

Environmental Enrichment for Small Mammals

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Environmental enrichment is important for keeping patients mentally stimulated and active and meeting their emotional and psychosocial needs. In the mammalian brain, environmental enrichment has been shown to induce biochemical and structural changes that correlate with better memory, learning, and immune function.^{1,2} Conversely, development of brain function and behavior has been negatively affected in rodents housed in restrictive and socially deprived conditions.^{3,4} Research also found that ferrets deprived of social stimulation and rough play associated with their natural development had life-long behavior deficits.³⁻⁵

Other behavior issues that can occur if sensory and social needs are not met include overgrooming, self-mutilation, restlessness, cage chewing (Figure 1), stereotypical behaviors, and timidity.⁶⁻⁹ Lack of environmental enrichment can also lead to anorexia (or obesity) from stress, boredom, lack of stimulation, and general inactivity.

Providing enrichment (see **Enrichment Strategies by Species**, page 89) can be easy and inexpensive and allows creativity in simulating circumstances that cater to instinctive behaviors and natural habitats of small mammals (Figure 2).

The 5 main areas of enrichment that can be manipulated to better meet the needs and welfare of small mammals are social, physical, nutritional, sensory, and occupational.

Social Enrichment

Social enrichment includes catering to species-specific needs for social or solitary living and is generally considered the most effective form of enrichment. Many species (eg, rabbits, guinea pigs, mice, rats, chinchillas, sugar gliders [Figure 3, next page]) prefer to be group housed. Care should be taken to ensure adequate, supervised bonding and the correct gender balance based on species. Those housed in groups should also have enough room and shelter to interact while spacing themselves in a socially acceptable way.

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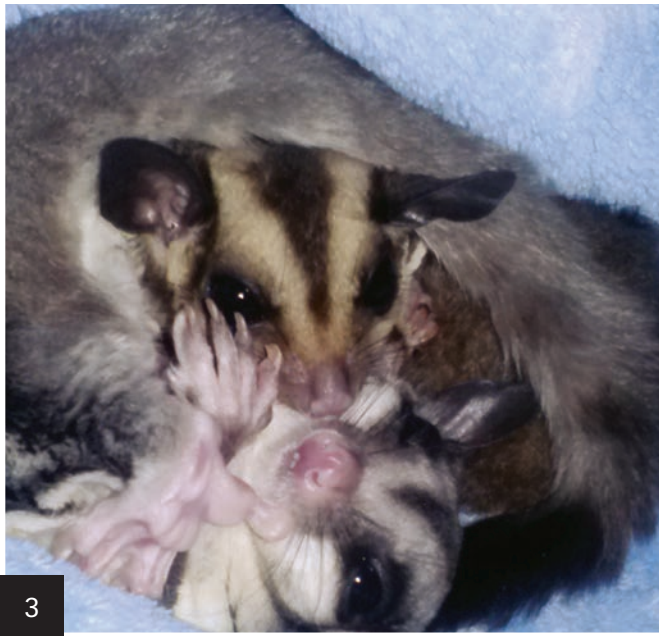
1

Chewing on cage bars can be a sign of stress and/or boredom in small mammals.



2

Placing ping pong balls in a shallow pan of water can keep ferrets entertained and mentally stimulated as they try to fish the balls out of the water. Courtesy of Dr. Peter Fisher



3

Keeping inherently social species (eg, sugar gliders) together is important in providing for psychosocial needs.

Although social interactions account for the most dynamic form of enrichment, they are also likely to result in injury. Some species, such as Syrian and Chinese hamsters, are prone to intraspecies aggression, and elevated cortisol levels related to stress have been detected when housed in groups.^{10,11}

Physical Enrichment

Physical enrichment entails making the patient's environment conducive to performing natural behaviors (eg, digging, chewing, gnawing, climbing, perching) that can help minimize stress-related behaviors and improve quality of life (Figures 4–6). Changes as simple as providing larger cages and deeper bedding resulted in fewer stereotypies (eg, cage chewing, excessive running on hamster wheel).^{11,12} Deep bedding can also help many rodents better regulate body temperature. Hamsters kept in deep substrate (40 cm, 15.8 in) were perceived to have better welfare than those kept in shallow bedding (10 cm, 3.9 in).¹³ Gerbils also prefer deep bedding (20 cm, 7.9 in) for tunnel construction (Figure 7).¹³



4

Given sufficient room in an enriched rabbit-safe area, rabbits can be quite inventive. Courtesy of Darice Heishman



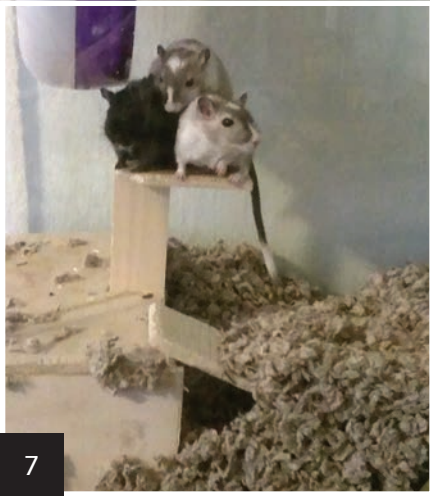
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Creating tunnels using interconnected cardboard boxes covered with sheets or towels is a simple way to enrich the environment of small mammals. Placing food items in different areas of the tunnels is mentally stimulating and encourages physical activity. Courtesy of Paul and Debbie Ladas



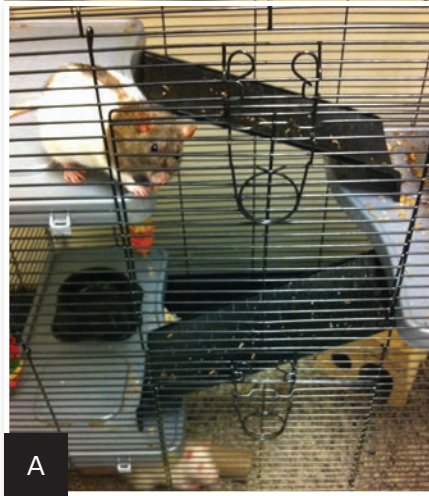
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Tunnels, deep hay, scattered food treats, and bonded cage mates can enrich the quality of life for guinea pigs. Courtesy of Rebecca Howell



7

Deep bedding, ramps, and vertical spaces can provide enrichment and help offset aggressive behavior in gerbils. Courtesy of Lewana Parker



A

8 An enriched enclosure for rats can include ramps, vertical shelves, hide spaces, toys, and deep bedding (A). Providing places to hide, be with cage mates, and enjoy nutritional treats (B) is important when small mammals are hospitalized.



B

Many small mammals prefer to be on high perches, likely so they can watch for perceived predators. Animals can perch on top of a hide box, or carpeted ramps can give them access to shelving or other vertical spaces (Figure 8).⁶ Introducing novel objects can improve spatial memory and lower stress to new situations, but care should be taken not to elicit fear or stress by introducing too many changes at once or too often.

Nutritional Enrichment

Enriching the environment with healthy, species-appropriate food treats and providing foraging opportunities are other ways of fostering stimulation and increasing exercise (Figure 9, next page). One study in rabbits showed that activity time was preferentially increased with food-based enrichment.¹⁴ Providing nutritional enrichment can be as simple as scattering food items in bedding for small rodents and other small mammals housed in groups, thereby encouraging foraging and increasing activity, both of which can lower cage-mate aggression.

More complex environmental modifications to provide food include drilling holes in a nontoxic tree branch and filling it with favored foods to allow sugar gliders to forage similarly to how they would in nature.^{15,16}

Care should be taken not to overfeed, and daily rations should be decreased so treats for enrichment do not result in obesity and medical problems.¹⁷

Sensory Enrichment

Sensory enrichment includes increasing sensory stimuli (ie, manipulating the environment with safe novel items, tastes and smells). This might include rotating cage furniture and food items and treats that are in season and occasionally providing safe branches smeared with a favored food. Providing a day/night cycle appropriate for the species can also aid sensory well-being.

Protected enrichment areas outside the cage allow for safety from other pets, young children, and predators (if outdoors) and dangerous items that can be chewed or ingested (eg, toxic plants,

Environmental Enrichment: Items & Toys

Evaluate the following items carefully based on each pet's needs; not all items are safe with other species or with individuals in a particular species.

General

- Oxbow Pet Products (oxbowanimalhealth.com)
- Bio-Serv (bio-serv.com)

Rabbits

- House Rabbit Society (rabbit.org/shop/#Toys)
- Happy Rabbit Toys (happyrabbittoys.com)

Sugar Gliders

- SugarGliderToy.com (sugarglidertoy.com)

Chinchillas

- Pet Chinchilla Toy (petchinchillatoys.com)

Rats

- RatToy.com (rattoy.com)

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electrical cords). Supervision is recommended, especially for smaller species and always when a small pet mammal is outdoors. Protected areas can be as simple as a portable folding pen or a series of connected cardboard boxes or PVC tubing.

Occupational Enrichment

Occupational enrichment allows small mammals to modify and have more control of their environment, which can lead to problem solving and learning. This includes allowing for environmental manipulation by providing objects or toys that stimulate problem solving, motor skills, and coordination. Providing materials to build nests or wood blocks that must be chewed through to gain access to another area of the enclosure also allows captive small mammals to modify their environment.

Conclusion

Enrichment is necessary for small mammals and is as important as routine veterinary care and proper nutrition.⁵ Using natural history and species-specific natural behavior as a guide to creating healthier environmental parameters—while taking individual temperaments into consideration when choosing environmental manipulations—can make a significant difference in the quality of life of small pet mammals. Various safe toys, distractions, and healthy food treats that simulate natural behaviors can help offset boredom and destructive behaviors, increase exercise levels, and provide the mental stimulation that all pets deserve.

■ **cb**

See **Aids & Resources**, back page, for references & suggested reading.



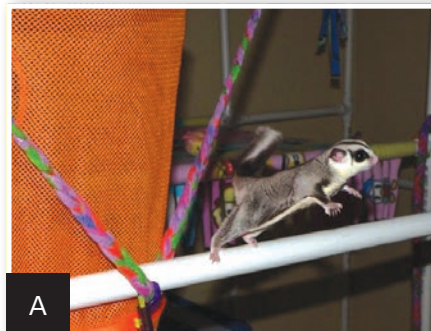
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Growing grass for herbivores creates a safe way to provide nutritional enrichment. Courtesy of Rebecca Howell



10

Compressed haystacks can enrich the lives of grass-eating species by providing mental stimulation through foraging for food. Courtesy of Oxbow Animal Health



A



B

11 Providing a PVC structure with hammocks (A), hide spaces, and a solid small mammal safe wheel (B) can keep sugar gliders active and mentally stimulated. Courtesy of Tracie Brandow

The Association of Zoos and Aquariums (aza.org) defines enrichment as “a process for improving or enhancing animal environments and care within the context of their inhabitants’ behavioral biology and natural history. It is a dynamic process in which changes to structures and husbandry practices are made with the goal of increasing behavioral choices available to animals and drawing out their species-appropriate behaviors and abilities, thus enhancing animal welfare.”

Enrichment Strategies by Species*

Rabbits & Guinea Pigs**

- Boxes with escape holes and tubes connected to simulate dens, burrows, and tunnels
- Carpeted ramps to climb to high perches
- Compressed alfalfa cubes, haystacks, and/or free-choice grass hay
- Covered box with a hole in the side filled with shredded paper or a basket filled with hay or straw for digging
- Food treats hidden in crushed paper cup, cardboard box, or part of an egg carton
- Green leafy vegetable treats hidden to simulate foraging
- Hay and straw to lay in, burrow under, and eat
- Hide boxes made of hay, straw, grapevine, or plastic
- Newspapers or old phone books positioned beneath table legs to chew on and dig at
- PVC tubes and/or dryer hose to use as a tunnel
- Sea grass, sisal mats or rope, grapevine wreaths, cholla cactus, sisal rope, coconut rope, or untreated wicker baskets for gnawing and climbing
- Sturdy hard plastic toys made for large birds (eg, macaws) and large dogs to chew on
- Toilet paper rolls, cardboard boxes (untreated), paper cups (not styrofoam), or paper towel rolls to chew on and hide in
- Treats dangled from a high place or empty pill vial with a treat inside to simulate foraging
- Tub, cardboard box, or paper bag filled with loose hay or straw
- Untreated wood blocks to chew on

Chinchillas & Prairie Dogs

- Deep bedding made from recycled paper pellets or fiber or from shredded paper
- Dust baths
- Haystacks (**Figure 10**)
- Hide boxes
- Multilevel cages or structures for climbing
- Perching platforms
- PVC tubes for tunneling
- Solid wheels

Sugar Gliders

- Coconut structures and other nest boxes
- Ladders and slings
- Mirrors
- Perching platforms
- Pouches
- Sisal rope or grapevine perches and swings for climbing
- Wheels and hammocks (**Figure 11**)

Ferrets

- Cardboard box filled with potting soil, rice, ping pong balls, hay, or crumpled pieces of paper for digging
- Empty paper bags or paper bag filled with crumpled paper and ping pong balls, intermixed with food treats
- Food treat in a plastic bottle with the top off or egg carton taped shut with a hole in it
- Ping pong balls in a plastic tub of water
- Ping pong ball suspended 2 inches from floor on string
- PVC tubes, dryer hose, or empty oatmeal containers with bottoms removed for tunneling
- Rolled up sock with treat inside to simulate foraging
- Straw mats, cardboard boxes, and baskets for gnawing and climbing
- Telephone books for gnawing
- Toilet paper or paper towel tubes for gnawing and tunneling
- Toys hidden in a box of sand or recycled newspaper pellets, rice, or hay

Hamsters, Hedgehogs, Gerbils, Mice, & Rats

- Cardboard boxes and paper towel or toilet paper tubes for hiding, chewing, and climbing
- Cholla cactus, mineral and pumice stones, or cuttlebone for gnawing
- Deep bedding (eg, compacted peat with paper, hay, recycled paper, compressed cotton)
- Favored treats hidden in bedding (eg, insects for hedgehogs)
- Nuts pushed into a piece of apple or a pinecone for foraging
- Paper, cardboard, branches, or wood sticks for chewing
- Perching platforms
- Plastic tubing and other tubing for climbing
- Plastic dump trucks or cars
- Rodent-safe wheels for running
- Untreated wood to chew on
- Wooden ladders

*Adapted with permission from Bradley Bays T, Lightfoot T, Mayer J (eds): *Exotic Pet Behavior Birds, Reptiles, and Small Mammals*—St. Louis: Saunders Elsevier, 2006.

**Many items listed under rabbits and guinea pigs are also appropriate for other small mammals.