

## Appendix 2: Behavioral Management of Nonhuman Primates

### Introduction

A major objective of the NIH Animal Care and Use Program is to promote the humane care and use of animals in biomedical research. The *Guide for the Care and Use of Laboratory Animals* (*Guide*, NRC, 2011), is one of the primary references regarding the implementation and management of the NIH Animal Care and Use Program. The *Guide* promotes the humane care and use of laboratory animals and strives to enhance animal well-being, the quality of research, and the advancement of scientific knowledge that is relevant to both humans and animals.

Behavioral management programs address the physical and psychological well-being of nonhuman primates with plans that include social housing, positive reinforcement training, behavioral assessment, exercise enclosures, and environmental enrichment (APV, 2019; Baker et al 2016). The Animal Welfare Regulations state, “research facilities must develop, document, and follow an appropriate plan for environment enhancement adequate to promote the psychological well-being of nonhuman primates.” The plan, at a minimum, must address social grouping, environmental enrichment, nonhuman primates requiring special attention, as well as restraint devices and exemptions to individual nonhuman primates from participation in the environment enhancement plan (AWR, 1991. 9§CFR 3.81). Therefore, it is the intent of this document to establish best practices for behavior management programs on the NIH campus.

Coleman et al (2012) and Coleman and Novak (2017) provide a comprehensive overview of the relative issues regarding the effectiveness and usefulness of a behavioral management program for nonhuman primates.

### Behavioral Management Strategies

Long developmental periods, high intelligence, and complex social structures are common characteristics of all nonhuman primate species and set them apart from most other biological groups (NRC 1998; NIH DVR Enrichment Plan, 2012). The goal of a behavioral management program is to provide the animals with the option and ability to engage in species typical behavior and promote psychologic well-being through the use or application of environmental enrichment (physical, social, nutritional, occupational and sensory enrichment), social housing and applying positive reinforcement training techniques to facilitate husbandry, veterinary and experimental procedures. Providing these options will ultimately address the physical, physiologic and behavioral needs of the nonhuman primates.

#### **Social Housing**

Housing configurations should take into account the social dynamics and needs of the animals. Nonhuman primates should be housed in stable pairs or groups whenever possible unless excluded by experimental or veterinary concerns. Providing species typical social housing does not preclude participation in experimental procedures (Reinhardt, 1989). The *Guide* specifically states, “single housing of social species should be the exception and justified based on experimental requirements or veterinary-related concerns about animal well-being” and recommends limiting single housing to the minimal amount of time necessary. If single housing is required, methods should be explored if possible where animals can engage in periodic release

into larger enclosures for enhanced structural contact (Wolff & Ruppert, 1991, Griffis, 2013) or consider alternative social housing such as, intermittent housing or protected contact housing (Baker, 2014).

ACUCs should consider the following questions when evaluating the justification for single housing of nonhuman primates due to experimental design (*Guide*). Does the ASP:

- a) describe the course of the experimental portion necessitating single housing and if subsequent re-pairing /group housing is possible?
- b) state a plan and timeline for returning an animal to social housing after the experiment portion requiring single housing ends?
- c) reference working with the behavioral enrichment staff or IC facility veterinarian to employ tools that can provide the single-housed animal with an enhanced environment, maximal cohort exposure, and a quicker return to social housing if it does not interfere with the experiment?
- d) address intermittent periods in the study where social housing may be attempted without interfering with the study?

### **Physical Enrichment**

Physical enrichment for nonhuman primates may include but are not limited to enhancing the animal's physical environment, changing size or complexity of enclosure, cage furniture, manipulanda, visual barriers, varied substrate and forage material, perches, nest boxes, climbing structures, and swings. Additional components of the home cage specifically designed to provide enrichment may include tunnels or grooming contact panels which connect adjacent cages and allow for the expression of species typical behavior (Crockett et al, 1997).

### **Nutritional Enrichment**

In their natural environment, nonhuman primates spend a large portion of their day foraging for food. The nutritional enrichment program should include offering novel foods, changing delivery of food and providing foraging opportunities to increase the time spent conducting these activities. For example, a method to extend foraging time is to provide standard chow in a cage mounted puzzle feeder to slow biscuit consumption.

### **Occupational Enrichment**

The *Guide* recommends including positive training techniques in husbandry and experimental procedures. The occupational enrichment aspect of a behavioral management program should include positive reinforcement training (PRT). It provides the animals a way to cope with stress, gives them some control, keeps them occupied, promotes exercise and provides mental stimulation (Perlman, 2012). Training nonhuman primates through the application of positive reinforcement training may facilitate cooperation in veterinary (Bloomsith, 2015), husbandry (Veeder, 2009) and experimental procedures (McMillan, 2014).

### **Sensory Enrichment**

Sensory enrichment can be broken down into four categories: visual (television, windows, bubbles, people watching), olfactory (scented sprays, herbs), auditory (radio, people talking to the animals) and tactile (frozen treats, varied nesting or foraging material). Alternatively,

behavioral testing can be seen as a dynamic activity as it provides nonhuman primates opportunities to engage in mentally and physically stimulating procedures outside of the home cage.

Environmental enrichment is one component of an Institutional Animal Care and Use Committee (IACUC) approved behavioral management program and should be provided in a consistent manner across the animal program. In addition, enrichment programs should be reviewed by the IACUC, researchers, and veterinarian on a regular basis to ensure that they are beneficial to animal well-being and consistent with the goals of animal use. (*Guide*, Page 53, Weed & Raber, 2005)

### **Exemptions**

According to the Animal Welfare Regulations (9§CFR 3.81, e), the following exemptions should be considered:

- The attending veterinarian may exempt an individual nonhuman primate from participation in the environment enhancement plan because of its health or condition, or in consideration of its well-being. The basis for exemption must be recorded by the attending veterinarian for each exempted nonhuman primate. Unless the basis for exemption is a permanent condition, the exemption must be reviewed at least every 30 days by the attending veterinarian. (Sect. 3.81 (e)(1)).
- For a research facility, the Committee may exempt an individual nonhuman primate from participation in some or all of the otherwise required environment enhancement plans for scientific reasons set forth in the research proposal. The basis of the exemption shall be documented in the approved proposal and must be reviewed at appropriate intervals as determined by the Committee, but not less than annually (Sect.3.81 (e)(2)).
- Records of any exemptions must be maintained by the dealer, exhibitor or research facility and must be made available to USDA officials or officials of any pertinent funding Federal agency upon request. (Sect.3.81 (e)(3)).

### **Summary**

Behavioral management strategies for nonhuman primates have been widely adopted across the NIH Intramural Research Program, the United States, and Europe (Coleman et al 2012), to address the welfare of nonhuman primates used in biomedical research. Standardized strategies have been applied to a wide range of research situations with varying research goals without adverse results. All NIH programs must have an environmental enrichment plan for nonhuman primates used within their program. Enrichment plans should delineate the standardized approach to be used within the program as well as document the effectiveness of the plan. Programs choosing to go above this minimum must consider the introduction of additional research variables between their animals and animals housed in different facilities and programs. In all situations, the decision regarding whether or not to enhance the microenvironment of nonhuman primates housed in the intramural program at NIH ultimately rests with the Principal Investigator and the protocol review process in each Institute or Centers' ACUC. Valid reasons for either enhancing or limiting the microenvironment should be provided to the ACUC during initial protocol review.

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