

**DIVISION OF**  
**VETERINARY RESOURCES**

**ENVIRONMENTAL ENRICHMENT PLAN**

## TABLE OF CONTENTS

<b>1. INTRODUCTION.....</b>	<b>3</b>
<b>2. DISTRIBUTION OF BEHAVIORAL AND ENVIRONMENTAL ENRICHMENT PROGRAM RESOURCES.....</b>	<b>5</b>
<b>3. MICE AND RATS.....</b>	<b>6</b>
<b>4. HAMSTERS AND GROUND SQUIRRELS.....</b>	<b>6</b>
<b>5. GUINEA PIGS.....</b>	<b>7</b>
<b>6. RABBITS.....</b>	<b>8</b>
<b>7. DOMESTIC FOWL.....</b>	<b>9</b>
<b>8. PIGS.....</b>	<b>9</b>
<b>9. OTHER UNGULATES.....</b>	<b>10</b>
<b>10. CATS.....</b>	<b>11</b>
<b>11. DOGS.....</b>	<b>12</b>
<b>12. NONHUMAN PRIMATES.....</b>	<b>13</b>
<b>SELECTED REFERENCES.....</b>	<b>18</b>
<b>APPENDIX A: STANDARD OPERATING PROCEDURES.....</b>	<b>22</b>
<b>APPENDIX B: INTERNAL GUIDELINES AND DEFINITIONS.....</b>	<b>23</b>
<b>APPENDIX C: REQUIREMENTS FOR PRIMATES AND DOGS.....</b>	<b>32</b>
<i>C.1 Requirement for Environmental Enhancement for Primates Under the Animal Welfare Act , and exemptions from the DVR environmental enrichment plan</i>	
<i>C.2 A Quick Reference to the Requirement for the Exercise of Dogs Under the Animal Welfare Act</i>	
<b>DISCLAIMER.....</b>	<b>38</b>

## **1. Introduction**

The Division of Veterinary Resources (DVR) is a full service biomedical research animal care and use program within the National Institutes of Health (NIH). DVR supports intramural research by providing professional and technical services and animal housing to NIH intramural scientists from several of the individual institutes that make up the NIH. In addition, DVR professional staff provides consultative and collaborative assistance to scientific investigators. DVR services are offered in support of biomedical research using a variety of animal species including rodents, lagomorphs, fowl, ungulates, carnivores, and nonhuman primates. An important aspect of the care and use of laboratory animals at DVR is the promotion of psychological well-being through a Behavior and Environmental Enrichment Program (BEEP).

### ***1.1 DVR Behavior and Environmental Enrichment Program***

DVR is unique in that it has a dedicated behavioral staff responsible for the promotion of psychological well-being in animals housed within its facilities. The BEEP is a unique group within the NIH, providing management oversight and implementation of the DVR Environmental Enrichment Plan for animals housed within DVR facilities. The cornerstone of the program is the promotion of psychological well-being as evidenced by the display of species-typical behavior and the reduction or elimination of abnormal behavior in research animals. DVR behaviorists provide technical expertise and consultation to DVR veterinarians and facility management concerning environmental enrichment and behavioral management techniques. The BEEP is also available as a trans-NIH resource to provide expert guidance and recommendations to the NIH community regarding animal behavior and environmental enrichment.

The BEEP ensures DVR compliance with relevant guidelines and regulations pertaining to the psychological well-being of laboratory animals. DVR is subject to NIH policy, including NIH Policy Manual 3040-2, Animal Care and Use in the Intramural Program (<http://oacu.od.nih.gov/NIHpolicy/3040-2.pdf>). As a federal research institution, DVR operates in accordance with specific guidelines and animal welfare regulations pertaining to the use of animals in biomedical research, including the Public Health Service Policy on Humane Care and Use of Laboratory Animals as well as the Federal Animal Welfare Act and Title 9 Code of Federal Regulations. Demonstrating its commitment to state of the art animal care, the NIH is accredited by the Association for the Assessment and Accreditation of Laboratory Animal Care International (AAALAC), and thus operates in compliance with the Guide for the Care and Use of Laboratory Animals (NRC, 1996). The NIH Office of Animal Care and Use provides electronic links to these and other guidelines, policies, standards and regulations pertaining to the use and well-being of animals in biomedical research (<http://oacu.od.nih.gov/regs/index.htm>).

### ***1.2 Environmental Enrichment***

Environmental Enrichment is the provision of stimuli that encourage species appropriate behavior and satisfy an individual animal's physical and psychological needs.

Environmental enrichment is achieved by modifying a captive animal's environment with the goal of providing the animal with a wider range of behavioral opportunities (Mellen and Ellis, 1996; Shepherdson, 1992). These opportunities allow animals to cope better in an artificial setting (Carlstead et al., 1993). Thus, successful environmental enrichment programs take into account all aspects of a species' natural behavior, including social organization, foraging behavior, and daily activity budgets.

The DVR Environmental Enrichment Plan addresses species' natural behavior through three primary elements of the laboratory environment: structural environment, social environment, and the provision of foraging opportunities. Elements of the structural environment include type of housing, available substrate, amount of space, provision of perches, and objects that can be manipulated. An animal's social environment may include any sensory contact with a member of a similar or compatible species, and can range from daily positive contact with a human caretaker or visual, auditory, olfactory, or tactile contact with similar animals to continuous housing within a large group of conspecifics. Animals may be provided with foraging opportunities through a variety of means, including provision of standard feed in a decentralized manner or the provision of highly desirable or time consuming novel foods.

### ***1.3 Behavioral Management***

The DVR approach to behavioral management focuses on the diagnosis and treatment of abnormal behavior. For animals housed in a research environment, the development of abnormal behavior is a cause for concern with many possible consequences, ranging from alopecia to self-injury. In order to identify, treat, and prevent animals from developing abnormal behavior, the DVR BEEP observes animals, collects data, analyzes problems, creates treatment and acclimatization programs, and evaluates the effectiveness of treatment approaches.

### ***1.4 Environmental Enrichment Plan***

DVR is an institution driven by biological research. Therefore there are limitations to the manner in which animals may be housed. In caring for the psychological well-being of laboratory animals, it is important to recognize these limitations and use a balanced approach in providing the best possible care and allowing for the expression of species-typical behavior within a functioning research environment. The DVR Environmental Enrichment Plan includes natural histories of each species housed in DVR facilities. These natural histories guide methods of caring for the psychological well-being of laboratory animals by describing naturalistic behaviors that might be promoted within the limitations of the laboratory environment.

Animals housed in DVR facilities may at times be exempted from various aspects of the Environmental Enrichment Plan due to research constraints or medical concerns. Nonhuman primates may be exempted from the Environmental Enrichment Plan only by the attending veterinarian for reasons of physical well-being or by an Animal Care and Use Committee approved ASP for research requirements.

The DVR Environmental Enrichment Plan covers all species housed in DVR facilities on the main NIH campus in Bethesda, MD and the animal center in Poolesville,

MD. Animals covered include rodents, lagomorphs, fowl, ungulates, carnivores, and nonhuman primates. Each animal population represents a distinct challenge. Therefore, the plan is written in species-specific chapters that include natural histories and complete descriptions of the environmental enrichment and behavioral management provided at DVR. Select references are listed immediately following the body of this document.

## **2. Distribution of Behavioral and Environmental Enrichment Program Resources**

The BEEP focuses primarily on the behavioral management aspects of the DVR Environmental Enrichment Plan. The behavioral staff also coordinates and oversees much of the provision of environmental enrichment, but relies largely upon the facility management and staff for its implementation. The DVR BEEP is successful in part because of this dynamic relationship.

### Consultation/Training Services

The behavioral staff consults with DVR facility and veterinary staff regarding general behavior, socialization, enrichment, and animal training options. Based on the consultation, the behavioral staff may provide further staff training. In order to promote awareness of laboratory animal psychological well-being, the behavioral staff develops and conducts staff trainings for DVR facility and veterinary staff. Staff trainings cover species typical environments, normal behavior, the identification of abnormal behavior, and environmental enrichment.

### Manufacturing

The behavioral staff assists in the manufacturing of enrichment devices that cannot be manufactured or assembled by the facility staff. They also design, manufacture, and repair supplemental enrichment devices and equipment needed for the process of nonhuman primate socialization.

### Purchases

The behavioral staff purchases some non-standard facility equipment and supplies, such as samples of new enrichment items. The behavioral staff may purchase the equipment and supplies necessary for the process of nonhuman primate socialization (e.g. lexan panels and grooming bars), behavior treatment (e.g. supplemental enrichment devices), and animal training (e.g. food rewards).

### Behavior referrals and consultation

Upon referral, the behavioral staff consults with facility management and staff regarding specific behavioral problems, socializations, and enrichment options. After receiving a referral regarding a specific animal or animals, the behavioral staff will evaluate the animal(s) (Appendices B.1, B.2, B.3), and propose possible treatment options. The facility management and staff are responsible for implementing the treatment plan. The behavioral staff periodically follows up on and assesses the progress of treatment.

### 3. Mice and Rats

#### 3.1 *Natural History*

##### Mice (*Mus* spp.)

Mice are highly social rodents and their social structures may include dominance hierarchies. Fighting may occur among individuals, most often among males, during the establishment of hierarchies or territorial defense. Mice are nocturnal, burrowing and nesting mammals that prefer to seek shelter near walls or by hiding behind structures. They are omnivorous and granivorous. Mice primarily use olfactory and auditory cues for communication. (Suckow et al., 2001)

##### Rats (*Rattus norvegicus*)

Rats are highly social, typically non-aggressive rodents, with males unlikely to fight when housed together. They are nocturnal, burrowing mammals that prefer dark, confined spaces. Rats are a gnawing species and are omnivorous and granivorous. Rats primarily use auditory cues, including ultrasonic vocalizations, for communication. (Sharp and La Regina, 1998)

#### 3.2 *Environmental Enrichment*

##### Social Environment

Where possible, mice and rats are housed in pairs or groups. Mice and rat racks are arranged in holding rooms in a manner that permits animals to have auditory, visual, or olfactory contact with conspecifics.

##### Structural Environment

Mice and rats are housed on bedding such as hardwood, Carefresh®, or corn cob. Rats are provided a paper tube. Mice are provided with nesting material, specifically a paper towel, nestlet, or bedding that provides the ability to nest such as Carefresh® or shavings.

### 4. Hamsters and Ground Squirrels

#### 4.1 *Natural History*

##### Hamsters (*Mesocricetus auratus*)

The Golden or Syrian hamster, (*Mesocricetus auratus*) is the most frequently used hamster species in the laboratory. Hamsters can be socially compatible when raised and weaned together, but they become increasingly aggressive as adults, particularly toward newly introduced animals. They are nocturnal, burrowing rodents. Although hamsters are not true hibernators, they do enter pseudohibernation with decreasing temperature and daylight. Hamsters are omnivorous, existing on fruits and plants in the wild and usually fed a pelleted rodent diet in the laboratory. Characteristic buccal cheek pouches, located along the lateral side of the head and neck region are used to hoard and carry food. If startled, a female may hide her young in her cheek pouches. Hamsters use sebaceous

glands called flank organs, located on the hip region in both males and females, for territorial marking. (Field and Sibold, 1999)

#### Ground Squirrels (*Spermophilus tridecemlineatus*)

The thirteen-lined ground squirrel is a grassland animal. They are omnivorous and cache large quantities of seeds and grass. The cached food may be eaten during periods of bad weather or when other food is scarce. Ground squirrels are diurnal, burrowing rodents that typically hibernate (Cleary and Craven, 1994, Vaughan, Gruber, Michalski et. al., 2006).

### **4.2 Environmental Enrichment**

#### Social Environment

Hamsters and ground squirrels are housed singly in clear micro-isolators and arranged in a manner that permits animals to have auditory, visual, or olfactory contact with conspecifics.

#### Structural Environment

Hamsters are housed on hardwood bedding. Ground Squirrels are housed on Carefresh® bedding. Both hamsters and ground squirrels are provided with a paper tube.

#### Novel food items

Hamsters and ground squirrels receive novel food items at least twice weekly. Appropriate novel food items include fruits (e.g. apples).

## **5. Guinea Pigs**

### **5.1 Natural History**

#### Guinea pigs (*Cavia porcellus*)

Guinea pigs are social rodents that do very well in group-housing situations. Most aggression is observed between males. Mating privileges, space and food are the primary stimuli for aggressive interactions. Guinea pigs may be active at all times, though they appear to avoid intense light. Guinea pigs are sensitive to changes in temperature and do not tolerate extreme heat very well. Increased levels of noise and vibration have been documented to produce a physiologic stress response in guinea pigs. Guinea pigs are a gnawing species and are strict herbivores with a unique requirement for vitamin C. They use vocal communication extensively and also rely on olfactory signals such as scent marking (Terril and Clemons, 1998).

### **5.2 Environmental Enrichment**

#### Social Environment

Where possible, guinea pigs are housed in pairs or groups. Guinea pig racks are arranged in holding rooms in a manner that permits animals to have auditory, visual, or olfactory contact with conspecifics.

### Structural Environment

Guinea pigs are housed on either Carefresh® or Tek-fresh™ bedding. As allowed by cage size, guinea pigs are provided a CPVC tube or paper tube. The tubes are distributed according to a 2 weeks rotating schedule to ensure novelty.

### Novel Food Items

Guinea pigs receive novel food items at least twice weekly according to a rotating schedule. Appropriate novel food items include fruits (e.g. apples and oranges) and vegetables (e.g. cabbage).

## **6. Rabbits**

### ***6.1 Natural History***

#### Rabbits (*Oryctolagus cuniculus*)

Rabbits are crepuscular or nocturnal animals that spend most of the diurnal period underground in burrows while emerging to feed at dusk or during the night. In the laboratory, periods of activity are seen throughout the day and night. Rabbits are social animals and stable breeding groups are formed with linear hierarchies of both males and females. Once a dominance hierarchy has been established, continued fighting is rare. Aggressive behavior is seen most in breeding and pubertal animals. Adult males are most aggressive when competing for food, territory or females. Rabbits are gnawing herbivores requiring a diet with high fiber content. They are normally coprophagic, reingesting their feces in order to absorb additional nutrients (Wolfensohn and Lloyd, 1998; Gunn and Morton, 1995).

### ***6.2 Environmental Enrichment***

#### Social Environment

Rabbit cage racks are arranged in holding rooms in a manner that permits animals to have auditory, visual, or olfactory contact with conspecifics. When possible, female rabbits are socialized through pair-housing. In instances where a compatible social partner cannot be identified, rabbits will be offered the opportunity for supervised activity outside of the cage.

#### Structural Environment

Each rabbit is provided with at least one floor toy (e.g., jingle balls, plastic balls, dumbbells or bell rockers) and one hanging toy (e.g. Rabbit Relaxers®, bunny block chains, mirrors or rattles) on a daily basis. The floor toys are distributed according to a rotation schedule to ensure novelty and rotated once weekly.

#### Novel Food Items

In addition to their standard diet, rabbits receive a minimum of two novel food items at least five days per week according to a rotating schedule. Appropriate novel food items

may include fruits (apples), vegetables (cabbage, carrots, broccoli, kale), cereal (shredded wheat, raisin bran), hay (timothy), and bunny blocks.

## 7. Domestic Fowl

### 7.1 *Natural History*

#### Chickens (*Gallus domesticus*)

Domestic chickens live in large social groups in which a hierarchy or pecking order develops. They spend much of their day engaged in foraging behavior, dust bathing, and perching. Chickens are omnivorous.

### 7.2 *Environmental Enrichment*

#### Social Enrichment

Singly housed chickens are housed in racks that permit visual, olfactory, and auditory contact. When possible, domestic fowl are housed in pairs or groups of the same or similar species.

#### Structural Enrichment

Domestic fowl are provided with perches in their pens. They may have access to a mirror in their pen.

#### Novel Food Items

Occasionally, domestic fowl are offered chicken scratch or cooked mealworms.

## 8. Pigs

### 8.1 *Natural History*

#### Pigs (*Sus scrofa*)

Pigs are highly social and live in large groups with strictly linear, stable hierarchies that are often established at an early age among littermates. When introduced to non-family members, pigs often fight until a hierarchy can be established. Serious fighting consists of teeth grinding, foaming of the mouth, and biting. Pigs are intelligent animals capable of learning complex tasks. Their primary sense organs are their nose and mouth. They engage in rooting and chewing behavior. Pigs are omnivorous and diurnal. Since pigs have relatively sparse hair and lack sweat glands, they are sensitive to temperature fluctuations and extreme temperatures. (Bollen, Hansen & Rasmussen, 2000)

### 8.2 *Environmental Enrichment*

#### Social Environment

Whenever possible, pigs are housed in pairs or social groups. Single housed pigs will be housed in a manner that permits animals to have auditory, visual, or olfactory contact with conspecifics.

### Structural Environment

Pigs will be provided with the provision of manipulanda such as challenger balls. The challenger balls are filled with appropriate supplemental foraging materials e.g. jellybeans, unsalted peanuts, cereal, Beggin' Strips®, primate biscuits or dog biscuits. Distribution takes place according to a monthly schedule, providing each animal within the DVR facility access to manipulanda for at least one week every month (Huntsberry et al, 2008). Pigs are also provided with hard plastic balls and a variety of other toys. Pigs are provided with supplemental structural enrichment via access to a pen modified to allow rooting in loose straw. Novel food items may be scattered into the straw before animals access it.

### Novel Food Items

Pigs are provided with foraging materials such as straw or hay. Appropriate supplemental foraging materials e.g. jellybeans, unsalted peanuts, cereal, Beggin' Strips®, primate biscuits or dog biscuits are distributed into or on top of the straw or hay as a novel food item in order to increase foraging time. Distribution occurs according to a monthly schedule, providing each animal within the DVR facility access to additional foraging opportunities on a regularly scheduled basis.

## **9. Other Ungulates**

### ***9.1 Natural History***

#### Cattle (*Bos taurus*)

Cattle live in large social groups in which a matrilineal dominance hierarchy develops. Cows are herbivorous, ruminant grazers that spend up to eight hours a day grazing. Bouts of grazing are interspersed with time spent chewing cud or resting.

#### Sheep (*Ovis aries*)

Sheep live in large social groups, with a highly developed herding instinct. Since their flocking instinct is so strong, individuals become stressed when separated from others. Sheep are herbivorous, ruminant grazers.

#### Llamas (*Lama glama*)

Llamas live in social groups with dominance hierarchies. Llamas are herbivorous, modified ruminant grazers, having a three-chambered stomach rather than four. They spit regurgitated food during agonistic encounters over food or mates (Arnold and Dudzinski, 1978).

#### Horses (*Equus caballus*)

Horses are herd animals (Waring, 1983). Paddocks, pastures and corrals are sufficient to house horses if provided with appropriate structural support such as loafing sheds, windbreaks, resting places, and ready access to appropriate foodstuffs and clean water. (FASS, 1999; Houpt & Ogilvie-Graham, 2002)

## ***9.2 Environmental Enrichment***

### Social Environment

Where possible, ungulates are pair or group housed. In situations where there is only a single animal of a particular species, an effort is made to house that animal with an individual or group of a compatible species.

### Structural Environment

Ungulates are maintained in pastures with loafing barns for shelter, partially covered pens with open and sheltered areas, or indoor/outdoor runs.

### Novel Food Items

Cattle and horses receive fresh fruit or vegetables daily. Sheep and goats are provided hay and may be given grain.

## **10. Cats**

### ***10.1 Natural History***

#### Domestic Cats (*Felis silvestris catus*)

Although it has been generally accepted that cats are solitary animals, domestic cats may take part in some sort of social organization. Social interactions depend on factors such as food availability, population density, degree of relatedness, and individual characteristics such as age, sex, and social status. Cats communicate with each other primarily through auditory, visual, and olfactory cues. Early socialization is critical for the behavioral development of kittens. Play behavior is important in the development of motor, cognitive, social skills. Cats are predatory carnivores, hunting primarily alone. (Bradshaw, 1992)

### ***10.2 Environmental Enrichment***

#### Social Environment

Cats are socially housed in pairs or groups whenever possible. Singly housed cats will be given auditory, visual, or olfactory contact with conspecifics.

#### Structural Environment

Cats are housed in either cages or kennels. All enclosures have a minimum of two manipulable objects, such as balls, Cat Trackers®, and hanging toys. All enclosures have at least one elevated resting surface, such as perches or prima-hedrons. Cats housed in kennels have access to outdoor runs, weather permitting, which may contain logs.

#### Novel Food Items

Cats occasionally receive novel food items, such as Whisker Lickins® or catnip.

### **10.3 Behavioral Management**

### Feline Behavior Referrals

The feline unit personnel will report any observed feline behavior problems to the behavior staff. Upon receiving a referral, the behavior staff will evaluate the animal within 2 days and make notes in the medical record and report findings to the facility staff.

## **11. Dogs**

### ***11.1 Natural History***

#### Domestic dogs (*Canis familiaris*)

Dogs are a highly social species living in a pack. Dominance hierarchies exist within the pack. Dogs communicate primarily through auditory, visual, and olfactory cues. Early socialization is critical in behavioral development, allowing a dog to develop normal social relationships with other dogs and adjust more easily to unfamiliar stimuli and environmental changes. Dogs are predatory carnivores, hunting with members of the pack. (Bradshaw and Nott, 1995)

### ***11.2 Environmental Enrichment***

#### Social Environment

Whenever possible dogs are socially housed in pairs or groups. Singly housed dogs have auditory, visual, or olfactory contact with conspecifics. Dogs that are born in-house and/or designated for long-term study protocols actively participate in a canine socialization and training program unless precluded by protocol. Single-housed dogs that are not actively participating in the canine socialization and training program, are provided with supervised activity outside of their kennel on a scheduled basis unless precluded by protocol. Positive human interaction is encouraged.

#### Structural Environment

Dogs are housed in kennels with access to outdoor runs. Each kennel provides at least 100% of the minimum USDA required floor space in the indoor portion. All kennels contain an assortment of toys and may be equipped with resting benches.

#### Novel Food Items

Dogs receive novel food items in the form of one small dog chew treat on a daily basis.

### ***11.3 Behavioral Management***

#### Behavioral Evaluations

The behavioral staff evaluates all dogs entering a DVR facility during the beginning of the second week following their arrival. The carnivore unit personnel report any canine behavior problems observed to the behavior staff, which upon receiving a referral, evaluates the animal within two days (Appendix A). The purpose of the evaluation is to determine temperamental soundness. If a dog has a minor behavioral problem it receives

a formal evaluation that provides a plan of action, addressing the behavior problem with the goal of decreasing or eliminating the undesirable behavior.

### Documentation

All canine behavioral data and supplemental evaluations are entered in the canine behavior database and are available via computer.

## **12. Nonhuman Primates**

### *12.1 Natural History*

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). Early socialization is critical to the development of normal behavior and social skills.

### **New World Primates**

#### **Mustached Tamarins** (*Saguinus mystax*)

These tamarins are found in western Brazil and in the middle Amazon region of northern Peru. They live in small groups of three to eight individuals with a single breeding female and several reproductive males. Males are known to assist in the care of infants. They are arboreal, seldom coming to the ground in the wild (Fleagle, 1999).

#### **Owl monkeys** (*Aotus* spp.)

Owl monkeys live in monogamous pairs and nuclear families, with adult males playing a significant role in the raising of offspring. Owl monkeys are territorial and communicate with other groups primarily through olfactory and auditory cues. Owl monkeys are nocturnal and arboreal, nesting in cavities of trees, and are primarily frugivorous (Eckert, 1999; Kinzey, 1997; Moynihan, 1976).

#### **Squirrel monkeys** (*Saimiri* spp.)

Squirrel monkeys live in large, mixed-sex social groups. Females are dominant over males for most of the year, with males becoming dominant during the breeding season. Squirrel monkeys are arboreal and eat insects, fruits and a variety of plant material (Fleagle, 1999; Mendoza, 1999).

### **Old World Monkeys**

#### **Macaques** (*Macaca* spp.)

Macaques live in large, mixed-sex social groups based on stable matrilineal dominance hierarchies. Males emigrate from their natal groups at puberty and establish their dominance positions in adopted groups. Macaques use elevated surfaces and trees for predator avoidance and sleeping. They are omnivorous. Macaques spend the majority of their day foraging and resting, though social interactions (including sex, grooming, and territorial/dominance displays) are also an important part of their daily activities. The

three species of macaques typically found in biomedical research facilities are rhesus (*Macaca mulatta*), long-tailed or cynomolgus (*Macaca fascicularis*), and pigtail (*Macaca nemestrina*) (Baskerville, 1999; Lindburg, 1980).

**African Greens** (*Chlorocebus sp.*, vervets, grivets, or green monkeys, Fleagle, 1999) African green monkeys live in mixed sex social groups. They are terrestrial omnivores and range throughout most of sub-Saharan Africa. Habitat preference includes gallery forests and savannah woodlands (Fleagle, 1999).

**Baboons** (*Papio sp.*)

Baboons are the largest monkeys used in biomedical research. The baboon species most often found in the laboratory are *Papio cynocephalus cynocephalus*, *Papio cynocephalus anubis* and *Papio hamadryas*. The savannah baboons live in large mixed sex social groups of up to eighty individuals (Fleagle, 1999). They are semi-terrestrial omnivores (Napier & Napier, 1967).

**Hamadryas baboons** (*Papio hamadryas*)

The structure of the hamadryas social group is a close-knit family consisting of a single adult male and up to ten females with their offspring. Hamadryas baboons are not arboreal in their native habitat, but spend the night on rocky cliffs in order to avoid predation.

## ***12.2 Environmental Enrichment***

### Social Environment

Nonhuman primates are housed with other members of their species and/or similar species in a variety of social contexts whenever possible. These include large, full-contact groups housed in indoor/outdoor runs or Environ-Flexagons™, smaller full-contact groups housed in tunnel cages, pairs with varying levels of social contact, and single cages within sensory contact of other animals. Nonhuman primate socializations involving anything more than audio-visual contact are performed or supervised by the DVR behavioral staff (Appendix A).

**Singly housed animals:** Nonhuman primates may need to be housed in single cages for a variety of reasons. Animals are generally ineligible for social contact while in quarantine. Exceptions to this quarantine restriction may be made with the approval of the attending veterinarian in cases of animals that demonstrate abnormal levels of distress and might benefit from social contact. Animals are ineligible for social housing if specifically exempted from social housing in an approved Animal Study Proposal (ASP 3040-2). Animals may also be deemed temporarily or permanently ineligible from social housing by the attending veterinarian for a medical condition or medical treatment. Animals may also be singly housed due to documented individual histories of failed socialization attempts.

Nonhuman primates housed singly have visual, auditory, and olfactory contact with members of their species and/or similar species. Where animals cannot be housed within

direct visual access of one another, mirrors may be placed on the walls across from animal cages so the animals can see their neighbors. Special consideration is taken in the rare case where an animal cannot be housed with other members of its own or similar species due to a lack of cohorts of similar serological status. In these cases, supplemental enrichment will be provided, often in the form of a mirror.

**Pairs:** The DVR behavioral staff socializes adult owl monkeys in same-sex pairs or in mixed-sex pairs where the male has been vasectomized. Because owl monkeys live in monogamous pairs in the wild, they are socialized exclusively in pairs rather than groups. The behavioral staff introduces potential new pairs by providing visual access between cages separated by a lexan panel for a predetermined period of habituation which typically lasts a week. New pairs are formed by removing the panel between adjacent home cages.

For all other nonhuman primate species in DVR, the behavioral staff uses a gradual process to form adult same-sex pairs, mixed-sex pairs with a vasectomized male, or breeding pairs where the female is on an ASP with approval for breeding (Reinhardt, 1994). The behavioral staff observes each potential pair with visual access first, then depending upon cage and equipment limitations, the estimated risk of animal injury, and the expected probability of success, they increase the contact level to small mesh, large mesh, grooming bars, or full contact. The DVR behavioral staff socializes juvenile nonhuman primates in same sex pairs through an abbreviated process. The behavioral staff observes each potential pair with visual access first, then gives the animals full contact if they do not observe negative interactions.

**Groups:** For most nonhuman primate species in DVR other than owl monkeys, i.e., macaques, introducing groups of eight or more individuals simultaneously to large indoor corrals or habitats is the preferred method of social housing. The behavioral staff socializes smaller groups in traditional caging using the gradual process described above (Appendix A). The behavioral staff supervises the socialization of larger groups in indoor/outdoor runs and Environ-Flexagons™ by introducing animals simultaneously into a clean environment stocked with standard feed and novel foods. Adults may be grouped in same-sex groups or in breeding groups where each female is on an ASP with approval for breeding. Juveniles may be grouped in same-sex or mixed-sex groups until the onset of sexual maturity.

### Structural Environment

**Structure and substrate:** The structure and substrate found within each nonhuman primate housing environment allows for the expression of species typical activities. DVR provides each owl monkey cage with a CPVC tube for perching and scent marking, an elevated perch, and a nest box. Additionally, owl monkeys are housed in rooms kept on a reverse light cycle to allow for more natural feeding and activity patterns. Squirrel monkey cages may have a swinging and elevated stationary perch. Single cages for larger nonhuman primate species have an elevated perch. Activity units have an elevated perching platform with an attached ladder. Gang cages have elevated perching platforms and visual blocks within the enclosure. All Environ-Flexagons™ are equipped with

elevated perching platforms, and may also be provided with wood foraging chips, barrels for hiding, and visual block panels within the enclosure. Indoor/Outdoor runs have elevated perching platforms, rotating perching poles, hanging chains, prima-hedron or similar design moving perches, barrels for hiding, and are provided with wood foraging chips. Weather permitting, nonhuman primates housed in indoor/outdoor runs are provided outdoor access.

**Manipulanda:** Each nonhuman primate is provided with manipulanda specific to its housing environment. DVR provides all standard cages with one hard floor toy (such as grenades, Hercules™ dental devices, and dental balls), one soft floor toy (such as flying saucers and Gumabones®), and one hanging toy (such as tug toys), and may also provide additional hanging apparatus (e.g. mirrors and rattles). Environ-Flexagons™, gang cages, and indoor/outdoor runs hold large floor toys (such as balls and prima-hedrons). Challenger balls are rotated through all nonhuman primate housing other than indoor/outdoor runs and the Environ-Flexagons™ located in Building 104. These challenger balls are on a regular schedule of rotation throughout DVR facilities by room and are refilled with novel food items at least twice before they are removed.

#### Novel Food Items

Each nonhuman primate receives a novel food item at least twice weekly. Novel foods are any food other than an animals' standard feed, and can include fruits (such as apples, bananas, oranges, or grapes), vegetables (such as lettuce, celery, or carrots), nuts (such as sunflower seeds or peanuts), or manufactured treats (such as Primatreats, Mazouri ® foraging bits, foraging crumbles, foraging discs, softies, or twice baked bagels).

### ***12.3 Behavioral Management***

#### Standard

The DVR behavioral staff performs a facility entry observation on each animal arriving at a DVR facility within two weeks of the animal's arrival. During the observation, the behavioral staff records any and all defined abnormal behaviors the animal exhibits (Appendix B.2). Twice each year, the behavioral staff also performs similar semi-annual observations on every nonhuman primate housed in a DVR facility.

Any animal exhibiting an abnormal behavior during a facility entry or semi-annual observation receives a supplemental behavioral evaluation. A semi-annual observation may refer to the previous supplemental behavioral monitoring evaluation rather than requiring a new follow up if the animal previously displayed the same behavior to the same or lesser severity and did not require supplemental behavioral monitoring. The behavioral staff conducts behavior evaluations (Appendix B.3), noting abnormal behavior and probable causes, severity, and behavioral modification plans (if any are required). Any nonhuman primate that is referred by the facility care staff, veterinary staff, or investigator to the DVR behavioral staff for a suspected abnormal behavior, will receive a behavioral evaluation.

### Animals on Supplemental Behavioral Monitoring

Animals that exhibit high levels of distress are placed on supplemental behavioral monitoring. Each animal on supplemental behavioral monitoring receives, at a minimum, weekly monitoring and monthly follow-up behavioral evaluations conducted by the DVR behavioral staff. These monthly behavioral evaluations are conducted as described for facility entry and semi-annual follow-ups above (Appendix B.3). Supplemental behavioral monitoring also includes efforts either to diagnose further an animal's abnormal behavior and its possible causes, such as by video taping the animal's activities, or to reduce and eliminate abnormal behavior through a variety of methods. These methods can include moving an animal within the room, training an animal, socialization, or giving an animal supplemental enrichment such as a peanut feeder, challenger ball, or foraging turf.

### Documentation

The DVR behavioral staff maintains a nonhuman primate behavior database in order to track and document behavior observations, supplemental behavioral monitoring, socializations, and other information relevant to behavior or enrichment. All behavior records for non-human primates are accessed by computer. Computerized data records track and document all animal socializations and semi-permanent separations; facility entry and semi-annual observations; supplemental behavioral monitoring and referrals; and changes in supplemental behavioral monitoring. The behavioral staff also tracks daily animal and weekly monitoring notes and enters these observations into the computerized behavior database.

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# APPENDIX A

## STANDARD OPERATING PROCEDURES

Standard Operating procedures pertaining to environmental enrichment, animal well-being, and documentation of the program are located on the DVR V-drive. The relevant numbers of each SOP are posted below.

- 400 *Environmental Enrichment for nonhuman primates*
- 401 *Behavioral record keeping for nonhuman primates*
- 402 *Clinical and behavioral assessment of SIB in primates*
- 403 *Socializations of non-human primates*
- 405 *Clinical and behavioral assessment of abnormal behavior in primates*
- 406 *Environmental enrichment for pigs housed in DVR buildings*
- 407 *Environmental enrichment for rats and mice housed in DVR buildings*
- 408 *Environmental enrichment for rabbits housed in DVR buildings*
- 409 *Environmental enrichment for ground squirrels, guinea pigs and hamsters housed in DVR buildings*
- 411 *Environmental enrichment for sheep housed in DVR buildings*
- 412 *Environmental Enrichment for felines housed in DVR Buildings*
- 413 *Procedures to address barbering in mice*
- 414 *Exemptions from the DVR enrichment plan*
- 420 *Behavioral evaluations of canines housed in DVR buildings*
- 421 *Environmental enrichment for canines housed in DVR buildings*
- 605 *Interacting with nonhuman primates*

## **APPENDIX B**

# **INTERNAL GUIDELINES AND DEFINITIONS**

*B.1 Definitions of Abnormal Canine Behavior*

*B.2 Definitions of Abnormal Nonhuman Primate Behavior*

*B.3 How to Conduct Nonhuman Primate Behavioral Evaluations*

### **Definitions of Abnormal Canine Behavior DVR Behavior and Environmental Enrichment Program**

#### **Aggressive toward Other Dogs (*AGD*)**

The dog growls, snaps, or pounces at other dogs in the kennel. May escalate into fighting between dogs.

#### **Aggressive toward People (*AGP*)**

The dog growls, snaps, or lunges at a human either outside or inside of its kennel. Dominance-related aggressive behavior toward people may include body postures such as an erect, straight tail, piloerection, and raised head and ears. Aggression toward people may also be fear-based.

#### **Locomotor Stereotypy (*LST*)**

Moving in a repetitive, ritualized pattern that serves no obvious function (i.e., is not a part of play, sex, grooming, etc). Subcategories can include pacing, circling and wall jumping.

#### **Self-injurious Behavior (*SIB*)**

The dog engages in licking, biting, chewing, or scratching to the point of self-injury. This includes any biting or chewing that leads to scratches or more severe trauma.

#### **Fearful (*FFL*)**

Dog signals apprehension to an external stimulus in one or more of the following ways: by leaning back and away from the perceived threat, ears pressing back, tail carried tightly between the legs, grinning, excessive licking of the lips, vocalizing in a high pitched whine or yelp, cowering to the ground or rolling over to expose the belly, urinating, shaking, or avoidance of eye contact.

**Definitions of Abnormal Nonhuman Primate Behavior  
DVR Behavior and Environmental Enrichment Program**

**Floating Limb (FLT)**

While sitting passively, one limb or tail is observed beginning a slow, upward movement. This apparently goes unnoticed at first by the animal. Scored using two components: context in which the behavior occurs and level of response by the animal to the limb.

Scored: Mild, Moderate, or Severe

**Context**

		Specific	Non-Specific
<b>Response</b>	Non-Aggressive	Mild	Moderate
	Aggressive	Moderate	Severe

Context:

Specific: Behavior only occurs under stressful circumstances (e.g. only when someone stares directly at the animal)

Non-Specific: Behavior occurs under many different circumstances, may not appear to be stimulus cued

Response:

Non-Aggressive: Animal ignores floating limb or notices limb but does not react by attacking the limb

Aggressive: Animal attacks the floating limb

**Hair Loss (HLS)**

Not a behavior in itself, but the symptom of an underlying problem. Scored using two components: percentage of body missing hair and pattern of hair loss.

Scored: Mild, Moderate, or Severe

**Percentage of Body with Hair Loss**

		1-33%	34-66%	67-100%
<b>Pattern of Hair Loss</b>	Thinning/Mottled	Mild	Mild	Moderate
	Patchy/Bald	Moderate	Severe	Severe

Pattern of Hair Loss:

Thinning: Hair is evenly but sparsely distributed

Mottled: Areas of hair intermixed with small patches of thin or missing hair that is most often observed on the limbs

Patchy: Areas of hair intermixed with large patches of missing hair

Bald: Well defined areas of missing hair

**Huddle (HDL)**

Crouching or curling up while hugging oneself or a cohort. Can include rocking while in this position.

Scored:

Mild: Animal huddles in specific contexts (e.g. only when someone first enters room, only during feeding or distribution of novel food), and is easily interrupted.

Moderate: Animal huddles intermittently in various contexts, and is not easily interrupted.

Severe: Animal huddles for the majority of daily activity budget, stopping infrequently and for short periods of time. A video recording can be used to make this determination.

**Locomotor Stereotypy (LST)**

Moving in a repetitive, ritualized pattern that serves no obvious function (i.e., is not a part of play, sex, grooming, etc). Subcategories can include pacing, circling, flipping, non-huddled rocking, and head tossing.

Scored:

Mild: Animal engages in locomotor stereotypy in specific contexts (e.g. only when someone first enters room, only during feeding or distribution of novel food), and is easily interrupted.

Moderate: Animal engages in intermittent locomotor stereotypy in various contexts, and is not easily interrupted.

Severe: Animal engages in locomotor stereotypy for the majority of daily activity budget, stopping infrequently and for short periods of time. A video recording can be used to make this determination.

**Masturbate (MBT)**

Manipulating one's genitals with one's hands or feet. This behavior will be noted if directly observed or inferred by the presence of seminal fluid.

Scored: Y/N

**Penis Suck (PSK)**

Observed sucking on one's own penis. Subcategories can include urine drinking or sexual stimulation.

Scored: Y/N

**Regurgitate (RGT)**

Expelling food through the mouth at any point during digestion including food that has been chewed but not swallowed. This behavior will be noted if directly observed or inferred by the presence of partially digested food in or on the enclosure.

Scored: Y/N

**Salute (SLT)**

Observed holding one's hand or finger against one's eye or eyebrow. Can include eye poking.

Scored:

Mild: Animal salutes in specific contexts (e.g. only when someone first enters room, only during feeding or distribution of novel food), and is easily interrupted.

Moderate: Animal salutes intermittently in various contexts, and is not easily interrupted.

Severe: Animal salutes for the majority of daily activity budget, stopping infrequently and for short periods of time, or to the point of self-injury. A video recording can be used to make this determination.

### **Self-Grab (SGB)**

Observed clasping a part of one's own body with hands and/or feet. This does not include self-hugging, which is scored as huddle (see above). Self-grabbing is a natural part of the behavioral repertoire of pigtail macaques and should not be considered abnormal.

Scored:

Mild: Animal engages in self-grabbing in specific contexts (e.g. only when someone first enters room, only during feeding or distribution of novel food), and is easily interrupted.

Moderate: Animal engages in self-grabbing intermittently in various contexts, and is not easily interrupted.

Severe: Animal engages in self-grabbing for the majority of daily activity budget, stopping infrequently and for short periods of time, or to the point of self-injury. A video recording can be used to make this determination.

### **Self-Mouth (SMT)**

Observed sucking or resting one's open mouth on any part of one's own body other than genitals.

Scored:

Mild: Animal engages in self-mouthing in specific contexts (e.g. only when someone first enters room, only during feeding or distribution of novel food), and is easily interrupted.

Moderate: Animal engages in self-mouthing intermittently in various contexts, and is not easily interrupted.

Severe: Animal engages in self-mouthing for the majority of daily activity budget, stopping infrequently and for short periods of time, or to the point of self-injury. A video recording can be used to make this determination.

### **Self-directed Display (SDD)**

Observed mouthing oneself vigorously while looking directly at an observer or cohort. Commonly referred to as sham biting.

Scored:

Mild: Animal engages in a self-directed display in specific contexts (e.g. only when someone first enters room, only during feeding or distribution of novel food), and is easily interrupted.

Moderate: Animal engages in a self-directed display intermittently in various contexts, and is not easily interrupted.

Severe: Animal engages in a self-directed display for the majority of daily activity budget, stopping infrequently and for short periods of time, or to the point of self-injury. A video recording can be used to make this determination.

**Self-injurious Behavior (SIB)**

Observed biting or scratching oneself without looking at an observer or cohort, or any apparently self-inflicted injury of indeterminate cause, or any observed self-inflicted pain or injury not directly caused by one of the above listed behaviors. Scored using two components: frequency of behavior and severity of wounds. This code is to be used **ONLY** for self-injurious behavior that has been directly observed, not for suspected cases or for wounds due to unknown causes.

Scored: Mild, Moderate, or Severe

**Frequency**

		Once in a month	More than once in one month	More than once in one week
Severity	No harm, bruising, pin pricks, or abrasions	Mild	Mild	Moderate
	Surface lacerations	Mild	Moderate	Severe
	Subcutaneous wounding	Moderate	Severe	Severe

## Appendix B.3

### How to Conduct Primate Behavioral Evaluations

#### *DVR Behavior and Environmental Enrichment Program*

**Subjective Notes:** This is a detailed description including any and all relevant information regarding the animal's well being. This includes any abnormal behaviors an animal displays during the evaluation, or has displayed during the weekly checks leading up to it. The notes should use wording from the behavior definitions and follow-up evaluations should address each abnormal behavior noted in the original observation. Other information may include observed behaviors that justify a particular plan of remediation (e.g. "Aggravated by other animals in room." for an animal that might be provided with a visual block). If a plan for remediation is currently underway, the description should note whether the animal's condition or behavior has "improved", has "not changed", or has "deteriorated" since the beginning of that particular plan.

**Abnormal Behaviors:** This should list each abnormal behavior observed, including cases where supplemental behavior monitoring will not be implemented or where "hair loss" is not suspected to reflect psychological distress. This should also include the severity level of each applicable behavior (all behaviors except "masturbate," "penis suck," and "regurgitate" have severity levels). This severity level should be determined primarily from the criteria in the behavior definitions.

**Distress Score:** This is a subjective rating (from 1-4) of the psychological distress of an animal. In most circumstances, the score will be determined by the highest behavior severity level (i.e. 2 for an animal with only a mild behavior, 3 for moderate, and 4 for severe). An animal will receive a score of 1 (mild or anticipated distress) when it displays "no abnormal behavior," or an abnormal behavior that is believed not to be caused by psychological distress. All other animals with any abnormal behavior noted will receive a score of 2 or higher.

**Plan:** The plan should be a clear and concise path of action for remediating psychological distress, or a reason why such action is unnecessary. Animals receiving a distress score of 1 or 2 are not typically placed on supplemental behavior monitoring due to their low levels of distress. Animals receiving a distress score of 3 may be placed on supplemental behavior monitoring at the discretion of the DVR behavior staff. Animals receiving a distress score of 4 should be placed on supplemental behavior monitoring. The plan may include justification for a particular remediation (i.e. "Place BLK because aggravated by other animals.>"). Plans for remediation may include (but are not limited to) videotaping the animal to determine possible causes of distress or abnormal behavior, moving it in the room, adding a supplemental enrichment device to its cage, socialization, training, or simply monitoring its behavior.

#### IMPLEMENTING PLANS

Each week, the behavior staff will print a list of plans for remediation that were prescribed in the previous week's evaluations. The behavior staff will be responsible for seeing that the plan for each animal is implemented by the end of that week. The behavior staff will sign and date this sheet when each plan has

been addressed, and make a short notation explaining exactly what was done. A “Daily Animal Note” should be entered in the animal’s behavior record noting what progress has been made.

**Animal Move:** A request should be made to the facility manager (preferably both verbally and via email) explaining where and how an animal should be moved. Except in the most severe cases, such moves should be coordinated with room cleanings. The date when the animal is moved to its new position in the room should be noted in the animal’s behavior record.

**Supplemental Enrichment:** The behavior staff will be responsible for placing any supplemental enrichment device on the animal’s cage on the first workday of the week.

**Socialization:** The behavior staff will explore socialization options for the animal, in accordance with SOP 403. If the animal meets the criteria for socialization and a suitable partner can be found, a request to have the animal placed in appropriate caging will be made to the facility manager (preferably both verbally and via email).

**Videotape:** The behavior staff should videotape the animal for at least an hour at some point during the week. The behavior staff is responsible for coordinating with the schedules of animal care staff if such videotaping must be done at a specific time (e.g. during room cleanings or feedings) or under particular circumstances. The behavior staff will review the videotape to aid in devising a plan of remediation.

**Training:** The behavior staff will attempt to address the animal’s abnormal behavior through regular training sessions. The purpose, method, and results of each training session will be recorded in the animal’s behavior file.

**Monitoring:** The behavior staff will perform an assessment of the animal’s condition sometime during the week.

## **REMOVING ANIMALS FROM BEHAVIORAL MONITORING**

If an animal’s level of distress improves to the point that behavioral intervention is no longer required (e.g. hair coat has filled in or frequency of abnormal behavior has declined), an animal may be removed from behavioral monitoring. If the distress level has improved with the presence of a supplemental enrichment device, the device should be taken off the cage and the animal should continue to receive weekly checks for at least one month before actually being removed from monitoring. This is to ensure that the removal of the device will not result in a relapse of distress.

## APPENDIX C

**C.1** Requirement for Environmental Enhancement for Primates Under the Animal Welfare Act (NAL summary), and exemptions from the DVR environmental enrichment plan

**C.2** A Quick Reference to the Requirement for the Exercise of Dogs Under the Animal Welfare Act (NAL summary)

### **Primates:**

*A Quick Reference to the Requirement for Environmental Enhancement for Primates Under the Animal Welfare Act (NAL summary)*  
<http://www.nal.usda.gov/awic/legislat/awabrief.htm#Q9>

The requirements of the Animal Welfare Act (AWA) are set forth under the Regulations and Standards in the Code of Federal Regulations (CFR). These requirements are found in Title 9 CFR, Chapter 1, Subchapter A - Animal Welfare, Parts 1, 2, and 3. The requirement for the psychological well-being of primates is set forth under section 13(a)(2)(B) of the AWA (7 USC, 2143). The standards for environmental enhancement to promote psychological well-being in primates are set forth under 9 CFR, Chapter 1, Subchapter A - Animal Welfare, Part 3, Section 3.81. Section numbers are given for reference to the actual wording of each requirement.

### **Environment enhancement to promote psychological well-being (3.81).**

Dealers, exhibitors, and 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 must be in accordance with the currently accepted professional standards as cited in appropriate professional journals or reference guides, and as directed by the attending veterinarian. The plan must be made available to APHIS and any funding Federal agency upon request. At a minimum, the plan must address each of the following:

(a) **Social grouping.** The environmental enhancement plan must include specific provisions to address the social needs of nonhuman primates of species known to exist in social groups in nature. Such specific provisions must be in accordance with currently accepted professional journals or reference guides, and as directed by the attending veterinarian. The plan may provide for the following exceptions:  
 (3.81(a)).

(1) If a nonhuman primate exhibits vicious or overly aggressive behavior, or is debilitated as a result of age or other condition, such as arthritis, it should be housed separately; (3.81(a)(1)).

(2) Nonhuman primates that have or are suspected of having a contagious disease must be isolated from healthy animals in the colony as directed by the attending veterinarian. If an entire group of nonhuman primates is known to have or believed to be exposed to an infectious agent, the group may be kept intact during diagnosis, treatment, and control. (3.81(a)(2)).

(3) Nonhuman primates may not be housed with other species of primates or animals unless they are compatible, do not prevent access to food, water, or shelter by individual animals, and are not known to be hazardous to the health and well-being of each other. Compatibility is to be determined in accordance with generally accepted professional practices and actual observations, as directed by the attending veterinarian, to ensure that the nonhuman primates are in fact compatible. Individually housed nonhuman primates must be able to see and hear nonhuman primates of their own or compatible species unless the attending veterinarian determines that it would endanger their health, safety, or well-being. (3.81(a)(3)).

(b) **Environmental enrichment.** The enclosure for the nonhuman primate must be enriched by providing means of expressing noninjurious species-typical activities. Species differences are to be considered when determining the type or methods of enrichment. Examples of enrichment include perches, swings, mirrors, and other increased cage complexities; providing objects to manipulate; varied food items; using foraging or task-oriented feeding methods; and providing interaction with the care giver or other familiar and knowledgeable person consistent with safety precautions. (3.81(b)).

(c) **Special considerations.** Certain nonhuman primates must be provided special attention regarding enhancement of their environment, based on the needs of the individual species and in accordance with the instructions of the attending veterinarian. Nonhuman primates requiring special attention are the following: (3.81(c)).

(1) Infants and young juveniles; (3.81(c)(1)).

(2) Those that show signs of being in psychological distress through behavior or appearance; (3.81(c)(2)).

(3) Those used in research for which the Committee-approved protocol requires restricted activity; (3.81(c)(3)).

(4) Individually housed nonhuman primates that are unable to see and hear nonhuman primates of their own or compatible species; and (3.81(c)(4)).

(5) Great apes weighing over 110 lbs. Facilities must include in the environment enhancement plan special provisions for great apes weighing over 110 lbs, including additional opportunities to express species-typical behavior. (3.81(c)(5)).

(d) **Restraint devices.** Nonhuman primates are not to be maintained in restraint devices unless required for health reasons as determined by the attending veterinarian or by a research proposal approved by the Committee. Maintenance under restraint must be for the shortest period possible. In instances where restraint over 12 hours is required, the nonhuman primate must be provided the opportunity for daily unrestricted activity for at least one continuous hour during the period of restraint, unless continuous restraint is required by the research proposal approved by the Committee. (3.81(d)).

(e) **Exemptions.**

(1) The attending veterinarian may exempt an individual nonhuman primate from the environment enhancement plan because of its health or condition, or in consideration of its well-being. The basis of the exemption must be recorded by the attending veterinarian for each exempted nonhuman primate. Unless the basis for the exemption is a permanent condition, the exemption is to be reviewed at least every 30 days by the attending veterinarian. (3.81(e)(1)).

(2) The research facility Committee may exempt an individual nonhuman primate from some, or all, of the required environment enhancement plan for scientific reasons set forth in the research proposal. The basis of the exemption is to be documented in the approved proposal and must be reviewed at appropriate intervals but not less than annually. (3.81(e)(2)).

(3) Records of any exemptions must be maintained and must be available to USDA officials, or officials of any funding Federal agency upon request. (3.81(e)(3)).

**NOTE:** The information in this paper contains excerpts and paraphrasing of the published regulations and standards in 9 CFR, Chapter 1, Subchapter A - Animal Welfare. The appropriate section in 9 CFR should be consulted for the actual wording of that requirement.

**At NIH: If non-human primates are exempt from social housing, and this exemption has been reviewed and approved by the Institute ACUC, then documentation indicating this exemption from social housing should be included into 3040-2 under section M, or submitted as an addendum to any previously approved protocol if there are significant changes to social housing options for non-human primates held in DVR buildings on the NIH campus.**

**3040-2 Section M.**

**SPECIAL CONCERNS OR REQUIREMENTS OF THE STUDY** - List any special housing, equipment, animal care (i.e., special caging, water, feed, or waste disposal, etc.). Include justification for exemption from participation in the environmental enrichment plan for

nonhuman primates or exercise for dogs.

**DVR policy is to socially house all non-human primates whenever possible unless an approved written exemption is on file with DVR management. The required exemption documentation must be reviewed at least annually by the Institute ACUC.**

## C.2

### Dogs:

*A Quick Reference to the Requirement for the Exercise of Dogs Under the Animal Welfare Act (NAL summary)*

<http://www.nal.usda.gov/awic/legislat/awabrief.htm#Q10>

The requirements of the Animal Welfare Act (AWA) are set forth under the Regulations and Standards in the Code of Federal Regulations (CFR). These requirements are found in Title 9 CFR, Chapter 1, Subchapter A - Animal Welfare, Parts 1,2, and 3. The requirement for the exercise of dogs is set forth under section 13(a)(2)(B) of the AWA (7 U.S.C., 2143). The standards for the exercise of dogs are set forth in 9 CFR, Chapter 1, Subchapter A - Animal Welfare, Part 3, Section 3.8. Section numbers are given for reference to the actual wording of each requirement (see Note at end of section).

**Definition - Positive physical contact:** means petting, stroking, or other touching which is beneficial to the well-being of the animal.

The requirements for the exercise of dogs are as follows:

#### I. Exercise for dogs (Sect. 3.8):

Dealers, exhibitors, and research facilities must develop, document, and follow an appropriate plan to provide dogs with the opportunity for exercise. The plan must be approved by the attending veterinarian and must include written standard procedures to be followed in providing the opportunity for exercise.

The plan must be made available to APHIS and any funding Federal agency upon request. At a minimum the plan must comply with the following;

(a) **Dogs housed individually** - Dogs over 12 weeks of age, except bitches with litters, must be provided a regular opportunity for exercise if they are individually in enclosures that provide less than two times the floor space required for that dog under section 3.6(c)(1) (i.e. length of dog in inches + 6) x (length of dog in inches + 6)/ 144 = required floor space in square feet. (3.8(a)).

(b) **Dogs housed in groups** - Dogs over 12 weeks of age maintained in groups do not require additional opportunity for exercise if they are maintained in enclosures that

provide at least 100 percent of the required minimum floor space for each dog if maintained separately. These dogs may be maintained in compatible groups unless: (3.8(b)).

(1) Housing in compatible groups is not in accordance with the Committee approved research protocol; (3.8(b)(1)).

(2) In the opinion of the attending veterinarian such housing would adversely affect the health or well-being of the dogs; or (3.8(b)(2)).

(3) Any dog exhibits aggressive or vicious behavior. (3.8(b)(3)).

**(c) Methods and period of providing exercise opportunity.**

(1) The frequency, method, and duration of the opportunity for exercise shall be determined by the attending veterinarian and, at research facilities, in consultation with and approval by the Committee. (3.8(c)(1)).

(2) In developing the plan, the provision of positive physical contact with humans that encourages exercise through play or other similar activities should be considered. Any dog that is maintained without sensory contact with another dog must be provided with positive physical contact with humans at least daily. (3.8(c)(2)).

(3) The opportunity for exercise may be provided in a number of ways, such as, (3.8(c)(3)).

(i) Group housing if the enclosure provides at least 100 percent of the minimum required floor space for each dog if maintained separately under section 3.6(c)(1). (3.8(c)(3)(i)).

(ii) Maintaining individually housed dogs in enclosures that provide at least twice the minimum required floor space under section 3.6(c)(1); (3.8(c)(3)(ii)).

(iii) Providing access to a run or open area at a frequency and duration prescribed by the attending veterinarian; or (3.8(c)(3)(iii)).

(iv) Other similar activities. (3.8(c)(3)(iv)).

(4) Forced exercise methods such as swimming, treadmills, or carousel-type devices are not acceptable methods of exercise. (3.8(c)(4)).

**(d) Exemptions.**

(1) If, in the opinion of the attending veterinarian, it is inappropriate for certain dogs to exercise because of their health condition, or well-being, those dogs may be exempted from the exercise requirement. Such exemptions must be documented by the attending

veterinarian and reviewed at least every 30 days unless the basis for the exemption is a permanent condition. (3.8(d)(1)).

(2) Dogs at research facilities may be exempted from the exercise requirement if the principal investigator determines for scientific reasons set forth in the research proposal that it is inappropriate for certain dogs to exercise. The exemption must be documented in the Committee approved proposal and must be reviewed at appropriate intervals as determined by the Committee, but not less than annually. (3.8(d)(2)).

(3) Records of any exemptions must be maintained and made available to USDA officials or any funding Federal agency upon request. (3.8(d)(3)).

**NOTE:** The information in this paper contains excerpts and paraphrasing of the published regulations and standards in 9CFR, Chapter 1, Subchapter A- Animal Welfare. The appropriate section in 9 CFR should be consulted for the actual wording of that requirement.

## **Disclaimer**

The DVR Environmental Enrichment Plan is a living document. Accordingly it is revised periodically to reflect the dynamic nature of the enrichment program for species housed within DVR facilities. This plan was written specifically to address enrichment for animals housed within the Division of Veterinary Resources Program and does not represent an enrichment plan for any other institute within the NIH community. Thus, it does not constitute an NIH policy or guidance statement regarding environmental enrichment plans.