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Enrichment and Primate Centers: Closing the Gap Between Research and Practice

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Abstract

A wealth of published research is available to guide environmental enrichment programs for nonhuman primates, but common practice may not consistently correspond to research findings. A 2003 survey to quantify common practice queried individuals overseeing enrichment programs about (a) social, feeding, structural, and manipulable enrichment; (b) human interaction and training; (c) general program administration; (d) the role of the institutional animal care and use committee (IACUC) in the enrichment program; and (e) the impetus for recent programmatic changes. Returned surveys provided information on the management of 35,863 primates and found social housing significantly more constrained than inanimate enrichment. Survey results suggest that social housing of macaques has not increased significantly over the past decade. The most commonly mentioned constraints related to research protocols. Facilities with thorough IACUC reviews of enrichment issues provided social housing for a significantly larger proportion of primates in biomedical research studies than did those with rare IACUC reviews. IACUC reviews prompted program enhancements much less often than did regulatory or accreditation inspections. These results suggest IACUC review is an underutilized mechanism for improving enrichment programs.

The Animal Welfare Act standards require that a facility's environmental enhancement 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" (Final Rule: Animal Welfare; Standards; Part 3, 1991, p. 6499). There is a wealth of published research to guide environmental enrichment programs, but applying "currently accepted professional standards" inevitably involves perceptions of common practice. Many individuals working in the field of behavioral management perceive a mismatch between information in the scientific literature and current management practices for nonhuman primates.

The lack of characterization or quantification of common practice poses numerous challenges. Lack of quantification can hinder progress within a facility, because information is not available for making internal assessments relative to an objective gauge of common practice. The U.S. Department of Agriculture (USDA) clearly recognizes this problem, which played a role in the development of the USDA's Draft Policy on Environmental Enhancement for Nonhuman Primates. This document points out

there has been considerable disagreement in various sectors of the public over the adequacy of the performance standards in Sec. 3.81, as well as confusion among the regulated public concerning on what basis they will be judged by inspectors as meeting or not meeting the requirements. Our inspectors requested information and clarification on how to judge whether someone was meeting the requirements of Sec.

3.81. (Animal Welfare; Draft Policy on Environment Enhancement for Nonhuman Primates, 1999, p. 38146).

THE SURVEY

The informality of existing mechanisms for sharing information on the current status of enrichment program practices and the resulting lack of cross-institutional consistency prompted this author, J. Weed, C. Crockett, and M. Bloomsmith to initiate a project in 2003 to generate a thorough characterization of common practice, as well as recommendations regarding mechanisms and goals for the future progress of nonhuman primate enrichment programs. We developed a survey requesting information on enrichment program administration and management, and implementation standards, procedures, and constraints regarding the following major categories of environmental enrichment:

1. Social housing.
2. Feeding enrichment.
3. Manipulable enrichment.
4. Enrichment devices.
5. Structural enrichment.

The survey also included questions regarding (a) human interaction and training, (b) intervention plans for primates exhibiting behavioral pathologies, (c) the nature of the intersection between a facility's enrichment program and the institutional animal care and use committee (IACUC), and (d) the impetus for recent programmatic changes.

We distributed the surveys to individuals managing enrichment programs at facilities in the United States that maintain nonhuman primates for research or breeding. Facility types included

1. National Primate Research Centers.
2. National Institutes of Health (NIH) facilities.
3. University laboratories.
4. Private research facilities.
5. Pharmaceutical companies.
6. Primate suppliers.

Completed surveys numbered 22, and they provided data on almost 36,000 primates.

Reported constraints on enrichment implementation varied greatly between the major categories of enrichment. Response options included (a) "cost"; (b) "time or staff"; (c) "protocol concerns"; and for social housing, (d) "incompatibility" and (e) "housing/space." The survey instructions permitted multiple responses for this question. Respondents reported that social housing was by far the most constrained form of enrichment. At least one factor constrained implementation of social housing at 95% of the responding facilities. In contrast, 45% reported constraints to the use of enrichment devices, 32% to the use of structural enrichment, 14% to feeding enrichment, and only 9% to manipulable enrichment. Because the survey detected an apparently restricted status for social housing, this article will focus on social housing issues.

SOCIAL HOUSING ISSUES

Despite the increasing number of scientific articles concerning the benefits of social housing, implementation of such housing has not increased much over the past decade. The 2003 survey found that, over all settings, 73% of primates lived in social housing. This statistic, however, includes large breeding groups in outdoor corrals. For individuals in biomedical research studies, housing typically consists of cages or small indoor enclosures. Therefore, the most accurate way to determine the percentage of socially housed primates in the context of biomedical research is to focus on these types of housing. Among the primates housed in cages or small indoor enclosures ($N = 17,471$), only 46% lived in social housing.

Very little information is available for measuring change over time in the use of social housing for primates in research, but a 1994 study (Reinhardt, 1994), which surveyed enrichment for four species of macaques, found that 38% of the indoor-housed macaques lived in social housing. In the 2003 survey, 44% of indoor-housed macaques of the same species lived in social housing. Although a major focus of many enrichment programs is to increase the proportion of research subjects in social housing, a comparison of the results of the two surveys suggests that the use of social housing for research primates has not expanded as substantially as applied behavioral scientists and enrichment program managers would have hoped.

The 2003 survey's most frequently cited constraint regarding social housing was protocol concerns (77% of the responding facilities), followed by incompatibility (73%), availability of appropriate housing (41%), and availability of time or staff (32%). The least frequently cited constraint was cost (14%). Because protocol concerns were the most common constraint to the implementation of social housing, the interaction between IACUCs and enrichment merits particular attention.

The survey included several questions about IACUCs. One question, to which 82% of the facilities responded affirmatively, asked if the IACUC's membership included an individual with expertise and experience in primate behavior. Another asked about the consideration of enrichment issues during IACUC meetings. Response choices included

1. "Little support (enrichment issues are rarely discussed during meetings)."
2. "Some support (enrichment issues are occasionally discussed)."
3. "Moderate support (enrichment issues are not only discussed but could possibly affect protocol design)."
4. "Strong support (specific enrichment questions must be addressed during each protocol review)."

Only 36% of the facilities reported strong support of enrichment objectives by the IACUC.

Survey results permitted an exploration of the effect of these IACUC characteristics on the prevalence of social housing for rhesus macaques, the species housed at the largest number of facilities in the sample. We divided the facilities with at least some caged rhesus macaques into two groups: (a) those with an IACUC member with behavioral expertise (10 facilities, housing a combined total of 6,172 caged rhesus macaques) and (b) those without (4 facilities, housing 2,669 such macaques). This variable had no effect on the percentage of the macaques housed socially (Mann-Whitney U test; $U = 23$, ns).

However, we did find a significant difference when we divided the facilities into two enrichment-support categories: (a) those with either little or some support for enrichment in IACUC meetings (rare or occasional discussions of enrichment issues) and (b) those with either moderate or strong support (consistent discussions of enrichment issues, possibly affecting

protocol design). Facilities reporting little or some support numbered 6 and housed a combined total of 1,634 caged rhesus macaques. Facilities reporting moderate or strong support numbered 10 and housed 7,207 such macaques. The mean percentage of social housing for facilities with rare or occasional IACUC reviews of enrichment issues was 18.2%, $SE = \pm 9.1\%$, whereas the mean percentage for facilities with consistent IACUC reviews was 45.4%, $SE = \pm 6.5\%$. This difference was statistically significant (Mann–Whitney U test; $U = 11, p < .05$). Although a relationship between the treatment of enrichment issues during IACUC meetings and the use of social housing does not establish causality, it at least suggests that IACUC support may be pivotal to a facility's implementation of social housing for its research primates.

Another part of the survey provided a further indication of the underutilization of IACUC review for improving enrichment programs. Although the vast majority of facilities reported program changes in the past several years, only 20% of these facilities indicated that "internal review" (review by the IACUC) prompted such changes, in contrast to the 65% reporting modifications due to regulatory or accreditation visits. Enrichment coordinators seeking to expand the implementation of environmental enrichment, particularly social housing, may want to focus on the IACUC review process and promote the systematic evaluation, in all protocol reviews, of any proposed housing restrictions. Regulatory agencies may also want to examine the IACUC's role carefully, when seeking to identify the factors influencing a facility's implementation of enrichment, because the regulatory requirements of the Animal Welfare Act charge IACUCs with the responsibility for determining if proposed research activities provide appropriate living conditions for each species (Final Rule: Animal Welfare; Definition of Terms, 1989).

Finally, the survey revealed considerable variability between institutions in the amount of monitoring that new pairs received and in the use of grooming-contact pair housing (Crockett, Bellanca, Bowden, & Bowden, 1997). Given the prevalence of staffing and time constraints on the use of social housing, the cost/benefit ratios of different monitoring levels may merit evaluation because the monitoring of new pairs was extensive at most facilities. In addition, expanding the relatively rare use of grooming-contact caging may allow implementation of social housing for primates who are subject to protocol constraints or are experiencing incompatibility problems.

SUMMARY

These suggestions highlight the need for cross-institutional sharing of methodological and outcome data on social housing attempts because, currently, there appears to be more consistency within, than between, facilities with regard to techniques used to socialize nonhuman primates. Such cross-institutional communication, although it may be sensitive in nature, could promote enrichment program progress by expanding views of what is feasible and effective. Sharing information on successful methods for moving enrichment programs forward may help bring common practice in line with the science of environmental enhancement.

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