

The Environmental Enrichment Committee

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Summary — Both the US *Guide for the Care and Use of Laboratory Animals* and the Canadian Council on Animal Care *Guide to the Care and Use of Experimental Animals* specify that suitable enrichment and social interaction with con-specifics should be considered when planning adequate housing for all laboratory animal species. In response to this dictum, the University of Notre Dame established an Environmental Enrichment Committee to develop, implement and assess an overall enrichment programme that encompasses all species housed at the Freimann Life Science Center. Although many enrichment strategies had been used prior to the formation of the committee, having the facility director formally authorize a committee gave the members credibility with the Principle Investigators, resources for programme development and time allotments for meetings and observations. The committee members began their assignment by defining the committee goals and responsibilities. Six categories for the enrichment strategies were established: social interaction, burrowing opportunities, perches and ramps, foraging opportunities, gnawing opportunities and food treats. A programme was developed to encompass the use of techniques within these categories with the animals that would benefit from them. Our experience is that the Environmental Enrichment Committee is an effective vehicle for the development and implementation of enrichment strategies.

Key words: *committee, environmental enrichment, refinement.*

Introduction

The US *Guide for the Care and Use of Laboratory Animals* (1) and the Canadian Council on Animal Care *Guide to the Care and Use of Experimental Animals* (2) specify that suitable enrichment and social interaction with con-specifics should be considered when planning housing for all laboratory animal species. However, the regulatory agencies have not established standards for providing enrichment to the laboratory animals, leaving it to the discretion of each facility to develop and implement a programme that meets the needs of the animals in their charge. Many facilities are having difficulty integrating the enrichment programme into their established Standard Operating Procedures (SOPs) for the daily care and husbandry. At the University of Notre Dame, the establishment of an Environmental Enrichment Committee has facilitated the development of a credible enrichment programme that encompasses the diverse group of animals housed in the Freimann Life Science Center (3).

The Environmental Enrichment Committee was commissioned by the director of the animal facility. While many enrichment strategies were being utilised in the facility, a coordinated, cohesive programme had not been developed. There were no established SOPs for the staff to follow. The committee was charged with the development, implementation and assessment of an enrichment programme. A modest budget was

allotted, staff members were recruited and a set of goals and responsibilities was established.

Following a review of the literature, the committee adopted the definition for enrichment as written by the American Zoo and Aquarium Association-Behavior Advisor Group: “Environmental enrichment is a process for improving or enhancing animal environments and care within the context of the inhabitants’ 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”.

In addition, an enrichment programme is defined as being developed at the institutional level for the overall approach to the enrichment of all animals in the facility, whereas the enrichment plans are the particular strategies that are developed by the animal care staff for the species and individuals in their care (4). Based on these definitions, the goals of increasing the species-typical behaviour and decreasing pathologic, maladaptive behaviour were established. Finally, a mission statement was developed to keep the committee members focused on their mission: “The mission of the Environmental Enrichment Committee is to develop and implement strategies for the environmental enrichment of the diverse population of animals housed in the Freimann Life Science Center”.

Committee Membership

Although no formal appointments are made to the committee, the staff volunteers are committed to the mission and goals of the committee. New hires, along with those staff members with a long-standing history with the facility, are encouraged to participate on the committee. All levels of employees are welcome. For archival reasons, consistency, logistics of recordkeeping and profound personal interest, the associate director of the animal resource facility has been the coordinator of the committee since its inception. The committee developed the overall enrichment programme and many of the specific enrichment plans. Enrichment plan ideas from other staff members are always encouraged. The committee then explores the feasibility, as described below.

Committee Responsibilities

The committee members established a list of duties that would be required to develop and implement an effective enrichment programme. Initially, new enrichment options had to be researched. Anthropomorphism is a good starting point, but often it does not truly reflect an animal's needs. Literature searches, conversations with colleagues at other institutions and brainstorming sessions create a list of ideas for the committee members to further explore.

For each new idea, the feasibility of designing or implementing the enrichment strategy is evaluated. There are many restrictions that interfere with the development of novel ideas. Cost, time, availability of materials, availability of animal care staff, safety concerns, experimental design and sanitation requirements are just a few of the restrictions that the committee has had to face. A balance of the time and the cost spent on the enrichment technique with the amount of benefit that will be derived by the animal must be reached. With the use of the Nylabones® as a gnawing opportunity for rats, the committee found that the rats destroyed them within 1–2 days. The mice, however, could use the same one for several weeks. Thus, the committee felt that the cost of the Nylabones was justified for the mice, but not for the rats.

Once all of the obstacles have been considered, if the idea is still deemed viable, a prototype of the new device is produced. If the cost of constructing the prototype is prohibitive, line drawings are also developed. The committee then presents the ideas to the Attending Veterinarian (AV) and the Principle Investigators (PIs) for approval. The AV is responsible for assuring the animals' safety, while the PI is responsible for assuring that the enrichment device will not interfere with the experimental protocol.

When approaching a PI with an innovative plan, all aspects of the plan must first have been thoroughly investigated. A file of articles that document the benefits of enrichment for each species should be readily available to present to the sceptical PI. With documentation at hand, they will often agree to at least try the new plans, even if only on a separate control group, which provides a chance for the committee to demonstrate the benefits firsthand to the investigator.

Prior to implementing any enrichment plan, the committee establishes that it is in compliance with all relevant regulations and laws. A protocol or updated SOP is submitted to the Institutional Animal Care and Use Committee (IACUC). If a proposed new plan requires the use of naive animals that must be purchased for enrichment evaluation, then an IACUC protocol review is completed. For those strategies that only required the implementation into established groups on study or being held for future studies, the SOP for the enrichment programme is updated. The Environmental Enrichment SOP is available for the IACUC semi-annual programme review.

Animal care staff must be kept apprised of all programme changes. Not only are they most familiar with the animals' "normal" behaviours, but they will also make the observations of the animals' behaviours upon implementation of new enrichment plans. It has been observed in our facility that the animals acclimatise to novel stimuli more readily in the presence of the primary caregivers than new personnel. Allotment of extra time in the animal rooms when unfamiliar enrichment strategies are introduced is crucial for the assessment of the value of a device. Observations of initial reactions to new enrichment strategies and to the level of sustained interest over a designated period of time, hours, days or weeks, must be documented. This allows for modifications to be made if there was little or no interest displayed by the animals.

Record keeping is crucial to the success of the enrichment programme. All plans added to the programme must be documented. The animals used for the initial trial of the strategy, initial reactions to the novel device and observations made after the animals have acclimated to the device must all be recorded. A complete database of all enrichment strategies is maintained for the committee to use during the evaluation of the enrichment programme.

Regular meetings of the committee must be held to accurately and efficiently evaluate the success of the overall programme and the individual plans. However, this seems to be the most difficult duty for the committee to fulfil. Time constraints on all members make it difficult to set aside even an hour a month, yet it was made a priority. It was during these sessions that, with the remarks from the primary caregivers and the notations made during observations, the committee decided if the

Table 1: Enrichment technique categories**Social interaction**

Group or pair house compatible animals as the experimental protocols allow. If single housing is required, position the caging to accommodate visual, olfactory and auditory stimulation

Burrowing opportunities

Paper tubes, PVC tubing, plastic tubes, Critter Cubes®, Mouse Igloos®, dried corn husks, Nestlets®, Enviro-Dri® and many other commercially available products provide burrowing opportunities for rodents. Ferret Balls®, dried corn husks, old caging inverted and a “door” cut into it can be used for guinea-pigs

Perches and ramps

PVC tubing and rocks can be used with amphibians, and wooden dowels can be used in laying hen cages

Foraging opportunities

Artificial turf is used to spread the feed onto the chick brooder. Turf can also be used for foraging boards for non-human primates. Seeds, fruits and vegetables can be scattered among the bedding in rodent and guinea-pig enclosures

Gnawing opportunities

Paper tubes, wooden blocks and Nylabones® can be used for rodents. Bunny Blocks® and baby rattles are provided to all rabbits

Food treats

Dried corn husks, fruit, vegetables, parsley and other greens can be provided to guinea-pigs. A variety of seeds can be given to rodents. Rabbits can be given apples, Bunny Blocks® and alfalfa hay. Provide treats on an unscheduled basis to prevent the animals from expecting them. Include the treats in the animals' overall diet plan to keep the diet nutritionally balanced

plans were successful, if modifications needed to be made or if a plan was not working and needed to be eliminated. It was also during these sessions that the brainstorming for new ideas took place. Finally, the decision as to how to report the findings was made.

It is imperative that the committee share new information with the laboratory animal science community. With the wide variety of opportunities for information exchange — newsletters, journals, local, district and national meetings — it is easy to share the information with colleagues.

Successful Strategies

The committee has seen a number of improvements in animal behaviour resulting from simple techniques utilised at our facility. Female mice

that are anaesthetised and used to blood-feed mosquitoes on a weekly basis were constantly fighting upon waking. Several cages of mice were used each time. Due to the large number of mice, upon returning the animals from the insectaries, the laboratory technicians randomly placed them back into cages, resulting in a constant disruption of the social groups. As the animals recovered from the anaesthesia, they were fighting to re-establish the hierarchy in the cage. However, with the addition of paper tubes, PVC tubes and other burrowing type devices, the incidence of fighting became negligible. The incidence of food grinding in several strains of mice has been reduced with the addition of Nylabones or wooden blocks placed in their food hoppers. Fighting was eliminated in the group-housed female guinea-pigs when ample burrowing areas were supplied. Finally, survival of 1-day-old chicks was increased to 100% by placement of a small piece of artificial turf in the brooder. By placing the chick starter feed on the turf, the chicks displayed their natural foraging behaviours. The turf also provided a resting area for the animals.

Discussion

Over the past four years, the Environmental Enrichment Committee has developed and implemented a successful enrichment programme (Table 1). The overall enrichment programme has received praise from both the US Department of Agriculture and the Association for Assessment and Accreditation of Laboratory Animal Care, international representatives. New strategies are continually explored and added to the programme. The enrichment plans have been integrated into the SOPs for the daily care and husbandry of each species. The committee members persist in their pursuit of additional options for the enrichment of all species housed in the Freimann Life Science Center.

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References

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