

Contra Freeloading (Working for Food) at the Phoenix Zoo

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Although contra freeloading (against free feeding) is not a new concept, it is not very well known and practiced in captive nonhuman animal care. Animals show a preference to work for their food in the presence of identical freely available food items. In theory it is self-reinforcing and allows them to perform certain species-typical behaviors. In the wild, “working for food” is one of the most frequently observed species-typical, time-consuming behaviors, yet many captive animals are deprived of this stimulation. It is our strong belief that foraging programs should require animals to “work” for food items to help elicit these natural behaviors. The Phoenix Zoo promotes contra freeloading in its management practice. Request for reprints should be sent to Hilda Tresz, Behavioral Manager, The Phoenix Zoo, 455 N. Galvin Pkwy, Phoenix, AZ, 85008, USA. Email: htresz@thephxzoo.com

What is contra freeloading?

It is common that nonhuman animals show a preference to work for their food in the presence of identical freely available items. Animals have an “apparent behavioral need” to forage (Dolins, 1999, p.85). It is self-reinforcing (finding after seeking promotes additional seeking) and allows them to perform certain species-typical behaviors.

Contra freeloading is not a new concept!

Robert Yerkes wrote in 1925 that “The greatest possibility for improvement in our provision for captive primates lies in the invention and installation of apparatus which can be used for play or work.” (Tudge, 1992). This phenomenon was later explored in several studies. In 1986 English and Ferguson found that “starlings preferred to obtain 72% of their food by working (extrinsic exploration) even though identical food items were freely available” (Day, J.E. L.; Kyriazakis, I. & Rogers, P.J., 1998). Another study “provided 9 adult male Mongolian gerbils with the choice of digging for 30 sunflower seeds buried in a dish of sand, or eating from 1000 identical seeds which were given freely available in another dish. The gerbils preferred to obtain, on average 67% of their food by digging” (Forkman 1993).



Domestic chickens (*Gallus gallus*) searching for pellets in dry leaves at The Phoenix Zoo - photo by Hilda Tresz

Why is working for food important?

Non-food related enrichments such as sensory and manipulative items, structure and substrate, etc. are extremely important but are *short-term* enrichments. Gustatory enrichment (as part of sensory enrichment) that offers *novelty food items*, only provides *short-term eating behaviors as well*. In the wild, working for food is one of the *most frequently found* species-typical, time-consuming behaviors. In various situations animals prefer to work for food even when free food is available. Several hypotheses have been put forward to explain this phenomenon, most of them either suggesting that a learned behavior may be self-reinforcing or that the animal has an intrinsic need to perform a certain species-specific behavior (Forkman, 1993). “Foraging is a *time-consuming process* including searching for, retrieving or acquiring, and processing food. Foraging does not equal eating!” (Tresz, 2007). *Feeding schedules often only allow animals to eat* but not to forage. Therefore, foraging programs should require captive animals to “work” for their food items, concentrating on offering the original prescribed diet first and novelty food items as well if available.

Phoenix Zoo’s definition of contra freeloading

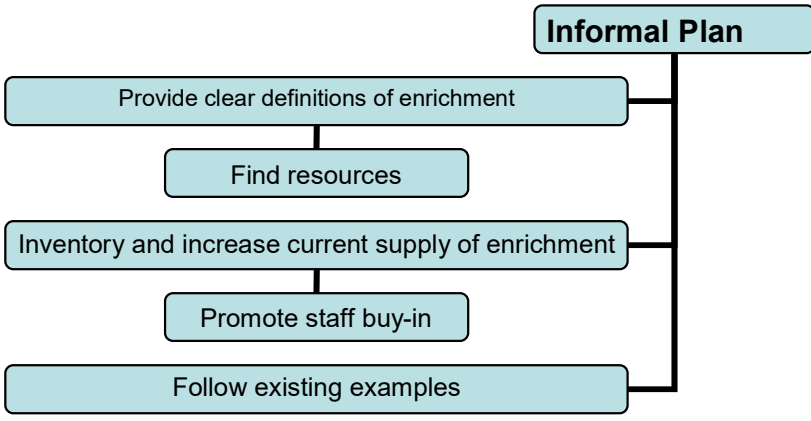
Contra freeloading by exact translation means against free feeding (against exploitation of freely accessible food). By necessity, zoos do employ some free feeding; therefore modifying the strict meaning of contra freeloading was necessary within zoo settings to reach truthful and positive goals. In Phoenix, not all animals were equally part of the program and/or had the opportunity of choosing to work for their food when at the same time free food was available. Sometimes diet was offered only by contra freeloading (feeding devices, in substrates, behind and under

furniture, smeared onto walls, etc. or just simply scattered in very small pieces). Other times animals had both options (working for food and free feeding). Depending on feeding schedules and their time frames, every so often only novelty food items (such as enrichment diet) were offered via contra freefeeding. Often the texture of the diet was changed to extend foraging time (pureed and frozen diets were given, for example). Geriatric and disabled animals (due to reduced eye sight or complete blindness, arthritis, tooth problems, missing limbs, etc.) were not always offered manipulative devices. Animals that required veterinary care or specially prepared diets were sometimes temporarily excused from the program

Therefore, a new definition better suiting the Phoenix Zoo’s program was developed: contra freefeeding was defined as “diet offered with the help of different devices, substrates, locations, and preparation to decrease or completely eliminate free feeding in order to extend foraging time.”

Institutional goal: Contra freefeeding as a minimum standard + additional daily regular enrichment

Randomly offered puzzle feeders, diet in substrates, and/or offering hidden food items to help animals forage longer, etc. were already a well known practice at the Phoenix Zoo, with the key word being “randomly.” The program had to be further evolved and structured. It was decided that foraging enrichment, when provided only as part of enrichment schedules, was no longer sufficient. Contra freefeeding was to be elevated to a minimum standard practice accompanied by non-food related enrichment items that are offered daily as well when possible. The long term goal was divided into two phases: informal and formal plans.



Providing clear definitions of enrichment and its categories and further defining contra freefeeding

Enrichment items can serve several purposes. For example: puzzle feeders need to be worked by the animal in order to gain food. Should the feeder be considered foraging enrichment or a manipulative device? To distinguish between categories, staff members were asked to try to determine the main purpose of the enrichment. We set an example to help decide- if a person is grocery shopping and at the same time chews gum; is the person grocery shopping or chewing gum? Obviously, the main purpose is to grocery shop, regardless of whether the person is chewing gum or not (or might have to drive and then walk, open and close doors, grab a cart and all other behaviors that are being performed while shopping).

To follow this logic, all definitions that could have been cataloged into several categories were clarified and redefined to fit into only one group. This system also further helped with cataloging and searching for enrichment items. The following six categories were outlined:

1) Foraging enrichment:

Foraging is a time consuming event involving searching for food, retrieving or acquiring food, and processing food. To promote psychological well-being it is important to increase processing time (contra freefeeding = working for food), stimulate the senses by providing diet other than what is typically fed (variety of food and consistency of food), and periodically change the availability of food in time and space (varying feeding time and location of food)

A variety of foraging devices can be utilized, although the type of device should be appropriate for the species, age group, and individual preferences. Items cataloged under foraging include:

- Forage presentation/placement: hiding, scattering food, puzzle feeders (plastic containers, suet baskets, boomer ball feeders, peg boards, etc., Kong toys, paper or wooden boxes, burlap sacks, doormats, pine cones, etc.) - *although substrates can elicit foraging behaviors, they will be grouped under Structure/Substrates*
- Live prey
- Browse - *herbs, flowers, buds, gum arabic, and other fresh plants that are consumed quickly and do not extend foraging time, but rather serve as different tastes, are cataloged under Sensory (Gustatory) enrichment. Novelty food items are categorized under Sensory (Gustatory) enrichment*

2) Manipulanda:

Objects that can be moved, used, or altered (manipulated) in some manner by the animal. The item can be artificial or natural. Toys stimulated curiosity and may increase play and hunting behaviors; however, animals lose interest in or habituate to toys over time. Rotating toys and other objects on the basis of texture, shape, and color helps to maintain interest (NRC/ILAR 1998). Examples include objects without food with the sole intention of manipulation: fire hose balls, kegs, barrels, cardboard, piñatas, wheels, rubber toys, punching bags, feathers, clothing, balls (golf, tennis, boomer, jungle and planet), rocks, wood, sea shells, pine cones, plastic or paper objects such as boxes, paper towel tubes, containers, etc.

3) Structure/ Substrate:

In order to accommodate species-appropriate behavior, enclosures need adequate space for resting, locomotion (terrestrial and/or arboreal as appropriate), and sanitation. The most basic component of the physical or inanimate environment is the enclosure structure (its size, shape, and design) and the substrate within it. In the enrichment context, structure refers to *temporary* furnishings such as perches and shelves, swings, ropes, ledges, nest boxes, culverts, water features (swimming pools, waterfalls turned on and off, etc.), branches and logs, hammocks, etc.

The term “substrate” commonly refers to the “base on which an organism lives” and would include flooring, artificial and natural turf, sand, gravel, mud, bedding/foraging materials (shredded paper, woodchip, leaves, hay, straw), etc.

4) Sensory enrichment or stimulating all five senses:

- Visual stimulation involves the use of color dyes, murals, cool-spectrum (green) lights, mirrors, motion (TV, video, DVD, video games), sun catchers, disco balls, etc.
- Auditory stimuli consists of vocalization from other animals, sounds from the natural environment, music, and nature sounds, etc.
- Tactile stimulation can be provided by touching and feeling inanimate objects such as scratching posts, scrub brushes, snake skins, etc., or changing the consistency of items (snow, bubbles, ice, etc.)
- Olfactory enrichments are spices, perfume, animal scents and lures, urine, feces, and extracts
- Gustatory enrichment differs from foraging enrichment by not necessarily increasing foraging time. Gustatory enrichment increases the variety of sensory characteristics:
 - Different tastes (novelty food)
 - Preparation of food
 - Textures (pureed food)
 - Consistency (frozen items)
 - Size (whole or chopped)
 - Color (food dyes)

5) Training:

May include classical and operant conditioning. *Although training could be considered as a social enrichment it was not grouped in this category because it is considered a more structured type of social enrichment.*

6) *Social enrichment:*

Stimulation can be provided by conspecifics and non-conspecifics (physical contact such as grooming, petting, verbal communication, etc.).

Finding resources to support the program

The Phoenix Zoo’s monthly enrichment budget was not nearly enough to support such a high caliber program at a fast pace. The plan relied on donations as well. The Zoo’s Women’s Auxiliary (volunteer support group that has supported the zoo for decades) and the Guardians (Member support group) instantly offered their help and purchased large amount of feeders and other foraging devices. Smaller donations were received from the City of Tolleson Fire Department, Boomer Ball owner David Schultz and contributions from private individuals such as the Mitchell family.

Increase in current enrichment supply

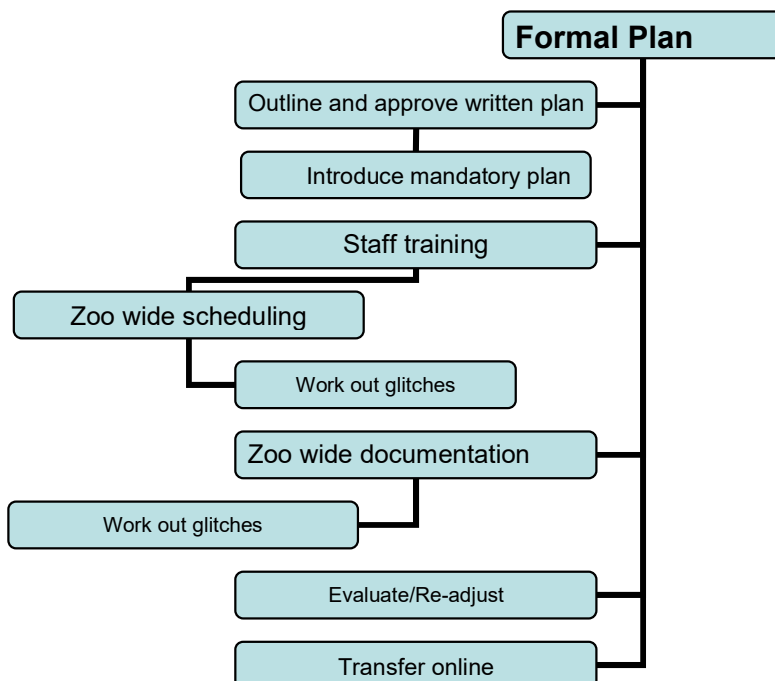
A plan was developed by the end of 2006 to acquire as many foraging devices of different types as possible within the next two years. Behavioral Enrichment Committee Representatives (B.E. representatives) needed to complete an inventory and submit a list of enrichment items that needed to be purchased to complete the program.

Staff buy-in

At the beginning, the program was not mandatory and ideas were quietly filtered down the system. New items were introduced almost “one at a time,” accompanied with a lot of explanations and evaluated by constant feedback. Staff needed to become acclimated to the idea of offering either basic diet or novelty food enrichment via foraging devices on a daily basis.

Following of existing examples

Since elephant enrichment and most of the primate enrichment were up to standards since 2002; following their examples, the plan was to switch over all hoofstock, amphibians and reptiles, and new primate species to contra freeloading by 2007. Carnivores and birds were scheduled to be fully included by the end of 2008.



After all areas had the necessary tools to support the plan, the program became mandatory. The goal was to help the staff understand (and therefore not oppose) the new program, to schedule all enrichment as soon as possible, have staff and animals used to new enrichment ideas and their schedules, work out all glitches, have staff trained to fill out enrichment paperwork zoo wide daily, and online, and to evaluate and re-adjust the program based on constant feedback.

Outlining and approving written plan

The contra freeloading master plan was finished and submitted for managerial approval on 06-18-08. The Living Collections Department at the Phoenix Zoo is divided into several trails and different strings (sections within trails). B.E. representatives had to submit a list of all species within all strings to the Behavioral Management Coordinator, and managers were asked to provide time for B.E. representatives to accomplish their tasks. The coordinator was tasked to create new enrichment log templates and to assign Behavior Observation Team (BOT) volunteers to duplicate these templates as master B.E. calendars. These calendars were cataloged by strings, and each worksheet included all species within that string. Each trail had 5-6 documents depending on the number of strings on their species cataloged under them.

Colors are used to categorize the species progress in the program. Green is used if animals were already transferred over to contra freeloading; natural color if animals have a weekly schedule but are not transferred over to contra freeloading yet; and red if animals have no weekly schedule made yet what so ever. Primary keepers of strings and the B.E. representatives together fill out the blank schedules for the species or individual animals by using existing weekly/monthly schedules and enrichment approval log books. If an animal can not work for its food, keepers need to indicate the reasons. Sick, geriatric, or otherwise incapacitated animals are excluded from the program unless staff suggested otherwise. Program animals that received their entire diet through training are considered working for their food as-is, and do not necessarily need to be part of the program. Sometimes animals are only required to work for part of their diet.

The zoo continued to maintain USDA standards. For example, if an animal is to be fed from puzzle feeders in a way that would allow food to fall on the ground, then feeders need to be hung above concrete areas, over grass areas, have rubber tubs under them, or be placed into troughs, etc. If animals (such as Galliformes) are to forage from substrates (pellets, or seeds in dry leaves, hay, straw, etc.), the substrate with diet need to be offered in boxes, trays, tubs, etc. Feeders can also be constructed and filled the day before (if applicable) to save time.

New online schedules must be developed, with keepers indicating:

- How animals will work for their food (easy feeder, hay feeder, boomer ball feeder, amazing graze, food in substrate, scatter diet, hide diet, whole prey, carcass feeding, food in paper products, insect feeders, etc.).
- What type of additional behavioral enrichment will be provided for the day
- Keeper’s initials
- Enrichment rating and explanation

Example: White-nosed coati

SATURDAY		SUNDAY	
Cardboard tubes		Feed baskets	
fire hose toys		pool	
Rating		Rating	
Initials		Initials	

Some areas have 3-5 rows depending on how many times per day they provide enrichment.

All animals that were currently being fed only from dishes and are therefore new to the concept of working for food are to be taught to search for their food. All types of enrichment listed on the monthly calendars must be evaluated by the rating scales or yearly by a more detailed format. If an animal had 50 different types of enrichment

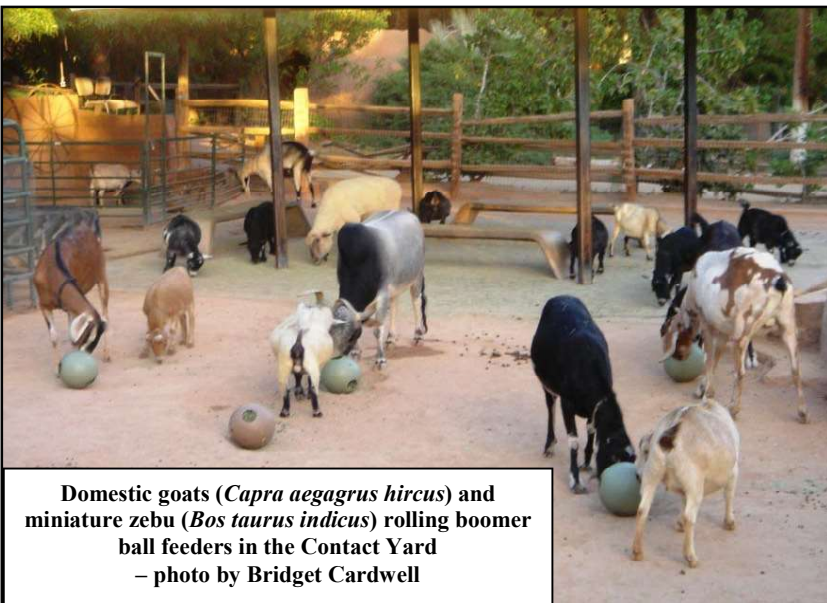
approved, staff can choose 10-20 of the best enrichments to evaluate yearly. The rest of the evaluations are scheduled as time allows. B.E. representatives are required to submit schedules to the behavioral management coordinator and area manager for review.

Paper copies of monthly calendars are posted in each area as needed (by the night houses on clipboards, inside kitchen areas, wooden hay boxes, etc.) where they are safe from weather. Copies are collected by the B.E. representatives at the end of each month and scanned onto the zoo's shared computer network drive. Managers and the coordinator review the documentations monthly. Some areas (with smaller collection such as Animal Care Center, Equine, Avian Propagation Center, and Animal Resources) are required to document online and all larger areas are to be transferred online as soon as possible.

Providing contra freeloading is a long process requiring team effort from inter- and intra-departmental staff and volunteer support. The Horticulture Department provides materials for bamboo and log feeders, volunteers help to gather pine cones and plastic jars for bird feeders, the Operations Department helps with modifying plastic products and Fire Departments were asked to donate fire hoses for use as browse and meat feeders.

Introducing mandatory plan to all staff

After managerial approval, the program was introduced by an inspirational email to all Living Collections Staff on 07-29-08 outlining the necessity of contra freeloading, the goals of the program in greater detail, and assuring staff regarding the program's slow implementation and flexibility. It was determined that all schedules would be developed and transferred onto the new format by November 1, 2008.



Domestic goats (*Capra aegagrus hircus*) and miniature zebu (*Bos taurus indicus*) rolling boomer ball feeders in the Contact Yard – photo by Bridget Cardwell

Staff training

Staff training was done in several different levels:

- Directions via email
- Coordinator training management staff during management meetings
- Coordinator training B.E. representatives during B.E. meetings
- B.E. representatives training keepers
- Coordinator training staff at all levels via email or on one on one
- Coordinator training volunteers one on one

Creating zoo-wide enrichment schedules

Creating templates - Coordinator and the B.E. representatives created new enrichment log templates, utilizing volunteer help when needed. The templates needed to reflect both contra freeloading and additional enrichment scheduled that day

Creating schedules - Primary keepers of area strings, the B.E. representatives and the coordinator prepared the new monthly schedules and submitted them for approval to area managers. Schedules were done by March 5, 2009.

Working out glitches during scheduling phase

Challenges (in regular type) and solutions (in italics):

Convincing staff to use feeding devices instead of the usual food dishes

Some people believed that animals would never be able to find or retrieve their diets from the feeders and therefore only wished to risk additional, novelty food items. *Staff developed "training" feeders by, for example, making*

holes (temporarily) bigger for animals to succeed faster and easier. Once animals learned how to use the feeders, the holes went back to their original sizes by inserting the original rubber rings back.

Training staff to be inventive

Some staff members were ready to quit ideas “cold turkey” the minute the enrichment did not seem to be successful. *Leading members of the program at all levels (managers, keepers, representatives, coordinator, etc.) had a great effect on convincing everyone to put extra effort into modifying ideas instead of abandoning them. If their encouragement failed, management stepped in and staff was required to brainstorm and improve the idea. Sentences such as “it is impossible, this will never work, it is useless,” etc., were cast out of the vocabulary. Problems were evaluated until solutions were found. Staff needed to prove that every possible option was exhausted and only then were the ideas allowed to be abandoned with managerial approval.*

Desensitizing animals to new objects

Sometimes animals reacted to devices with fear, were not be able to comprehend how to use them, or became aggressive towards them. *New enrichment was introduced gradually, in a safe manner, and often was altered to better suit use. Most of the animals became accustomed to new enrichment quickly.*

Teaching animals how to search for food

Some animals had never been fed from anything but plastic, metal, or rubber dishes. They had never been asked to search for food; they acquired their diet easily and ate at a fast pace. *Bird Trail developed a program to teach birds that have always been fed by traditional food dishes to look under paper slices, wooden sticks, or dry leaves that covered their food. Starting out with one piece of shredded paper, gradually increasing to a handful, the birds learned searching behaviors fast and most of the time without much stress - with the exception of some raptors, when larger pieces of papers (up to two inches), though not covering food, stopped the birds from eating all together. Attempts at using this enrichment became variable for these birds. Paper was discontinued later due to safety reasons (it stuck onto the food and was sometimes ingested together with diet) and only natural items such as edible leaves and sticks were used for covering food.*

Frustrating the animals

Especially after a long wait, such as overnight, some animals (horses, rock hyrax, etc.) became frustrated when the morning diet was received in boomer ball feeders and could not be ingested fast enough. Some horses simply left their diet in the balls and chose not to eat. *Horses were free-fed their pellets first thing in the morning and only after the animals returned from working (carriage rides, riding classes, etc.) were they required to work for their food by retrieving hay from puzzle feeders, for example. The hyrax was fed at least his morning and mid-day diet prior to being asked to work for some of his produce used as enrichment.*

Going too fast with introducing enrichment

Sometimes people did not realize that animals were at different stages in their learning. It was especially difficult for the relief keepers trying to keep up with all the changes. People were doing things the animals were not ready for such as placing too much paper, hay, etc. to cover food, and the animals ended up not eating. *B.E. representatives increased verbal and written communication, providing easy to follow instructions placed by the cage doors. For safety and continuity, they themselves took over doing the majority of the enrichment training.*

Ingestion of non-food related enrichment. Paper products that became moist from the food stuck to diets and were sometimes ingested. *This idea was modified to use paper to cover dry food (pellets, grains, etc.) and whole fruit only, and paper was exchanged with leaves and sticks as mentioned above.*

Dealing with animals that are too smart

“Likits” (flavored boredom breakers) are good at holding equine attention, but the majority of the herd figured out how to bite them and snap them in half, thus defeating the purpose, since they all fell to pieces on the ground where they were accessible. Warthogs learned to retrieve pellets from the Moultrie Easy Demand feeders much faster than was intended. *Staff started ordering “Likit hanging balls” that prevented horses from being able to bite the treat in half. Warthog demand feeders had to be reinforced/modified to create more difficulty in getting grain as well as making the feeders sturdier against the powerful animals.*

Broken enrichment items

Animals often came up with their own plans of just what to do with some devices. Horses, taguas and javelinas were breaking “horse proof” Snack-a-Ball feeders as fast as they were provided. They broke almost all the entry cap holes therefore the pellets could come out in much larger amounts than intended. At some points screws and bolts stick out of balls making them hazardous to the animals. Boomer balls and bobbins were a huge success with Arabian oryx. Yet, issues have risen that needed immediate attention. The regular bobbin feeders were no match for oryx; they were split in two, cracked, and numerous horn holes were made. Jungle balls for hay feeders have not had any major issues – they can withstand force. One of the eland broke apart a feeder overnight and got a plastic collar from the feeder stuck on her horn. *Keepers switched Snack-a-Balls with some sturdier 10” boomer ball feeders (cutting holes in for grain) and gave the Snack-a-Balls to less destructive species such as gazelles, or offered them to geriatric animals for easier diet retrieval. Exchanging items between areas also saved money in the long run. “Heavy duty” (and most expensive) bobbin feeders were purchased for each oryx. Demand feeders for elands had to be reinforced/ modified to withstand their horns and power.*

Special needs animals

Animals such as those at the Programs Department or at the Animal Care Center (ACC) were very difficult to enrich due to their special circumstances and strict instructions from the veterinarians. At Programs, challenges were finding items for the animals that have paper restrictions or were completely limited to metal or wood enrichment. *For Programs animals we used some metal feeders, scattered diet, or buried food in hay. Staff made feeders with tougher plastic so that “chewers” could still use items. Sick animals at the ACC did not receive enrichment most of the time. Recovering animals were under special orders. In some cases, enrichment was used as physical therapy to help animals recover faster. For example, if an animal needed to recover from a broken limb, veterinarians suggested either using a rolling ball feeder or a feeder hung higher depending on which muscles need to be strengthened. Quarantine area schedules were simply copies of the collection animals’ schedules that had already been developed.*

Diet alteration

Pellets (depending on the weather and the type of pellet) often stuck together due to moisture and could not be retrieved from feeder balls. *Smaller amounts were offered in shorter time frames or at different times of the day, making sure the animals could retrieve all diet that was offered in the device. Sometimes, especially in larger balls bigger holes were drilled and hay was fed out instead. Some animals (Bennett’s wallabies) actually enjoyed the wet and soggy pellets, and rolled the “pureed food” out of the feeders. In some cases, such as with most of the horses, the idea was abandoned altogether and instead of the pellets, only hay and novelty food items were offered from devices.*

Compromises and flexibility

Staff often requested a temporary break from a strict type of enrichment schedule in some situations, such as when animals were in breeding season, night house space was limited, males were too dominating and/or destructive, or keepers felt that the natural looking, mixed species exhibit was sufficient enough to provide plenty of enrichment. *Management always found some room to compromise, such as approving temporary respites as long as an estimated timeframe was established regarding when schedules would start up again. Some exhibits were permanently taken off of every-day scheduling and documenting and instead enrichment was outlined in the exhibits’ Standards Operating Procedures with the understanding of their mandatory execution.*

Work ethics

Staff sometimes had altercations over leaving untidy enrichment for each other to clean up. *Staff members often resolved these issues among themselves by simply talking to each other but, in some cases, resolving the issues required managerial input.*

Common sense

Enrichment items were sometimes placed into areas where they became wet from rain, mist-heads, and irrigation; under benches and perches where they became soiled; too close to the viewing areas where animals were apprehensive to use them; or unnatural items (such as paper and plastic) were placed in areas that were too obvious

to the public, etc. *This issue was usually quickly resolved since staff members were rotating on different strings within one to two days and somebody always recognized, fixed, and communicated the problem.*

Increased time spent on enrichment

The involvement of creating contra freeloading versus just placing enrichment items into enclosures added a significant amount of time to daily routine. *Management often scheduled "project days" for B.E. representatives to provide time for the extra activities such as scheduling enrichment and researching new ideas. Coordinator also provided BOT volunteers to help out. Regarding increased time for providing actual enrichment at the areas, in due time this problem resolved itself by simply becoming a well oiled routine. People learned how to incorporate new projects into their schedules and how to work around them.*

Paperwork limitations

For some species (primates, elephants, bears, etc.) that are easy to enrich, and therefore are offered a larger variety of enrichment more than twice daily, scheduling was restricted initially by a lack of room to record all available options on existing enrichment logs. *Staff were given authorization to modify their logs to meet their needs.*

Insufficient amount of enrichment approved

When staff tried to create templates for monthly enrichment they realized that some animals have never been approved for items they were planning to use. *Management considered all items that were supporting the contra freeloading program a priority for approval.*

Schedules and mixed species exhibits

Animal activity schedules and mixed species exhibits were continuous headaches. Animals in mixed-species exhibits have access to one another's diet and often have different feeding schedules (diurnal, nocturnal, etc.). Accordingly, they often eat each other's diet, fight over food, or do not get to any of the diet due to certain individuals monopolizing access. Scheduling enrichment for around 2-20 different species and 20 to 100 specimens in the same exhibit was a huge problem. Evaluating was even harder (please see evaluation difficulties below). *Special modifications (such as having species-specific holes on feeders) were designed, allowing only the right species to retrieve food from them. If the species had the same lifestyle, such as scavenger bird species all in one cage, all animals were fed the same type of food at a time. Feeders were provided in large numbers and far away from each other.*

Old school mentality

Lack of computer knowledge often held staff back from trying new things such as creating paper records. Lack of knowledge regarding the importance of behavioral enrichment also held the program back in some areas. And certainly there were those few staff members who could not be convinced, regardless of all efforts, that enrichment was good for their animals. They refused to follow any schedules or to fill out any documentation. *Regarding computer work, staff received continuous help such as receiving "ready to go templates" and assistance in being trained and retrained on computers at a comfortable pace. Educating staff through articles, verbal conversations, and through emails was also necessary at all times. After educating, compromising, and providing all help needed, if staff member was still refusing collaboration with the zoo's program, management, as a last resort, turned to disciplinary actions.*

Dealing with resentment related to change

Convincing people to do new and extra enrichment every day and to fill out extra documentation was a constant battle. *The solution was a mixture of:*

- *Rewarding*
- *Convincing*
- *Enforcing*
- *Continuous compromise*

Short articles with pictures were published in the Living Collections Newsletter where all staff and volunteers could read about successes. B.E. representatives were rewarded for their extra efforts by small presents (donation items such as Blockbuster video rental store cards, department store certificates, zoo gift shop presents, restaurant

certificates, zoo bucks, etc.) and were continuously praised in front of their peers during meetings. Leading trails also received similar appreciations. A motivational PowerPoint presentation was given during a staff meeting, showing positive results and assuring staff of the valuable job they did. Seeing their animals (in pictures or live) being active and working for their food was very rewarding for everybody. Extra help from BOT volunteers was offered and often utilized. At the same time, it was made very clear by the management that this program was mandatory and would have to be completed in a timely manner. When the amount of workload and enrichment seemed to be an impossible task, management often compromised by letting some areas start out with providing enrichment only to species that needed it most (singly housed, small-caged, etc.) and paying attention later to larger, mixed species exhibits.

Creating zoo-wide documentation

Once enrichment schedules were transferred onto the new monthly Excel sheets, it was decided to use two very simple rating scales. It is not the most complete evaluation system, but it was sufficient when trying to evaluate so many species and their enrichment on a daily basis. The zoo also has a one page, very detailed enrichment evaluation form, but it has not been utilized for quite some times due to time constraints.

At the beginning of March 2009, the second stage of the program started, teaching people to get used to the habit of filling out the logs in hard copies and online. At the beginning, it was dependent on trail sizes, quantity of species, specimens and their enrichment, computer availability, and the mentality of staff members. By mid June, all areas were transferred onto online documentation.

Working out the glitches during documentation phase

Computer access as a limiting factor in documentation

Even in areas that had the capacity to enter data onto computers, documentation was difficult due to the lack of computers or lack of time. Most of the time keepers tried to work on the computers around lunch time and at the end of the day. *As time passed, staff leaned to schedule their computer time around each other. Staff also searched for extra computers in different areas such as the library and other departments' offices and started to utilize them. Some keepers used their own laptops at their convenience transferring the data over by the end of the month.*

Time constraint of transferring information

Initially most of the areas were allowed to fill logs out on hard copies with the understanding that the information needed to be transferred online by the end of the month. All areas that tried this method fell behind significantly! *At some point BOT volunteers helped with backtracking but eventually the management decided that everybody would have to completely switch over to online documentation. By mid June all hard copies were taken away.*

Data loss

At some point data was lost due to unknown reasons (insufficient saving techniques, computer glitches, etc.). *BOT volunteer help was utilized to re-enter the data onto the public drive as well as backing up data onto CD-s and personal drives.*

Documentation modifications

In some cases species were given 4-5 different enrichment items per day. Recording their evaluation became confusing. *To have a more understandable form we added Roman numerals next to each items to be able to pair up the right enrichment with the corresponding rating.*

Arabian Oryx schedule

I. Puzzle feeder	16	I. Puzzle feeder	17
II. Browse		II. Toys	
Rating I. 5 II. 5		Rating I. 5 II. 5	
Initials cw, pm		Initials pm,sc	

Generalizations and lack of space for documenting extra comments

When the zoo’s collection contains several specimens of the same species, it was decided to offer all animals of a given species the same enrichment to reduce paperwork. This generalized scheduling was easier than having to manage multiple enrichment items for the species; however, evaluation was harder if all animals did not react to the enrichment in the same way. It was even more difficult to schedule and evaluate enrichment in exhibits keeping several different species together. There was not enough space to indicate a rating for each item and differentiate between all the items and the ratings. *The BE committee decided to insert comments indicating exceptions or special observations. On the original Excel documentation, a red flag would appear, indicating that out of the eight animals, Rico, for example, did not care for watching TV on Tuesday. This information cannot be printed, only viewed on the computer, but it is amenable with the Phoenix Zoo’s policy of going “green” and reducing the use of printed documentation.*

MONDAY		TUESDAY	
Puzzle feeder		Puzzle feeder	
Diet in paper		Bucket feeder	
Spices/Herbs		Radio or TV	
Rating	5;5;5	Rating	5;5;5
Initials	HT	Initials	HT

Continuous feedback, evaluation and re-adjustment

Communication was done on every possible level. Staff could relay their questions or concerns directly to the coordinator, or the managers and the trail B.E. representatives who were forwarding the information to the coordinator. The coordinator kept all information organized under one folder on the public drive accessible at any time to all personnel. Follow up was a necessity to keep everything on track.

Although management needed to keep the balance between being patient and supportive as well as demanding; starting April 2009 continuous feedback was mandatory on every level:

- B.E. representatives needed to report monthly to the coordinator regarding their areas’ progress. Every month they received the same set of questions via email and needed to show if progress was made as well as reporting any obstacles that needed to be resolved.
 - How far are you with schedules?
 - How well are people following schedules?
 - How many string schedules are done within your trail?
 - If not completed yet, what is your timeframe to finish all schedules?
 - Do people fill the logs out every day? If not what can be done?
 - Are logs all transferred over to online documentation?
 - What do you need to purchase to make the program happen?
 - Other obstacles?
 - Enrichment highlights?

The coordinator also placed two folders onto the public drive and B.E. representatives were continuously entering their feedback into them. One was for glitches in the system and one was for highlighting success. Besides written reports, B.E. representatives discussed the program during the monthly B.E. meetings and brainstormed over problems as well. Based upon the written and verbal follow up, monthly reports were generated by the coordinator and then relayed to management about the progress of the program. Separate reports to trail managers regarding the performance of the B.E. representatives were generated as well.

This continuous feedback was the key to success! Staff feedback was encouraged and was taken into consideration at all times. People felt that the program really was significant and was taken seriously at all levels and no one was going to let the issue go until it was done.

Results

Positive results in foraging activities

Increased species involvement in working for food

Out of 289 species, 236 species (82%) are participating in the contra freeloading program. Some animals work for their full diet, some for a portion of their diet and some only work for novelty food items; but besides the aforementioned exceptions, all animals contra freeload one way or another.

Increased appetite

Some of the animals, such as the plush-capped jays (*Cyanocorax chrysops*), ate much better if contra freeloading was used instead of an open food dish.

Open minded animals

After throwing so many new ideas at the animals in such a relatively short time, they became desensitized and curious towards novelty and were willing to try other food items. For example, scarlet macaws (*Ara macao*) were chewing on peas and green beans much faster than before.

Increased foraging time

Research which statistically showed increased overall foraging time was done only with the Asian elephants (*Elephas maximus*) as part of a separate program. By the end of the “foraging study,” foraging behaviors increased from 9.3% to 37.9%. After the introduction of the new feeders we had expected somewhat higher volume of foraging activities. The lower-than-expected increase lies in the results of all three individual animals’ different behaviors: while some of the elephants spent a great deal of time foraging, others ate much faster and then looked into other activities.

Positive results beyond foraging activities

Besides extending foraging time, the program has borne other positive outcomes:

Greater range of movements:

The giant tortoises had greater range of movement from varying access to food items (fruit, hung browse, cactus and apple bobbing in water features, etc.). Pictures of one of the Aldabra tortoise (*Geochelone gigantea*) clearly showed that even though there are leaves closer to the ground, she was working on ones farther up. She was stretching so much one of her front legs was off the ground. She spent about 10 – 15 minutes going from branch to branch checking them out and stretching to reach the upper leaves. When the tortoises are presented with food from above they seem to enjoy the challenge and are also using muscles they don’t normally use when they are just eating off the ground.

Increased trust and interaction with caregivers

The marabou storks (*Leptoptilos crumeniferus*) caught on to their extra feeding time within a couple days. They started looking for the keepers’ cart, and are interacting with the keepers more. Red and yellow barbets (*Trachyphonus erythrocephalus*), Von der Decken's hornbills (*Tockus deckeni*) and some raptors such as turkey vultures (*Cathartes aura*) and common ravens (*Corvus corax*) let keepers closer to them than before, which gives staff a better look at the animals during daily routine checks. Animals in general look calmer upon staff arrival and do not stay away from or appear worried by staff as before.

Decreased inactive, stereotypic, and self-directed behaviors

With the three Asian elephants, inactive behaviors decreased from 22.2% to 17.6%. While aberrant behaviors overall seemed to remain the same when we compared the three animals’ behaviors together, we found that by the time the study ended, Sheena’s swaying reduced from 4.7% to virtually 0%, Reba’s from 33.8% to 10.1%, while Indu increased swaying from 23.4% to 27.6%. Self-directed behaviors were under 1% for all three animals.

Increased muscle development

There was also significant neck, shoulder, trunk, and leg muscle development in our elephants; these muscles were visibly more pronounced after the program was implemented. Animals, after a few weeks, were clearly less tired

reaching up high and took fewer and fewer breaks from manipulating their feeders. More information regarding the Phoenix Zoo's elephant foraging study is available upon individual request from Heather Wright hwright@thephxzoo.com or Hilda Tresz htresz@thephxzoo.com.

Problem solving, increased mental stimuli and motor skills

Animals that had only been fed from metal and plastic dishes, rubber tubs, and wooden feeders had to learn to manipulate devices or had to learn how to get to their food in ways they had never encountered before. As they learned new behaviors and problem solving, they also developed their motor skills. To some degree, their problem solving skills developed so fast staff had a hard time coming up with new and more difficult ways to present food items.

Broader staff knowledge regarding natural behaviors

On a similar note, people appeared to be focusing more on species-specific behaviors with their enrichment items. Instead of just giving something "to give it," it seems there was a greater push to give items that would elicit natural behaviors. Additionally, people were more focused on all species getting quality enrichment.

Weight loss

Weight loss was seen in some animals such as the male jaguar (*Panthera onca*), who lost 24 lb (a significant amount of weight) due to long searching, traveling, climbing, jumping, and digging for his food.

Visitor education and involvement

Although this program was originally designed to focus on increasing the psychological well-being of the animals, at the same time it also had a great benefit to the visitors who got to see captive animals behaving more and more as their wild counterparts would. Observing African wild dogs (*Lycaon pictus*) organizing group hunting while attacking a piñata giraffe provided fascinating details of their social life and hunting skills.



African wild dogs exhibit team work during hunting - photo by Steve Roberson

Other zoos following the program

After the Animal Behavioral Management Alliance Conference (ABMA) presentation in May 2008, the interest of other zoos in the program grew intensively both in the USA and Europe. Zoos were either simply curious about the program and requested copies of the presentation or needed detailed information regarding enrichment schedules and documentation, puzzle feeder purchases, ideas for modifying their current enrichment, and backup information to start their own program. The program and the list of feeders are available on CD upon individual request from Hilda Tresz at the Phoenix Zoo at htresz@thephxzoo.com

Discussion

Providing enrichment for captive animals seven days a week is a well known necessity. Providing the proper enrichment by eliciting species-typical behaviors is even more valuable. Foraging is the most frequent species-typical behavior in the wild and therefore should be the most important behavior to focus on in captivity as well. The goal of the Phoenix Zoo's enrichment program is to elevate contra freeloaders to a minimum standard. With the exception of sick, geriatric, or otherwise incapacitated animals, all animals are required to work for their diet (partial or full amount and/or novelty food items) on a daily basis and receive additional non-foraging related enrichment items such as sensory, manipulative, structural, substrate, social enrichment, and training.

As a result, animals seem to be healthier and more relaxed, less bored, less aggressive and are spending more of each day foraging, locomoting, and interacting with both enrichment items and each other, just like their wild

