

Suggested Guidelines for Carnivore Enrichment

The order Carnivora include the felid, canid, ursid, raccoon, weasel, civet, and hyena families. This diverse group of animals shares a common lineage, the possession of four so-called carnassial teeth. A minority such as wolves, weasels, otters, felines and polar bears are still true meat eaters, yet most members of this order have adapted to a broader diet. Such animals are considered omnivorous, insectivorous or herbivorous (Ewer, 1973).

Carnivores inhabit every major ecosystem, including forests, deserts, grasslands and tundra. They have cursorial, arboreal, fossorial and aquatic habits. Communication occurs socially through expression and posturing, scent marking, vocalizations and olfaction. Olfaction, one of the primary senses in gathering information, is significant to carnivore behavior, but vision and auditory senses are also very important. They are primarily nocturnal animals with the exception of some species such as the cheetah, which rely on daytime vision for hunting. Many are considered solitary but some exhibit cooperative behaviors with conspecifics, such as coatis, in which males are solitary and females form tight social groups. Others, such as the mongoose, form groups for defense against predators (Ewer, 1973).

Feeding strategies among carnivores are generally similar in regards to hunting and foraging. Some species have special adaptations whereby they rely on olfaction to pursue prey. Some hunt in packs while others locate prey using refined tactile system, hunt by ambush or tunnel after prey. The very nature of opportunistic carnivores is to hunt and forage for their food, often spending hours doing so (Macdonald, 1984). Wild felines and canines may spend hours crushing bone, tearing flesh and plucking fur from a carcass while bears may spend approximately 80% of their time searching for food. Typical carnivore behaviors to consider in an enrichment program include foraging, olfaction, digging, nesting, denning, courtship and sexual activity.

Captive carnivores are known for exhibiting stereotypic, self destructive or abnormal behaviors. These behaviors can include overactivity, inactivity, pacing, head swinging and over-grooming, many of which are frequently observed in bears, felines, canids, weasels, civets and hyenas. These activities may be a method for animals to cope with inadequate, sterile environments, or they could be expressing redirected searching behavior such as mate finding, home range patrol, or hunting (Mellen et al., 1998). Loud noises, construction, small quarters, being locked inside, expectations of food, once-a-day feeding, scheduled feedings, and lack of novelty may also contribute to these behaviors. Evaluation of abnormal behaviors can help staff determine what action should be taken to discourage these undesirable behaviors. Foraging, exploratory and play behaviors have all been known to interrupt stereotypic patterns (Carlstead, 1998).

When developing enrichment programs it is important to look at the natural history of each species. Social structure, habitat use, feeding strategy, diet, primary senses and activity cycles should be used to plan enrichment (Shepherdson and Mellen, 1993). It is important that staff, supervisors, and veterinarians be consulted before changes in daily care are

initiated. The involvement of other departments at individual institutions or experts in their field may help spark new ideas for enrichment. Who, how, and when enrichment is delivered is important in planning enrichment. Forming a committee, or utilizing volunteers and docents can be beneficial in the implementation of enrichment. An assessment of each enrichment activity is important in evaluating and documenting what works and is beneficial to the species.

Exhibit Enrichment

Providing choices for captive animals allows them a degree of control over their lives (Markowitz, 1998), such as the option of having shelter or sun, heated rocks, or cooling systems. Complexity in the environment is important when designing a carnivore exhibit and enrichment should be included in the initial phases when possible. Naturalistic enclosures may be difficult to change, however by designing truck access into a new exhibit, large logs, rocks and substrates can be readily replaced. Adding substrates and new furniture on top of existing concrete or tile floors can enhance older exhibits.

With some creativity, older exhibits can be renovated into functional yet enriched environments. Vertical and horizontal spacing is important in terms of how animals utilize their exhibits. Focus should be on quality rather than quantity of space. Many carnivores are arboreal, arranging different levels with perches, creating a 3-D appearance, provides complexity in the exhibit which allows for climbing, leaping and jumping behaviors can promote activity (Mellen and Shepherdson, 1997). Moving perches can simulate the naturalness of trees, and changing furniture can stimulate activity, as animals will likely explore their new surroundings. Ropes and vines can also provide locomotion opportunities for some of the more arboreal carnivores such as binturongs, clouded leopards, margays, ringtails etc.

Visual barriers in the form of vegetation or hollow logs can provide privacy and a sense of security. Large rocks, trees or hilly landscapes can also create visual barriers that may help decrease food competition and aggression within a population while also adding a sense of visual complexity where the animals do not see their entire environment from all areas (Mellen et al., 1998). Trees, both natural and artificial, provide rubbing areas and provide scratching, and climbing opportunities. Rotten logs, mounds of dirt and logs drilled with holes and stuffed with food items offer animals a chance to forage, rip apart and dig for insects and other treat items. Living trees and vegetation provide shade and cool areas; however, with some animals trees may need to be protected with hot-wires or tree skirting to prevent destruction or escape. Natural burrows or dens may increase reproductive activity.

Substrates such as mulch, sand, soil, moss, leaf litter and grass provide different textures for foraging and bedding. Water features such as pools or streams can provide enrichment to carnivores that may swim or fish. Deep and shallow pool areas offer choices to aquatic carnivores, therefore creating a more interesting environment.

In addition to exhibit areas, holding areas should be carefully planned. Taken into account should be whether the animals will spend most of their time in this area and if so should it simulate a natural environment? Enrichment features should be provided especially if the animals spend most of their time off exhibit. Non-natural items can be utilized in holding areas if they cannot be used in the natural enclosure. Designing specific areas for medical procedures with squeeze cages or training areas should also be considered, as they can be beneficial for veterinary exams and animal training programs, which can also be a challenging form of enrichment.

Dietary Enrichment

Foraging behaviors are important to the well being of carnivores. Novel presentation of food items can be accomplished by hiding food throughout the exhibit in brush piles, mulch pits, in logs, under rocks and high in trees or perches. The method and timing of food delivery, such as randomized feeding schedules, the unpredictability of delivery, and increased number of feedings can help encourage foraging and reduce the frequency and duration of stereotypic behaviors (Shepherdson et al., 1993). Variety, such as alternating whole or chopped food items, is significant in both food delivery and method to discourage boredom. Encouraging stalking, crouching, chasing, leaping, reaching, grabbing, pulling, jumping and climbing for food allows for natural hunting behaviors. Meat sticks, treat boxes, lures, cowtails and horsetails can help elicit these natural behaviors.

Carnivores have the capability of crushing bone and tearing flesh. Feeding carcass foods and bones can elicit natural behaviors and also leads to healthier teeth. Crickets, mealworms and fish are examples of natural prey items that can easily be fed live. Because carnivores expend a considerable amount of energy foraging for food, efforts should be made to allow them to work for their meals. The complexity of the food items offered adds an element of expending energy and increasing activity (UFAW). A polar bear having to work for its diet which has been frozen in ice, or an ocelot that has to work for its food by leaping on a moving stick to get to its food are only a few examples of the wealth of possibilities of dietary enrichment.

Social Enrichment/Olfactory Enrichment

Many institutions exhibit carnivores such as felines or otters in pairs or groups. This does not always duplicate their natural social situations in which the animals are generally solitary except during breeding. However, companionship in captivity can be beneficial as it can encourage healthy competition as well as occasional aggressive tendencies and cooperative behaviors. Carnivores have complex social systems through communication and scent marking by way of feces, urine, and glandular secretions which furnish conspecifics with information regarding animal territories and movement. The function of social odors is often used for identification of individuals' animals and reproduction (Ewer, 1973). Carnivores, such as the skunk, have adapted a defensive system of using scent to ward off predators.

Extracts, perfumes, spices, hunting lures and aromatic oils provide opportunities for carnivores to investigate, mark or rub on new scents. Bedding, feces or fur from prey

animals or conspecifics in another area can also stimulate the olfactory sense. Proper social situations can increase reproductivity and the occurrence of natural social behaviors.

Interactions between caregivers and animals can be beneficial to animal well being. Providing a positive and secure environment can lead to a trusting relationship. This relationship, especially with small felids, may increase reproductive success and decrease pacing (Mellen, 1998; Poole, 1998).

Novel Enrichment/ Manipulable Objects

Artificial and novel objects can encourage natural behaviors via the expression of manipulation and exploratory behaviors. A feline may rip a cardboard box to shreds as if it were its prey. The use of mechanical prey in which cheetahs pursue and capture a moveable target can be beneficial for locomotor activity and mental stimulation (Lindburg, 1998). While the provision of novel items is important for stimulating activity, removal of novel items for a period of time will help maintain interest when the item is again presented at a later date.

Introducing novel objects outside of a holding area where the animal can still view them can help desensitize the animals to the new objects, and thus potentially lower stress levels. Animals may not react initially to a novel item or may react adversely to new objects in their environment, but leaving the items in the enclosure for a period of time or offering them at a later date can encourage interaction with the items. A new approach to a device being offered can make a significant difference. It is important to remember that what is successful with one animal may not work for another. Ideas from ungulate, bird or primates enrichment programs may be appropriate for carnivores as well. Wild animals encounter unpredictable and stressful situations whereas their captive counterparts are exposed to different and less frequent stresses. Providing negative stimuli may benefit animals by helping them to cope with changes or uncertainty in their environment (Carlstead and Shepherdson, 1994). It is best to keep in mind the behavior of the individual species, its medical and behavioral background when formulating enrichment ideas.

Safety Considerations

Veterinary and staff approval is important when designing enrichment ideas. Animals should be observed for problems when offered new enrichment.

Ingestion of novel items such as plastic containers, traffic cones, burlap bags, ropes etc., can cause serious medical problems. Individual animals may react differently to enrichment items offered. For instance, a mountain lion at one institution may play with a plastic jug, biting and crushing and swatting it around, while similar animals at another institution may choose to eat such items.

Rope or chain are often used for perching or to hang objects. To ensure that animals can not become entangled, such items should be hung so there are no loops at attachment points, or that a foot, leg, or head can not get caught. In addition, animals may have a

tendency to ingest ropes used for hanging objects. Chain or natural rope may offer more feasible options and should be used when possible.

Horticulturists can be consulted regarding plant toxicity. Some carnivores eat plants; therefore it is wise to be aware of the types of vegetation that are utilized in carnivore enclosures. Browse should be rinsed to rid it of any chemicals if the source is unknown, especially if it is donated or retrieved from the city forestry department. Feces from other animals which is offered to carnivores should be checked for parasites on a routine basis.

Carcass food should be obtained only from reliable sources. Many companies and private individuals breed animals specifically for this purpose. If road kill animals are used in carcass feeds, only freshly killed animals that have not been sitting in the elements for hours or show any signs of parasites should be used. Freezing a carcass for several days can also help reduce the risk of parasite infestations.

Some animals may become possessive of enrichment items and aggressive toward cagemates. To help reduce the potential of aggression, several of the same items can be scattered throughout the exhibit, providing ample activity for all inhabitants.

Particularly for carnivores, the ability to express predatory behavior can be an important aspect of a captive lifestyle. However, fake prey items (scarecrows, etc.) should not resemble humans in any way, to minimize the potential of predators learning that it is acceptable to attack humans. In addition, it is important to realize the risk to the safety of the animals and staff when new items or staff (volunteers, docents, etc.) are utilized during media events or special events that attract large crowds. Animals may show increased anxiety or aggression, which coupled with the potential of inexperienced staff making mistakes in animal shifting, can result in the animals posing danger to each other, the staff or the public.

The following are examples of enrichment that may be appropriate for carnivores, as well as an overview of safety issues that should be considered in the implementation of enrichment.

Exhibit Enrichment

- Visual barriers for privacy and for stalking prey: hollow logs, trees, live vegetation, termite mounds, mounds of dirt, large rocks and other topography, areas which are visible to the public but allow the animals to feel hidden and secure.
- Trees/logs: natural or artificial, log structures to climb, rub or scratch on, drilled with holes for treats, hollow logs.
- Natural substrates to provide digging opportunities or for scattering or hiding food: mulch, sand, gravel, soil, moss, leaf litter.
- Water features: shallow and deep pools, streams, waves.
- Plants: for visual barriers, grasses for grazing, herbs.
- Vertical and horizontal space usage: to provide complexity, jumping and climbing opportunities.
- Removable perching at various levels which can be changed periodically.

- Heat/Cold/Mist: heated rocks, cooler or misting system.
- Natural holes or dens.
- Holes placed high in rocks for hiding food and to encourage jumping.
- Concealed nest boxes.
- Rotation of exhibit furniture.
- Vines or ropes.
- Training devices such as squeeze cages.
- Rotation of carnivores through “prey” exhibits.

Dietary Enrichment

- Novel live prey: feeder fish, mealworms, crickets, grasshoppers, grubs, lizards, rodents.
- Carcass foods: chicken, rabbit, rats, mice, lizards, guinea pigs, quail, deer, elk, roadkill animals.
- Crayfish, clams.
- Bones: horsetail, knuckle, ribs, chicken necks.
- Hides from rabbit, deer, elk.
- Varied feeding schedules and several feedings per day.
- Brush pile feeder: food items hidden in piles of branches.
- Meat and blood trails.
- Meat sticks: animal jumps on or reaches to grab food on stick, bungee cord or spring.
- Honey and feeder logs (made from natural logs).
- Blood, fish, meat, fruit, vegetable popcicles.
- Scattered or hidden food items.
- Variety of chopped and whole food items.
- Melons, gourds, pumpkins to provide different textures.
- Lures: rabbit, rat.
- Cowtails, horsetails.
- Eggs: raw and boiled.
- Browse.
- Mealworm or cricket dispensers (PVC pipe dispensers).

Novel Enrichment/Social Enrichment

- Olfactory: fur, urine and feces or substrates from prey/same species, extracts, spices, herbs, perfumes, bedding from prey species, hunting lure scents, aromatic oils
- Boomer balls, Jungle balls, balls with holes drilled throughout to create food dispensers.
- Cardboard: boxes, paper towel tubes, carpet tubes, cereal box with hide treats inside.
- Grain bags, paper bags.
- Burlap bags.
- Kong toys.
- Dog toys: leather dog chews, Nylabones.
- Plastic jugs or containers.
- Artificial rat: remote controlled rat that runs through hollow log.
- Underground food pipe: PVC buried with food placed inside; can be covered with dirt.
- PVC for balance: large pipe that animals can walk through or walk on top of.

- Tires.
- Towels.
- Beer kegs, barrels.
- Attachments: chain, natural rope, bungee cord to hang objects or food.
- Feed box full of treats on top of cage (animal must use log or rope to climb).
- Plastic traffic cones.
- Timer release system: cricket cannons or fish released at various times during the day.
- Pine cones, palm fronds, bamboo tubes.
- Snake sheds.
- Rawhide bones, pig ears, hooves.
- Feathers.
- Brush piles
- Christmas trees.
- Antlers.
- Auditory: nature sounds, sounds from same species.

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