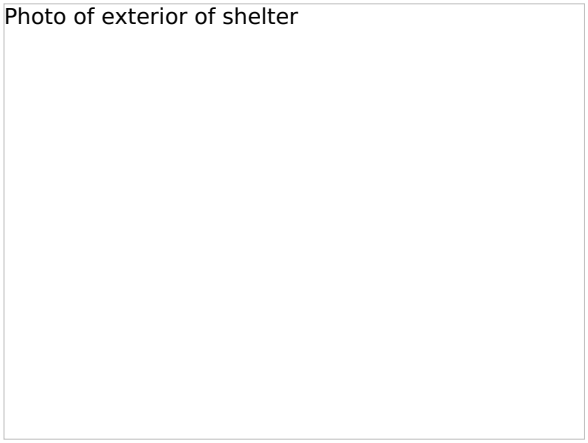


Table of Contents:

The shelter facility and the housing it provides have implications far beyond the shelter walls. The design of the facility will impact disease levels, behavioral health, staffing needs and the daily cost of care (and therefore how much time and money is left over for other important programs). Although excellent husbandry can make up for some deficiencies, a poorly designed facility exacts a daily toll on staff and animals, increasing stress and illness.

A well designed facility, on the other hand, provides for animal health and wellness with maximum efficiency. It also allows for flexibility in meeting the changing needs of a community and the evolving mission of an organization. It allows for successful response to disasters and outbreaks as well as new opportunities such as foster, transfer, treatment or educational programs. Both the UC Davis Koret Shelter Medicine Program and University of Wisconsin Shelter Medicine Program now offer facility design consultation if you would like customized guidance for your organization. Otherwise, read on for more information!

Before you build: defining goals and gathering information

Early in the process of considering a new or expanded facility, carefully articulate the goals for the project. Consider current and future trends. A good way to start is simply by brainstorming the

reasons for the new building. Is the hope that animals will be healthier and more comfortable? That the new building will be more efficient and easier to keep clean? That facilities will exist to provide education for the community or shelter staff? Are there special populations that are not provided for by the current building design, such as puppies and kittens, sick animals, or mothers and neonates awaiting foster care? Are shelter or rescue transfers anticipated, either as a receiving or source shelter? These are just some examples – of course each shelter's list will be different based on philosophy, resources and challenges inherent to that particular community.

Once a list of goals has been established, choose the top priorities. Each possible investment in the new facility should be consciously considered in light of how it will benefit the highest priority goals. If it turns out you cannot have it all, will additional adoption housing serve the shelter's goals better than an area for animals awaiting foster care or rescue or a new treatment area? Is a big, impressive lobby or retail area worth a trade-off of fewer units of animal housing? The answers will vary depending on your current challenges and opportunities.

The important thing is to make sure your plan truly matches your priorities. Sometimes shelters are built or expanded with the idea that simply increasing the number of animals housed and making the environment more appealing on the surface will lead to great gains in saving lives. However, more space for animal housing and even a nicer looking shelter will not necessarily reduce euthanasia. Extra cages quickly fill and a more appealing facility sometimes leads to higher intake as well as higher adoptions. The bottom line is that if quality and efficiency of the space is not improved, the results of even an enormous investment in facility expansion are likely to be disappointing.

Addressing the numbers

Before you build, you will need a good handle on the optimal number of animals to house at any given time. The daily shelter population determines overall operational costs and staff time for care, and has a profound impact on the average length of stay (LOS) for each animal.

In an undersized shelter animals must be either chronically crowded together, denied admission or euthanized for want of space. Increased disease, endless stress for humans and animals alike, and reduced chances for live release will be the nearly inevitable results over the long haul. Though it may be less intuitively obvious, too large a shelter can be equally problematic – trying to build your way out of community overpopulation is not only likely to be ineffective, it can be seriously counterproductive. An over-sized facility results in elevated care costs and needlessly prolonged lengths of stay. Long stays in turn increase risk for disease and behavioral problems, further increasing costs and daily care requirements. In the worst case scenario, an overstretched group of staff and volunteers dash around madly trying to keep up with cleaning and care and become less and less able to serve the public or do a good job at just about anything. Again the nearly inevitable result is disease, stress and reduced live release. It’s important to get the number right!

Calculating optimal shelter capacity is a multi-step process which can take a little time but is well worth the investment. Calculations need to take into account seasonal variation, species specific trends, intake levels and required/optimal holding times. A detailed explanation can be found in the “Calculating Shelter Capacity” information sheet.

If you would like personalized help, feel free to contact the UC Davis Koret Shelter Medicine Program (sheltermedicine@ucdavis.edu) or University of Wisconsin Shelter Medicine Program (uwsheltermedicine@vetmed.wisc.edu) about our consulting services.

Components of the shelter facility

Multiple smaller animal housing areas rather than fewer larger housing areas are ideal in most shelters to allow for flexibility in segregating different groups with different needs. Populations to house separately include:

- Different species
    - Do not house predators and prey in visual, auditory or olfactory contact with one another. *This includes cats and dogs.*
- Isolation for animals with infectious conditions
    - About 10% of housing designated for this purpose is a good rule of thumb. With good husbandry one would not expect more than about this proportion of the population to be sick at any one time. An exception would be for shelters that specialize in transferring from high disease risk shelters or otherwise accept an unusual number of animals requiring treatment.
    - Make sure housing in isolation areas is at least equal in quality to other housing in the

shelter. Sick animals especially need an environment that is comfortable, non-stressful, and easily cleaned between occupants.
        - Provide housing of a size and quality appropriate for the anticipated length of treatment. Larger, more enriched quarters are especially important when treating diseases such as ringworm that can take some weeks to cure.
        - Provide double-sided or compartmentalized housing to minimize handling and cross-contamination when caring for sick animals.
        - Protect cats from exposure to the sight or sound of dogs. This is especially important in isolation areas, as sick cats are even more stressed than well cats by exposure to dog noise.
        - Provide excellent ventilation for animal comfort and to reduce the occurrence of secondary respiratory infections.
    - Ideally, provide hand-washing stations in all isolation areas. At minimum, mount hand sanitizers and provide gloves in isolation areas.
    - Install adequate lighting to facilitate observation of sick animals.
    - Provide a surface for examination and treatment of animals. Ideally, it should not be necessary to remove animals from the isolation room for day-to-day treatment.
    - Include adequate storage for all needed supplies in or directly outside of isolation areas. Create a foyer for changing into protective clothing and storage of dedicated supplies for cleaning and animal care.
    - To avoid cross-species disease transmission, each species needs its own isolation area. *Never mix dogs and cats in isolation!*
    - Ideally, design separate areas for animals with respiratory versus other contagious conditions.
- Young animals (puppies and kittens < 5 months of age)
    - Because youngsters cannot be protected completely by vaccination, it is very helpful to provide special housing areas that mechanically prevent exposure to infectious illnesses.
        - This way staff and volunteers can take special precautions in handling these youngsters and more casual procedures can be in place for healthy adult animals.

Depending on the shelter, other desirable special housing areas include:

- Treatment areas for animals with non-infectious medical conditions.
- Nursery for moms with litters or neonates without a mother awaiting foster care.
- Flexible quarantine space for animals possibly exposed to a serious infectious disease.
- Areas to accommodate sudden influxes of animals as in a disaster or large scale legal case
- Comfortable housing that meets animals' behavioral needs for long term care, e.g. for animals caught up in a legal case or undergoing long term rehabilitation.

In all these areas, segregation by species should be maintained. Uses of various segregation areas should be flexible to accommodate changes in housing needs over time. For instance, during the summer one area might be used as a nursery for queens and kittens awaiting foster care, while at another time this same area might house a group of cats surrendered from a hoarding case. Due to this need for flexibility, make sure most of your housing is easily cleaned to accommodate newly admitted animals but can also provide humane accommodations for medium to long-term housing, just in case that is what it ends up getting used for.

Non-animal housing areas

An exhaustive list of additional shelter areas is beyond the scope of this document. Areas to consider include, but are by no means limited to, animal areas such as intake, treatment, surgery, euthanasia, behavioral evaluation, food preparation, laundry, grooming, and indoor and outdoor play spaces for dogs, cats and other species.

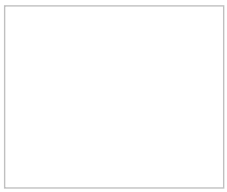
While some areas, such as laundry and grooming, can be doubled up, some areas cannot be safely combined. It is especially important to make sure there’s absolutely no cross over between intake areas and sick animal treatment/euthanasia areas. Of equal importance are people areas, such as a welcoming reception/adoption area, get-acquainted areas, and a break room for staff and volunteers.

Areas for training, conferences and meetings serve not only the shelter, but the whole surrounding community. With proper planning, these can also serve as temporary housing areas in the event of a serious disaster.

Strategies for noise control

Controlling noise in a shelter is important for the well-being of visitors, volunteers and staff as well as the animals. For cats, perhaps the most important noise to avoid is the sound of barking dogs.

It is not surprising that visual and auditory exposure to dogs is a significant stressor for confined cats [1]. Even one or two dogs present in the environment can have a significant impact. In the figures below (decibels levels are along the Y axis, time along X axis-and each represents 1 week of noise levels), the picture on the left depicts the sound measurements during a week when two small dogs were housed in a cat building. Noise levels routinely exceeded 80 decibels during a large portion of each day. In the picture on the right, both dogs were removed from the cat building at the time point indicated by the green arrow. Following their removal, noise levels dropped and remained below 80 decibels for much of each of the following days (the sharp noise spikes that continue to be seen occur during each days cleaning time).

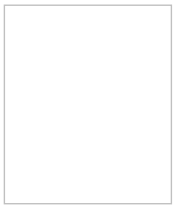


Dog noise is not the only noise to be concerned about in cat housing areas; any sudden or loud noises can cause stress and adversely affect cat health and well-being. In an unpublished study examining sound levels in cat intake housing areas and URI rates in 5 California shelters, the lowest URI rates occurred in a shelter with the lowest noise levels (10-100 fold quieter than the other 4 shelters).

Dog kennels should also be designed to minimize noise, for example by reducing the number of dogs housed per ward, using solid enclosures (e.g. real life type rooms with outdoor access for elimination), providing in-kennel enrichment, providing out of kennel time, and planning traffic flow so that dogs are not exposed to a constant parade of dogs and people walking by.

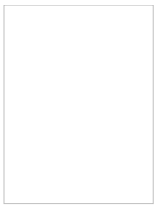
Preventing all visual access to other dogs may be necessary for a few individual dogs that are overstimulated by the presence of others, but in general it is neither an effective nor necessary means to decrease barking in dog kennels. In fact one study found that visual exposure to other dogs not only did not increase barking[2], it encouraged dogs to stay near the front of their kennels which may encourage adoption[3].

For all species also consider the impact of cage design and materials on noise levels. For instance, different types of latch closure for cat cages vary greatly in the amount of noise they make each time a cage door closes. Metal on metal noise can be extremely loud with typical opening of metal cage doors reaching 90+ decibels. Some new stainless steel cages come with quieter, replaceable plastic latches. In some cases older metal latches can be replaced with plastic ones – check with your cage manufacturer for availability. Consider this when investing in new cages.



Plastic latches help quiet metal cage

Cage material also has a great impact – stainless steel, for all its shiny virtues, is clang-y and resonant. All the cleanliness in the world may not avail if the banging of steel doors disrupts sleep and induces stress to the point that animals' immune systems are compromised. If stainless steel or other noisy material is used, towels and furniture in the cages can help dampen the effect, as can careful attention to minimizing noise during daily caretaking. Noise dampening panels are available for stainless steel cages for only a few dollars each.



Noise dampening panels on a steel cage.

Cleaning time is a noisy time in most shelters. Educate staff and caretakers to reduce noise during cleaning. Ensuring doors are closed between animal housing areas can help reduce noise levels. A gate or cage door that is closed with care can be much quieter than one closed without thought – making a noise that is startling to even the most social and adjusted shelter animals.

Ventilation

Air exchanges of 10-12 per hour are often recommended for animal housing areas, but the number of necessary air exchanges depends greatly on animal density and level of contaminants (e.g. litter dust, cleaning chemicals, etc.). For instance, just a two-fold increase in density can necessitate a 10-fold increase in air flow in some animal housing environments.

It is normal for shelters to occasionally smell like the animals they contain, but a persistent, noticeable odor of animal waste or cleaning chemicals can be a sign of inadequate air exchange, as can be respiratory irritation for staff during cleaning or frequent respiratory disease requiring treatment of animals.

Even if air exchange within a room is perfectly fine, the air quality within a housing unit may be poor. This is especially true of small cages enclosed on all but one side (e.g. typical single cat cages). Make sure cages are designed to take advantages of air exchange in the environment. Unless cages are individually actively ventilated, at least 1.5 walls of the enclosure should permit easy air flow (e.g. cage bars or Plexiglas with extensive vent-holes on the front and upper rear half of the cage).

Airborne disease is not a major issue for cats [14,15], but can be a significant means of disease transmission for dogs. While individual ventilation for dog runs is not necessary except for fully enclosed runs or real life type rooms, separate air flow should be maintained to canine isolation areas versus those housing healthy dogs. If offensive odors are noticeable either within enclosures or in animal housing areas in general, or respiratory irritation is reported by staff or visitors, air quality needs to be improved.

Plumbing and drainage

To avoid the necessity of mopping, any area requiring routine disinfection, such as animal housing areas, get-acquainted rooms, and indoor play areas, should be designed with drains. At minimum this is a requirement for all dog housing areas. Although passionate arguments are made either way, there is no documented association between drain type (individual vs. trench) and level of disease. It is possible to adequately control disease in shelters with either drain type, provided that drains are well designed, appropriately placed, adequately cleaned, and properly functioning. Conversely, drains of either type that are difficult to clean or that are accessible to animals can transmit disease. Never place drains in walkway areas.

For human as well as animal health, sinks should ideally be present in all animal housing areas. At minimum, they need to be provided in intake, treatment, surgery, euthanasia, and of course food preparation areas. Hand sanitizers should also be provided in all animal housing areas and anywhere else animals are routinely handled.

The primary enclosure

The type of housing encountered in a shelter is arguably the single most important factor in determining the quality of an animal's experience in that environment. Housing impacts the animal 24 hours a day and affects everything from stress level and disease risk to food intake and sleep quality. Good quality housing must meet several criteria:

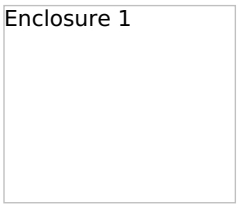
- Protect animals from disease exposure
- Permit provision of clean water and food without contamination from urine, feces or litter

- Facilitate monitoring of health and behavior
- Permit efficient and low-stress daily care
- Provide physical comfort (e.g. variety of surfaces, thermal control)
- Provide good air quality
- Provide animals with the opportunity to express normal behavior, such as (depending on species and housing unit) hiding, perching, walking, running, jumping, scratching, playing, and interacting with or avoiding con-specifics and people

In a shelter environment, housing must also facilitate the main functions of the shelter, which often includes reclaim, rescue or adoption of animals. Therefore, housing must not only protect animals from disease exposure and stress, it must simultaneously present animals for viewing to be recognized and reclaimed by owners or selected for adoption. Sometimes this leads to apparently conflicting goals: housing that is welcoming to adopters and volunteers may not facilitate easy disinfection or may subject animals to relatively high stress levels. However, if animals get sick or unduly stressed they are less likely to be adopted. Ultimately, a balance must be struck that meets the needs of animals, staff and adopters.

Re-evaluating the basics: what do animals need in primary enclosures?

For decades, cages and kennels have been produced with little regard to even the most basic needs of animals. This has been especially true for cats. Feline intake housing, where cats spend the crucial first days in shelter care, often consists of a single-compartment cage, approximately 24” wide by 28” deep by 24” high. With a food and water dish and litter pan placed in the cage, there is no room for an adult cat even to lay down with its body fully extended, let alone walk a few steps, stretch, or express virtually any other normal feline behavior.



The litter box has been overturned, leaving the top of the hiding box the only place to retreat from the mess.

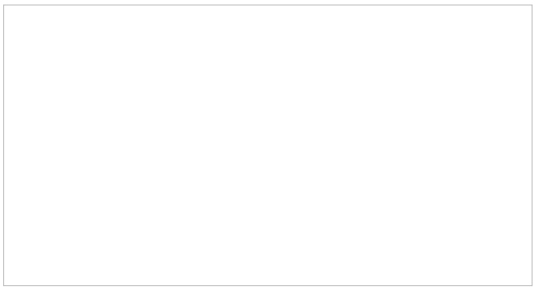
With litter and food in place the floor area is insufficient to allow virtually any normal behavior or posture other than the cramped position this cat has assumed.

Provision of a hiding place, a crucial tool to relieve stress in animals, results in an even more cramped environment. Contamination of food and water by adjacent litter and feces is common and usually unavoidable. These cages are difficult to clean on a daily basis without direct handling of animals, which in turn results in stress and extensive opportunities for disease transmission via fomites. Housing in this type of cage has even been linked to increased risk of euthanasia and decreased likelihood of adoption when compared to more enriched housing[4].

Canine housing is often not as cramped as feline housing, but still not infrequently fails to meet dogs’ basic needs. Because dogs do not contain their excrement to a litter pan as cats do, providing dogs with the opportunity to defecate and urinate away from their eating and sleeping area is crucial both for mental well-being of some dogs and to promote the house-broken behavior that virtually every adopter would prefer.

Even with the best intentions for frequent walking, it is likely that some dogs in a shelter will be confined for sufficiently long periods that they will need to eliminate in their run, and should have the choice of doing so in a way that does not soil their living quarters. This requires a run that is

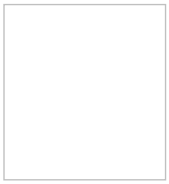
sufficiently large and ideally clearly segregated (e.g. double sided, preferably with one half having access to the outdoors).



This chart shows the strong preference of dogs to urinate and defecate away from their resting and eating area, even if they are not already housebroken. The first tall column (70%) indicates the percentage of time dogs had feces on the side away from where their bed/food was located. The second tall column(68%) indicates the percentage of time dogs had urine on the side away from where their bed/food was located (read the full study at http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0096254).

Double sided or otherwise compartmentalized runs are also critical to permit cleaning and disinfection of recently admitted or sick dogs. All the benefit of daily cleaning will be undermined if dogs must be transferred to a common area and walked down common hallways and/or exposed to the hands, arms, and clothing of caretakers in the process.

This cute puppy is exposed to all the germs that have accumulated in this hallway as he is transferred from one single run to another during cleaning.



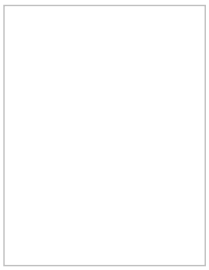
This cheerful Labrador mix can remain safely contained on one side of his run during cleaning, separated from the other half by closing the guillotine door. This type of housing provides for separation of feeding and elimination areas and affords a greater degree of environmental control for the dog compared to a cage, single-sided run or small room.

Elements of single animal housing

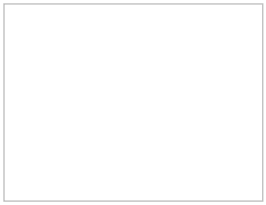
It is helpful to take a step back and look at what animals really need, rather than what we have been accustomed to providing. Adequately sized, enriched individual housing is generally the method of choice for housing newly admitted animals, juveniles (or litters), animals requiring close monitoring for health or behavior, and any animal not previously socialized to other animals. The desired characteristics of individual animal enclosures are described below; keep in mind that for long term housed animals, alternatives to traditional cage housing are necessary to provide for adequate welfare[5].

- **Adequate floor space and height:**
  - One study found that cats were less stressed when given 11 square feet of floor space compared with animals given only 7.5 square feet[6]. Our 2011 study, "Environmental and Group Health Risk Factors for Feline Respiratory Disease in Animal Shelters" documented lower risk for upper respiratory infection (URI) in shelters that provided housing with > 9 square feet of floor space compared to shelters that provided less than 8 square feet.

    - In order to allow cats to assume most normal postures, housing needs to provide at least 28” by 30” of clear floor space (e.g. excluding space occupied by bed, food and water dishes and litter boxes). In order to accommodate a carrier or hiding box, this generally means a width of > 3 feet for a main compartment.
    - The height should be high enough to allow the cat to stand on their hind legs and fully extend their front legs without touching the roof of the enclosure, at least 30” with a shelf or other elevated perching space [7].
    - Additionally, cages should be of sufficient size to accommodate a carrier which can be used to move the cat safely throughout the facility (and can double as the hiding space within the cage).
    - Although there are no studies documenting the specific space requirements for dogs, the same functional parameters should be met: sufficient floor space and height to allow the dog to assume all normal postures and engage in normal behaviors such as playing and moving about. Dog runs should be of sufficient size and height to permit human entry for cleaning and interaction, and should ideally be large enough to accommodate a human sitting in a chair to foster quiet interaction.
- **Hiding area/carrier**.
    - All animals should be provided with appropriate places for concealment which comfortably allow them to avoid visual contact with people or other animals[8]. These can be arranged such that staff can look in on an angle for identification and monitoring.
    - For cats and other small pets, cages should be of sufficient size to accommodate a carrier which can be used to move the animal safely throughout the facility (and can double as the hiding space within the cage). A carrier ideally stays with the cat throughout its shelter stay, from transport to intake, through stray holding, surgery, in get acquainted and play areas, to and from foster care, etc. If an airline type carrier or cardboard “Hide Perch and Go” type box is used, this can even go home with the cat to ease the transition to its new environment.
    - If floor space is insufficient to include a hiding box and still allow the cat to assume normal postures including laying down at full extension, providing a solid hiding box that takes up much of the floor space may do more harm than good. In such cases, the long term goal should be increasing cage size via installation of a portal (for more information, see our information sheets on Portal Instruction for Installation and Making Double Compartment Cat Cages using a PVC Portal) or purchasing larger cages to provide sufficient floor space and a hiding box or carrier.
    - In the short term it is a better option to provide a hiding option that does not clutter limited floor space, such as a towel draped over a shelf or bed or a cage cover (these can be tailored to allow some concealment while still providing good air flow and visual access). If cats are housed in small cages, carriers should be stored outside the cage but still used for transport through the facility and remain with the cat throughout its shelter stay. Recognize that small cage housing has limited use and should not be utilized for long term housing of cats.

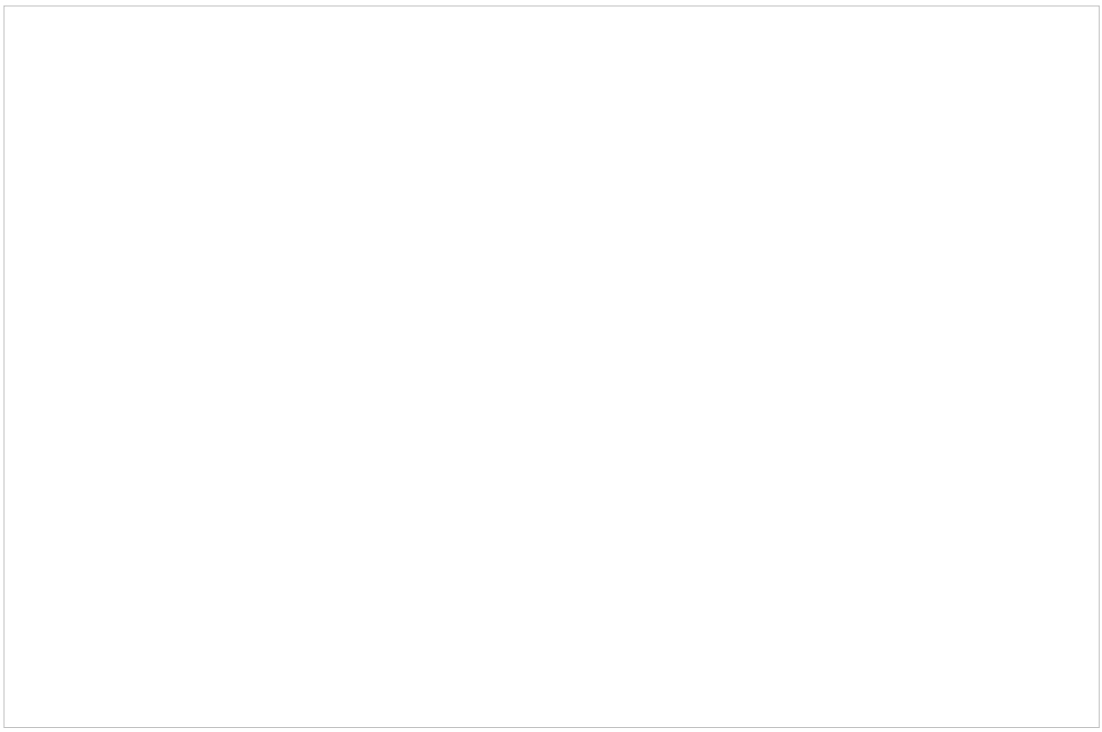


A cat perches on a bed with a towel draped over it in a small cage. This provides both an elevated resting place and a place for concealment with minimal impact on floor space. For more information on how to make this bed, see our information sheet on Building an elevated bed for use in shelter cat housing.



A custom cage cover has been made to allow the cat a choice of concealment or exposure to her

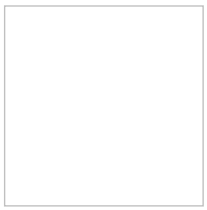
surroundings.



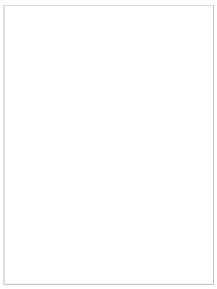
Homemade cage covers aka 'curtailments' can be placed on the cage without disturbing the cat inside and simply washed between uses. They have elastic in the top so they can cover more or less of the cage depending on the cat's needs. To learn how to make these, please refer to our information sheet How to make partial cage covers aka "CURTAILMENTS"

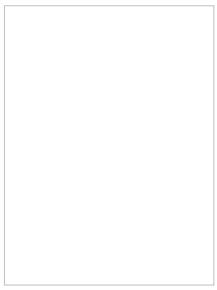
- Dogs also benefit from the opportunity for concealment and some control over their environment. Crates for dogs can be more unwieldy due to their larger size, but in some cases the benefit will outweigh the trouble, especially for small dogs, frightened dogs, and those staying longer term. Providing crates models this helpful tool for the public as well as providing a bed, concealment and even a place to perch on top (some dogs, like many cats, prefer to sit up high). Crates should be sent home with the adopter or thoroughly sanitized between dogs and discarded if they are chewed to bits. The design of the run itself can facilitate opportunities for retreat or interaction as well. Double sided runs, runs designed on an angle, and furniture in "real life rooms" also offer some opportunities for retreat

A terrified little dog crouches under its bed, the only hiding place available



A little dog chooses to use the outside half of his run to keep a wary eye on visitors. This dog shyly approached visitors with encouragement and ended up being a friendly pet.



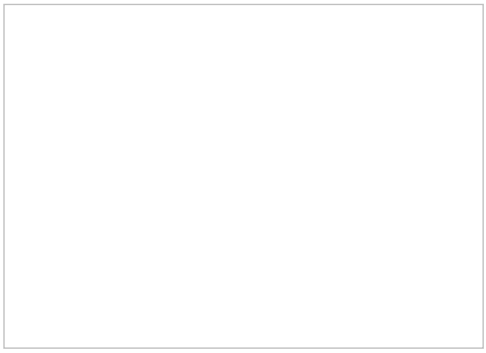


High sided beds or crates provide great hiding places and choice for dogs in their kennels.

- **Double-compartment**.
  - In addition to providing housing that allows for efficient and easy cleaning and daily care without animal disruption (critical for reducing handling stress for animals and reducing disease risk throughout the facility), double compartment cages meet animals' needs by providing distinct separation between elimination areas and feeding/resting areas.
  - Environmental control such as that afforded by compartmentalized housing can even promote friendlier behavior that may increase the likelihood of adoption[9].
    - For cats, litter should be in a separate compartment from the main food and resting area. The litter compartment may be smaller than the main living compartment but should be at least 15” wide to accommodate a litter box and allow easy access for cleaning.
    - Alternately, very large single compartment housing can function adequately, providing size is sufficient for a person to walk in and clean without disrupting the cat, and greater than 3 feet is maintained between food and litter. In these cases, a carrier should still be provided so that the cat can be comfortably confined if necessary while its quarters are tidied.
    - For dogs, double compartment housing (ideally separated by a guillotine door that can be operated from outside the run) is critical to allow safe, efficient cleaning and care. Cleaning dog runs is a splashy wet business and it is difficult to avoid spraying dogs in adjacent runs; thus when cleaning a row of kennels, all dogs should be moved to the other side of a double compartment kennel and the guillotine door closed during the cleaning process.
      - Tying dogs out or keeping them in common areas during cleaning is not a viable solution, as this practice promotes disease transmission and fighting between incompatible dogs thrown together.
    - Double compartment housing is also necessary to provide clear separation between elimination and sleeping areas, a foundation for housebreaking (see Dog Elimination Preference chart above). Even in shelters with robust dog walking programs, it is likely that dogs will sometimes be left in the run for longer than they can hold their bowels or bladder (especially those who are not trained to take advantage of outdoor elimination opportunities whenever they have the chance).
- **Minimal visual stressors and provision of visual choices.**
  - Animals in normal environments choose to spend a significant amount of time in visual contact with other animals or looking out windows. Visual access to other housed dogs has not been shown to increase barking, and allowing dogs the option of visual access to others (as long as they also have the option to retreat and not see or be seen by other dogs) may provide visual stimulation and encourage dogs to the front of cages, which in turn can facilitate adoption[2].
  - Animal housing should not face a blank wall if possible
  - If cage banks or kennels face each other, part of the front should be covered so that animals can choose their level of visual contact, and some housing should be available

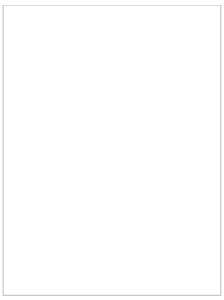
for individual dogs that get overstimulated by exposure to another dog across the way (e.g. a few runs that do not face onto other dogs).

- **Hard and soft surfaces**.
  - Animals prefer soft sleeping surfaces over harder surfaces such as metal [10, 11]. Firm, cool surfaces benefit animals' ability to thermoregulate and gives them choices in their environment – e.g. soft bedding should be provided, however the entire cage surface should not be taken up with soft bedding.
- **Opportunity for potential adopters to make physical contact with adoptable animals**
  - This can happen by by petting them through cage bars, an interactive toy, or the opportunity to physically enter a large kennel
  - Many adopters report that physical contact is an important factor in adoption-decision ("the cat chose me"). The risk of infectious disease transmission amongst healthy adoptable animals by visitors is likely minimal compared to the benefit of improving the chances and speed of adoption.
  - Hand sanitizers and hand washing stations should be provided, and unsupervised contact with infectious, sick animals prevented by housing these animals in separate areas.
- **Enrichment within the cage and opportunity for out-of-cage time** .
  - Provide animals with a variety of toys and offer cats a scratching post or pad. This can enhance opportunities for adoption as well as providing enrichment; even if toys are not played with, they can attract the attention of adopters [12, 13].
  - Once screened for health, provide individually housed animals with an opportunity for out of cage time unless kennel size is sufficiently large to permit running, jumping, predatory-play behavior, lap-sitting, ball chasing and other normal behaviors. This can be accomplished in a separate, easily cleaned room or large pen placed off to the side or in the center of a room.
    - Do not allow animals to run loose in a room as a method of enrichment during cleaning, as litter, hair and debris and other potentially infectious material tends to accumulate on the floor in front of cages and may transmit infection.
- **Outdoor space if possible**.
- Animals benefit from the choice of exposure to sunlight and fresh air within their primary enclosure. Outdoor sections of enclosures can also be a cost effective means of substantially improving air quality.
  - For dogs, this is accomplished through double sided runs, whether connected to an interior run or room. These can be separated by a guillotine door as described above to facilitate care without having to enter the run (especially beneficial for newly admitted, aggressive, or juvenile dogs). Alternately a door with a dog door can be used.
    - This design is also beneficial for cats; a human-sized door as well as a cat door will facilitate retrieving cats from the outdoor run sections.



This cat room has a human door and a cat door to an outside porch area creating wonderful indoor/outdoor housing.

- Single or stacked pens for cats can also have an outdoor section connected by a cat flap. In temperate weather litter pans can be kept in the outdoor half of the run, creating a more pleasant indoor environment for animals and visitors. Outdoor areas should be connected via a flap to an indoor compartment. (Adequately sheltered space must also be provided, of course).



Individual cat housing in a room large enough to permit entry for daily care needs.

The outdoor (porch) area of a similar housing unit. Both the indoor and the outdoor areas have a human door for entry, cleaning and care needs.

Cost effective solutions for individual cat housing

Although converting or replacing poor cat housing represents an initial investment, over time this will likely be more than repaid in decreased cost of illness and care. Poor housing has been specifically linked to increased risk of upper respiratory infection (URI) and euthanasia in animals[4].

Each case of URI can cost an estimated $200-$400 (including daily cost of housing and care). When a cat is euthanized rather than adopted, not only is a life lost, but also the opportunity to recover adoption and service fees is missed, resulting in increased overall cost to the shelter.

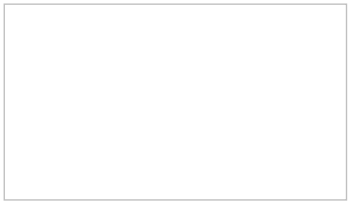
Double compartment or walk-in housing results in daily time savings during routine care procedures as it requires little to no animal handling and makes cleaning and feeding easier. Providing quality housing makes financial as well as ethical sense.

In case of severe financial constraints, gradual changes can be made, with a priority on intake housing and housing for kittens (as these populations are most vulnerable to infection). Lower cost materials may also be considered. While stainless steel is often considered the material of choice for its durability and ease of disinfection, it is also cold, reflective, noisy and has historically been available in a limited range of sizes and configurations.

A cage or condo that meets more of the animals' behavioral needs and facilitates easy day-to-day care may result in lower disease rates and higher adoption rates even if made with a theoretically less "disinfectable" material such as laminate, fiberglass or plastic. Combine this with a disinfectant with good penetration and activity in the face of organic matter and disease transmission concerns are further minimized.

Additional cost effective options include pre-built shower stalls or retrofitting existing cages by addition of a portal. This can be accomplished in cages of virtually any material (including steel and fiberglass) for ~$100 per cage depending on the cost of labor. For more information, see our information sheets on Portal Instruction for Installation and Making Double Compartment Cat Cages using a PVC Portal.

A pre-fabricated shower stall has been outfitted with shelves to provide additionally functional elevated space.



Two stainless steel cages have been joined via a portal to provide more adequate space and functional separation of food/water and litter.

Elements of group housing

Group housing has been utilized to address some of the deficiencies associated with traditional

individual housing. It is easier to provide animals behavioral choices, such as jumping, running, and hiding in a group housed setting. Caretakers can enter group cat rooms to tidy up, feed and care for the animals with minimal disruption and without having to directly handle animals, and adopters can interact with the animals in a more home-like environment. Group dog housing affords social dogs with opportunities for play and social interaction as well as offering an overall larger space.

However, group housing has some potentially serious downsides. Disease control within the group is not possible, making this an appropriate choice only for animals known to be in good health and protected by vaccination. Even so, transmission of sub-clinical infections can be a problem. Additionally, monitoring of individual health or behavior is challenging and some problems can go undetected until serious health and welfare issues have developed.

For dogs, adopters may be reluctant to break up a pair that seems to get along yet be unable to add two pets to their lives, leading to prolonged time to adoption for pair or group housed dogs (if this is an issue, it can be solved by housing dogs singly during open hours, and pairing them at other times for dog-dog socialization).

Perhaps most importantly, group housing can create intense, unrelieved stress for some animals, increasing their risk for disease, reducing their chance of adoption, and making their daily life miserable. Because animals must use space rather than physical barriers to prevent conflict in group settings, more rather than fewer square feet per animal are required in group compared to individual housing to prevent unacceptable stress levels.

For animals that have not been previously socialized to other members of their species, group housing is likely to be a constant stressor, and addition of non-social animals to a group can elevate the stress levels of the resident animals as well[14]. The transient nature of most shelter environments exacerbates the problems with group housing: we routinely counsel clients to give newly adopted and resident animals plenty of time for a gradual introduction, yet in shelter group housing several animals a day may be abruptly removed and added. This leads to constant social stress and readjustment, not to mention risk for introduction of disease. In cats specifically, addition of new cats to a group has been shown to be a powerful activator of feline herpesvirus, leading to reactivation of this infection even in cats negative after two steroid treatments[15].

Group housing should be used with care, as an enrichment for animals after individual evaluation, and some individual housing should always be available for animals requiring closer monitoring or who do not do well in a group.

Quality group housing should have the same characteristics as enriched single housing, with these additional considerations--

Cats: group housing

- **At least 18 square feet (1.8m2) of floor space per cat**
  - Cats also need the opportunity to maintain a distance of 3-10 feet (1-3 meters) distance between themselves and other cats [6, 16, 17].
  - This does not include perches or walkways, but in temperate climates can include outdoor areas provided cats have 24 hour access.
- **Group size of 2-4 animals.**
  - Addition of new animals to a group can result in more frequent aggression [17, 18] and can even cause sufficient stress to activate feline herpesvirus infection [15]
    - In order to prevent frequent regrouping and to allow periodic complete emptying and disinfection of group rooms, more small rooms are greatly preferable to a few larger group rooms.
  - Dog runs no longer in use can be nicely converted to serve as small feline “group rooms” for this purpose
  - At maximum house no more than 8-10 cats per adequately sized group room
- **Ample hiding and resting areas.**
  - There should be at least as many hiding areas and elevated resting surfaces (at least 12” wide) for the number of animals plus one
- **Ample litter and feeding stations.**
  - While it may not be practical or desirable to provide each cat with a litter box, even in small rooms housing only 2-4 animals there should be at least 2 non-adjacent litter boxes and feeding/watering stations to prevent guarding by any one cat
  - As the cat numbers increase the number of feeding stations and litter boxes will also need to increase
  - Daily monitoring is required, especially at feeding time, to ensure each cat has access

to food and water. Periodic examination and weight monitoring can be very helpful in insuring health
- **Enrichment materials such as scratching posts, perches and furniture that can be readily disinfected or discarded from time to time.**

- **Double doors at entry/exit points if possible.**
  - This is especially important in larger group rooms to prevent feline escape when human visitors come in and out. At minimum, group room doors should not open directly to the outdoors.

Dogs: group housing

- **Sufficient space for each dog** .
  - No studies are available documenting space requirements per dog, but each dog should be able to move about freely without encountering another dog, with enough additional room that each dog can have its own resting place.
- **Pairs rather than group housing.**
  - In addition to regrouping issues as for cats, dog feeding behavior is such that separation at feeding time is often required to ensure each dog has sufficient food. This can be easily accomplished if no more than two dogs are housed per double sided run.
  - If dogs are kept in larger groups, close monitoring of feeding is a must. If food guarding is observed, provision must be made to segregate dogs at meal time.
- **Ample resting places and toys for each dog** .
  - Although some dogs may choose to snuggle up together, there need to be at least as many beds as there are dogs to prevent guarding by some, preventing less dominant dogs from having access.
- **Double runs or rooms separated by a guillotine and/or full size door.**
  - Since it is likely that some dogs will urinate and defecate in the run, daily cleaning is a must. It is not often practical to remove a herd of dogs daily for cleaning, so double sided runs are an important management consideration. This also provides dogs more flexibility to stay away from other group members if they so choose.

All group housed animals:

- **Daily monitoring and removal of animals showing signs of social stress, including guarding of resources (e.g. food, beds, toys, litter, doorways or resting spots); frequent hiding; sitting with back turned to the group or hunched in a corner; decreased motor activity; or inappropriate elimination (e.g. eliminating on beds, cats eliminating outside of litter boxes)** [9].
  - Individual housing is the ideal option for any animal showing signs of stress in a group room, rather than repeatedly trying to house them with different, more compatible groups as the process of trying to find a compatible group is likely to afford numerous opportunities for stress and disease transmission.
  - A careful physical exam should also be performed to rule out medical causes for withdrawn or aggressive behavior

Considerations for “out of cage/kennel” time

Even when housing quality is good, it’s often beneficial to provide animals with enrichment areas outside of their cages or kennels for exercise, play and interaction. This becomes even more urgent when cages are small and/or length of stay extends beyond a week or two. Areas for out-of-cage time should be incorporated into a shelter design plan and can often be retrofitted into an existing structure.

For cats, out-of-cage areas can include sufficiently large enclosures within a room, outdoor areas enclosed by one means or another (e.g. cat fencing), and/or designated rooms (sometimes a get-acquainted room can function as an enrichment area when the shelter is closed to the public).

Most dogs enjoy outdoor play areas and walking trails, but dogs also benefit from quiet out of cage time in a more home-like indoor setting. Consider that many adopters want a dog that will mostly hang out with them in the house, quietly by their side as they go about their day. Allowing dogs to practice quiet indoor behavior while a friendly volunteer or staff member reads a book or watches TV can enhance their chances for adoption as well as providing a welcome break from the noise and activity of the kennel.

Ideally, construct and furnish enrichment areas such that they can be easily disinfected. With newer disinfectants such as Accel (accelerated hydrogen peroxide), a variety of materials can be

used and effectively decontaminated, but keep the area uncluttered and avoid nooks and crannies that are hard to reach. If structures for out-of-cage time such as play towers are placed within cat rooms, ideally place them at least 5 feet from the front of cages to prevent droplet transmission of disease.

For cats especially, make sure there is some part of the out-of-cage area that offers protection from visual exposure – for instance the play tower in the picture below is well-positioned away from the front of cages but would benefit from having one corner covered with a solid visual barrier.

Use of enrichment areas

Although this is not exactly on the subject of facility design, we will address the use of enrichment areas here since we have gone and brought up the subject. This applies to general use of indoor and outdoor enrichment areas – play groups as a form of enrichment for dogs are a separate subject unto themselves. In order to protect animal health and ensure that out-of-cage time relieves stress and enhances wellness, there are some caveats to consider.

Screening - a few steps to limit risk:

- Perform a good overall general health exam to rule out potentially infectious conditions
- Treat animals for common internal (notably roundworm, hookworm, and coccidia) and external parasites
- Thoroughly screen animals (especially cats) for ringworm by careful physical and Woods lamp exam + culture of suspicious lesions
- If multiple cats will share an enrichment area simultaneously, test for FeLV/FIV. Be sure to monitor group out-of-cage time for cats closely, if it is used at all.
    - Many cats prefer a gradual introduction to other cats (think about what we recommend to new adopters) and will do better with time on their own to explore without worrying about another cat roaming about in the area. The smaller the out-of-cage area, the more this is likely to be true.

Health history - provide in-cage enrichment instead of out-of-cage time for animals with risky health histories, such as:

- Possible recent exposure to a serious illness (e.g. parvo or panleukopenia in the previous two weeks)
- Recent recovery from a serious infection (e.g. panleukopenia, possible virulent calicivirus, parvo, distemper)
- Possible immunosuppressive condition (e.g. FIV, diabetes, treatment with high doses of steroids for any reason – if these animals are placed in enrichment areas, be extra careful about cleaning/disinfecting before and after)

Age and vaccine history - consider before placing in enrichment areas:

- Is the animal over > 5 months of age?
    - Kittens and puppies are never quite safe: not only are they more prone to infection and shedding of harmful pathogens, maternal antibodies may prevent effective vaccination.
        - Rather than using enrichment areas for out of cage time for these youngsters, ideally fast track them through the shelter so that cage confinement does not become an issue.
        - If you must hold onto youngsters, provide high-enough quality housing not to require out of cage time. If that's absolutely not possible, put only one litter at a time in enrichment areas with thorough disinfection between.
    - Vaccinated adults (> 5 months old)
        - Adult cats vaccinated > 3 days ago for panleukopenia with *modified live*

subcutaneous vaccine are at low risk for infection
    - Adult dogs vaccinated > 3-5 days ago for parvovirus and distemper with *modified live subcutaneous vaccine* are at low risk for infection
    - Vaccination does not fully protect cats from respiratory infection, but transmission of disease between healthy, unstressed cats is unlikely during routine use of an out-of-cage area even if not disinfected between uses.

Sanitation:

- Thorough disinfection and handling precautions in between each use by a healthy animal are generally neither realistic nor necessary.
    - Unstressed, healthy-appearing animals are at low risk to transmit illness to other un-stressed healthy-appearing animals. Therefore, selection of animals for out-of-cage time is more important than strict cleaning precautions between each animal or group of animals using the area.
    - Out-of-cage areas may also be used for cats or dogs all similarly affected within a shelter with mild respiratory illness (severe illness or in a veterinary clinic is a whole other matter). The rationale for that is that within a shelter isolation ward similarly affected animals are likely suffering from the same infection, rendering cross contamination less of an issue than it would be in private practice dealing with animals from different sources.
    - Although disinfection between individuals within a sub-population is not generally necessary, it is important to keep different sub-populations separate
    - Pick up and dispose of feces immediately
    - Swap litter boxes out after each use (e.g. urination or defecation – no need to swap if a cat merely visits the area and does not use the box)
    - Clean poop scoopers between uses with a disinfectant active in the face of organic matter (e.g. Accel)
    - Clean and disinfect (to the extent possible) once daily and after any known disease exposure
    - It is even more important to restrict use of areas where disinfection is not possible, such as grassy play areas or walking trails, to animals > 5 months of age, fully vaccinated, examined and treated for internal and external parasites, and in overall good health. If repeated disease problems are associated with an outdoor area, it may be necessary to pave or resurface the area.

Temperament:

- Obviously animals should not be placed in enrichment areas if this cannot be accomplished safely for animal and staff. Also make sure that the experience is, in fact, enriching for each individual based on their temperament and preferences.
- Observe behavior both in cage and in the enrichment area until the animal's preference is known. Animals that are very tense and/or hiding in their cage may not be ready for out of cage time (or they may benefit greatly if the enrichment area is quieter and more homelike than the cage or kennel and if other social animals are present). Watch these fearful animals especially closely when first placed in an enrichment area and provide alternatives for animals that spend all their out-of-cage time hiding or desperately striving to escape.
    - The focus for these animals should also be gentle interaction in their own cage to encourage adaptation, and improvement to the primary cage environment (such as visual barriers, hiding box, soft bed, moving to a larger cage or quieter area of the shelter if possible).
- For cats, if possible move some comforting item with them into the enrichment area, especially for cats that are fearful or shy.
    - If a carrier is assigned to the cat, this is ideal – place the cat's bedding in the carrier and use it to transport the cat to the area, and let the cat choose when and if to emerge.
    - If no carrier is available but the cat has a hiding box, bed or even a towel, this can be used both to transport the cat to the area without contaminating clothing, and for the cat to have a friendly smell when they are getting to know the new area.

Finally, a word about the big picture. However nice the housing at the shelter, the number of kindly staff and volunteers and the degree of enrichment, the ideal outcome for shelter animals is a home of their own. Housing and enrichment should enhance each animal's chances for adoption, never detract. This includes making sure that length of stay (LOS) is not unnecessarily prolonged. Sensible precautions as described above will minimize the chance of animals becoming sick as a result of out-of-cage time and therefore staying longer, negating the purpose of enrichment. Also be aware of the impact on staff time. If staff hours are very limited, such that spending time moving animals in and out of enrichment areas detracts from activities needed to move animals swiftly through the shelter and out to homes, invest in building a volunteer pool or increasing staff hours to accomplish this activity.

Conclusion

Too often, animal housing in shelters and veterinary clinics has been built without full consideration of the basic needs of animals or the practical implications for daily care. By paying attention to this important aspect of care for confined animals, an initial investment can have long term rewards in reduced staff costs, reduced disease, increased adoptions, and most importantly, greater comfort and well-being for every minute an animal is in our care.

References

1. McCobb, E.C., et al., Assessment of stress levels among cats in four animal shelters. Javma-Journal of the American Veterinary Medical Association, 2005. 226(4): p. 548-555.
2. Wells, D.L. and P.G. Hepper, A note on the influence of visual conspecific contact on the behaviour of sheltered dogs. Applied Animal Behaviour Science, 1998. 60(1): p. 83-88.
3. Wells, D.L. and P.G. Hepper, The influence of environmental change on the behaviour of sheltered dogs. Applied Animal Behaviour Science, 2000. 68(2): p. 151-162.
4. Gourkow, N., Factors affecting the welfare and adoption rate of cats in an animal shelter. 2001, University of British Columbia.
5. Newbury, S.P., et al., Guidelines for Standards of Care in Animal Shelters. 2010, The Association of Shelter Veterinarians. p. 64.
6. Kessler, M.R. and D.C. Turner, Effects of density and cage size on stress in domestic cats (Felis silvestris catus) housed in animal shelters and boarding catteries. Animal Welfare, 1999. 8(3): p. 259-267.
7. National Research Council, e., The guide for the care and use of laboratory animals. 1996, National Academy Press: Washington, DC
8. Carlstead, K., J.L. Brown, and W. Strawn, Behavioral and physiologic correlates of stress in laboratory cats. Appl Anim Behav Sci, 1993. 38: p. 143-158.Carlstead, K., J.L. Brown, and W. Strawn, Behavioral and physiologic correlates of stress in laboratory cats. Appl Anim Behav Sci, 1993. 38: p. 143-158.
9. Overall, K.L., Recognizing and managing problem behavior in breeding catteries, in Consultations in feline internal medicine, J.R. August, Editor. 1997, W.B. Saunders: Philadelphia. p. 634-646.
10. Hawthorne, A. and L. Horrocks. The behaviour of domestic cats in response to a variety of surface-textures. in Second International Conference on Environmental Enrichment. 1995.
11. Crouse, S.J., et al., Soft surfaces: a factor in feline psychological well-being. Contemp Top Lab Anim Sci, 1995. 34(6): p. 94-7.
12. Fantuzzi, J., K. Miller, and E. Weiss, Factors relevant to adoption of cats in an animal shelter. Journal of Applied Animal Welfare Science, 2010(13): p. 174-179.
13. Luescher, A.U. and R.T. Medlock, The effects of training and environmental enrichment on adoption success of shelter dogs. AppliedAnimal Behavior Science, 2009(117): p. 63-68.
14. Kessler, M.R. and D.C. Turner, Socialization and stress in cats (Felis silvestris catus) housed singly and in groups in animal shelters. Animal Welfare, 1999. 8(1): p. 15-26.
15. Hickman, M.A., et al., An epizootic of feline herpesvirus, type 1 in a large specific pathogen-free cat colony and attempts to eradicate the infection by identification and culling of carriers. Lab Anim, 1994. 28(4): p. 320-9.
16. Barry, K.J. and S.L. Crowell-Davis, Gender differences in the social behavior of the neutered indoor-only domestic cat. Applied Animal Behaviour Science, 1999. 64(3): p. 193-211.
17. Gouveia, K., A. Magalhães, and L. de Sousa, The behaviour of domestic cats in a shelter: Residence time, density and sex ratio. Applied Animal Behaviour Science, 2011.
18. Nordlund, K.V., N.B. Cook, and G. Oetzel. Co-mingling dairy cows: pen moves, stocking density, and health. in American Association of Bovine Practitioners. 2006. Minneapolis, Minnesota