

Suggested Guidelines for Ungulate Enrichment

The classification of ungulates describes a wide array of animals, ranging from rhinos and duikers to zebras and peccaries, all of which are as different as camels are to dik-diks. Many ungulate species that are naturally favorite prey items have successfully retained their keen flight response in captivity, making unfamiliar objects, movements and individuals unwelcome additions to their environments. Ungulates, while not exempt from developing stereotypic behavior, are not as well documented for producing some of the more undesirable or self-mutilating behaviors as seen in some of the primate, bird or carnivore species. Captive ungulates can often be viewed chewing cud, interacting with conspecifics or watching for unseen predators, much like their wild counterparts. So why would an ungulate caretaker spend a great deal of time and effort initiating an enrichment program for animals that appear content in their captive environment? The reasons for creating a stimulating environment can be found in the arguments for changing the animals' daily routines and providing them with time-consuming and complex activities that encourage species-typical behavior.

Ungulates, which are highly sensitive, flighty animals are successful in their natural environments due in part to their ability to escape predators. However, the instinct and behavior that save them in the wild can be a detriment in a captive lifestyle. A multitude of injuries can result from panic in a confined area. As observed in captive antelope and zebra, this response is not confined to a single entity and can be generalized to any object, such as buckets, jackets or daily cleaning tools. Through gradual introduction of approved objects to the animals' exhibits on a regular basis, the animals can become desensitized to foreign and potentially frightening items. This can result in calmer animals, safer shifting and less injuries resulting from panic. The incorporation of enrichment into their environment can allow animals that historically may have lived in fear of the routine objects in their environment, to experience healthy, positive stimulation.

Ungulates are not well known for self-destructive, aberrant behavior. However, even stereotypic behavior exhibited to a lesser degree in captivity is a signal that activities are necessary to direct this behavior in a constructive way. Evaluation of possible causes of the particular behavior can help animal keepers and managers determine the type of action to be taken to alleviate this behavior. For example, behavior that is related to social problems within the herd would require a different approach than would behavior caused by an animal feeling threatened by the public. Unaddressed issues can develop into larger, harder to resolve problems if not taken into account at the onset. The end result can be aggression toward other animals, keepers or essential components of the enclosure such as fences.

Even if the herd appears content within its habitat, the provision of additional stimuli can have positive effects on behavior. The addition of novel scents, curious objects and intriguing tastes can bring out behaviors that are perhaps dormant in captive animals. This type of enrichment can create fascinating interactions between herd members and elicit play behavior in both young and old animals, potentially awakening atrophied senses.

Exhibit Enrichment

Because each species has unique characteristics, incorporating enrichment into exhibit design would be ideal. However, this is often not the case. Providing enrichment after the initial construction of the exhibit can be a somewhat costly endeavor or difficult to accomplish depending on exhibit space. However, the effort is most assuredly well worth it, as a few simple additions can offer a wide array of activities and endless variations on a basic design. If the opportunity is present for enrichment to be considered in the blueprints, it is important to examine the natural history of the species that will live in the space and take its behavioral and instinctual inclinations into account. Permanent features should be sturdy and "keeper friendly" in regards to cleaning and general maintenance.

Zoo philosophy regarding naturalistic appearance should be taken into account in the development of an enrichment program. Several questions should be posed when designing exhibit enrichment, such as: Will the features stand up to the effect of weather and years of use by the animal? How difficult are the items to replace if and when they are in disrepair? The night areas and winter quarters should also be taken into account when planning enrichment features. Time spent by the animals off exhibit can be, in many situations, greater than time spent in the exhibit. Non-natural elements that may not be appropriate for public viewing can often be incorporated into these off exhibit areas.

Training chutes and restraint apparatus should also be considered in exhibit design. These elements can be beneficial tools for basic husbandry and veterinary care which can provide daily enrichment for the animals being trained or desensitized. These features can be used both on and off exhibit depending on the facility design.

Dietary Enrichment

When considering dietary enrichment, it is important to analyze new additions to the diet with supervisory and veterinary staff. Colic, rumenitis, metabolic acidosis are just a few of the digestive problems that can be associated with ungulates. When appropriate amounts of enrichment foods are determined, gradual introduction of each item should be scheduled. Some animals require time to adjust to unfamiliar food items. Even if an item is rejected at first the animal may begin to investigate it over time and learn to enjoy it, especially if the food item has been associated with a positive aspect of the animal's environment. This would allow the keepers a greater variety of "treats" in their enrichment arsenal. Desensitization to a variety of both sweet and savory flavors can also be helpful in dispensing medications when the need arises, as the animal would already be familiar with the flavors being presented.

Novel Enrichment/Social Enrichment

Creating novel ideas for enrichment devices can be challenging. Observation of the animals' behavior can be essential in finding inspiration for new items. Knowing both the species' traits and inclinations, as well as idiosyncrasies of the individual, will provide insight as to what an animal might find interesting. Reviewing behavioral studies on similar species, both captive and wild, can also spark ideas.

Because many keepers specialize in a certain type of animal, it can also be helpful to talk to keepers in other areas of expertise. Some devices provided to primates or carnivores, for example, could be effective with ungulates, with or without modifications. Volunteers or docents may provide fresh ideas and help break through a creative block.

It is also important to keep in mind that devices may lose their novelty if offered too frequently or left in an exhibit for an extended period of time. Rotating several items either on a schedule or randomly will likely provide more stimulation than if the item becomes a part of the "furniture". Modifying a device can also make something old, "new again".

Social situations can also provide enrichment. Knowing the species' social structure can help the keeper determine whether captive social groups can be altered to provide healthy stimulation. Appropriate social groups can promote breeding, elicit natural vocalizations and species specific displays and help eliminate aberrant behaviors caused by alienation or improper herd dynamics.

Operant conditioning programs are valuable tools for increasing husbandry and veterinary capabilities as well as providing occupational enrichment for the participants. Allowing animals to "work" for a positive reinforcement provides them the opportunity to control the outcome of a situation, improve mental agility and can assist with general desensitization.

Safety Considerations

When initiating any enrichment activity, the importance of complying with the protocols and regulations of the facility can not be understated. The input of veterinarians, curators and other managers can be integral in the provision of safe enrichment. When incorporating enrichment to an exhibit, knowledge of the animals' physiology can be helpful in avoiding problematic situations. For example, does the animal have horns? Can the horns become lodged in an object, causing panic, horn loss or myopathy? Is leg entanglement a concern? Will a substrate cause intestinal impaction if ingested? Can less dominant animals be cornered and injured in an area? Are "safe" areas available for smaller species or subordinate animals? Does the substrate or floor covering provide enough traction for hooves? These are just a few of the many questions that can be posed when designing safe enrichment for ungulates.

As stated above, many species of ungulates are sensitive to unfamiliar stimuli. Therefore, gradual introduction of new devices and objects may be necessary. Partially covering foreign objects with something familiar such as straw, browse or bramble can reduce stress or even help stimulate curiosity. As the animals become accustomed to the introduction to new objects on a regular basis, and those interactions are positive, their nervous reactions will likely diminish and give way to the desire to investigate and explore the new item. However, for the staff, knowing when to back off and remove the object entirely is essential. Some animals have such an overwhelming flight response that ensuring there is ample space for the animals to avoid the object may be necessary for their safety.

Novel enrichment should be viewed critically before being presented to the animals. For example, if the species or an individual is apt to chew or ingest rope, chain or coated cable may be a better option for hanging browse or toys. If the animals can destroy the item, it is important to consider whether the animals would be safe in the exhibit until the debris can be retrieved. Many questions should be considered to assure the safety of the animals. For example, could the item become attached to an animal? If so, would the individual likely react rationally until it could dislodge the object or would it panic? Some animals react to activities with a great deal of zeal, which can lead to an unsafe situation for cage mates. Knowing the individual animals can help keepers predict the outcome of an activity with some accuracy. Observing the animals during the initial phases of an item's introduction can help eliminate problems in the future or help resolve unforeseen predicaments. Because many ungulates are large and can be dangerous when in a panicked state, it is advisable to be aware of the keepers' capabilities in the event that a situation goes awry.

Browse and plant matter are important aspects of an ungulate dietary enrichment. Consulting local botanists, zoo horticulturists and regional field guides can help a keeper determine toxicity in plants before they are fed to the animals.

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

Exhibit Enrichment

- Rubbing/scratching apparatus for legs, neck, head, body, horns, antlers: telephone poles, rock work, artificial termite mounds, bramble.
- Weather considerations: shade, sun, rain cover
- Substrate variety: harder packed substrates to help wear hooves and provide solid ground during the wet and winter months.
- Novel substrate to provide olfactory enrichment.
- Comfortable lying areas: pits for mulch, soil, silage, etc.
- Natural watering opportunities: moats, pools, streams, waterfalls.
- Areas for escape from aggressive conspecifics/opposite sexes and larger species in mixed exhibit.
- Variety of feeding sites at varying heights.
- Objects securely suspended from high locations.
- Safe keeper access to the exhibit so enrichment can be offered throughout day.
- Truck access for addition of substrates and large items.
- Unobtrusive training platform/set-up for mid-day training or veterinary examination.
- Safe pulley systems for enrichment devices.
- Large, non-destructible live trees (i.e., large palm species).
- Artificial trees with browse attachments.
- Fine mist system placed at an appropriate height so that animals can not reach it.
- Mixed species for social stimulation.
- Varied topography in exhibits: berms, dips, etc.
- Visual barriers for animals to avoid the public.

- Safety zones for the animals to avoid objects entirely.
- Built in mechanical devices: scatter feeders, etc.
- Mud wallows.
- Planters or browse holders in the ground where large plants can be removed or rotated regularly.

Dietary Enrichment

- Variety of browse, produce and greens.
- Edible local weeds.
- Variation of feeding times and frequency.
- Variety of hay types: alfalfa, oat, Sudan, barley, etc.
- Mineral salt blocks.
- Acclimation to a variety of flavors to help mask medication and offer novel sensory experience: syrup, honey, jam, spices, bitter flavors, savory flavors, herbs.
- Equine "cookies" (manufactured): good for training reinforcement.
- Equine supplemental feeds (good for mixing with medications or hiding in crevices for extraction with the tongue): omolene, alfalfa, molasses, alfalfa cubes, grains.
- Crackers for training reinforcements and medication dispensing.
- Sliced bread.

Novel Enrichment/Social Enrichment

- Buckets with handles removed.
- Horse stall toys.
- Boomer balls affixed to walls, etc.
- Popsicles.
- Bramble for bark chewers.
- Appropriate social groupings: bachelor herds, female/calf groups, pair vs. solitary, harem group.
- Water: misters, running faucets, pools, mud wallows etc.

Behavioral Enrichment (head slamming, sparring, etc.)

- Sturdy, suspended objects, boomer balls.
- Manufactured horse toys.
- Puzzle feeders and licking devices to encourage constructive use of tongue.
- Dangling items to simulate sparring partners.
- Dangling bramble, bramble/log piles for shy species or subordinate animals.
- Objects for scent marking.
- Scent marked items from a different or similar species.
- Recorded vocalizations of same or similar species.
- Self grooming
- Scrub brush heads, fibrous matting affixed to furniture.
- Bramble/log piles for leg and belly scratching.
- Rockwork.

Training/ Human interaction

- Grooming.
- Halter training (helpful for restraint).
- Gate training.
- Medical husbandry (venipuncture, injections, hoofwork, desensitization, etc.)

Safety Considerations

- Animals can become entangled in pulleys, ropes and chains.
- Overwhelming panic can lead to injury of an individual animal or cagemates.
- Dietary concerns of colic, impaction, metabolic acidosis and rumenitis.
- Plants or parts of plants may be toxic to some animals.
- Social concerns: effect on breeding, herd dynamics, negative interaction between dominant animals/species over subordinate ones. Over excited animals can be dangerous to smaller species in mixed species situations.
- Animals can choke on large pieces of food.
- Dietary enrichment can lead to weight gain or animals not eating important dietary supplements.
- Animals may ingest unsuitable objects such as substrates, twine, rope or string.
- Loss of flight distance between animal and keeper can lead to a decrease in natural behavior and can be dangerous in free contact situations.

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