

Environmental enrichment and welfare implications for captive Hamadryas baboons

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Introduction

Baboons are frequently kept in captivity, either in zoos or as laboratory animals. Lack of social and environmental stimulation, in conjunction with environmental stressors can compromise the psychological their well-being, with the subsequent appearance of abnormal behaviours associated with compromised welfare. Abnormal behaviours of baboons include regurgitation and reingestion, self-directed behaviour, and stereotypies such as pacing and head tossing. Social and foraging behaviours are inherently important in baboons, and it has been suggested that environmental enrichment and companionship of conspecifics promotes these species-typical behaviours and prevents the occurrence of abnormal behaviours. This paper examines three studies investigating this concept, and the subsequent welfare implications of environmental enrichment in Hamadryas baboons (Papio Hamadryas).

Discussion

Baboons are inherently social and, when caged singly, are denied critical social interaction (Bourgeois and Brent, 2005). Being unable to satisfy innate behavioural drives is thought to compromise psychological well-being and manifest itself in the form of abnormal behaviours. Bourgeois and Brent (2005) investigated therapeutic techniques to reduce or prevent these abnormal behaviours in seven singly caged adolescent male hybrid Hamadryas baboons. They tested the effectiveness of four enrichment techniques: positive reinforcement training (PRT), food enrichment, non-food enrichment, and social enrichment (pair/trio housing). In the ten-week study, each of the four enrichment conditions was implemented for a two-week period, with ten thirty-minute observations conducted per subject. The effect of each enrichment condition on mean duration of normal and abnormal behaviours was examined.

The results showed that all enrichment conditions significantly decreased abnormal behaviours and increased species-typical behaviours. Social enrichment (pair/trio caging) and PRT were the most effective. Every abnormal behaviour category occurred at the lowest level during the social enrichment condition. A previous study by Kessell and Brent (2001) also showed that abnormal behaviour decreased significantly when singly housed baboons were moved to outdoor social groups. Total abnormal behaviour and whole body stereotypies were lowest with PRT. Foraging and feeding enrichment dramatically reduced regurgitation and reingestion (R/R), suggesting that this behaviour is most probably related to stress or boredom (frustration). A previous study by Baker and Easley (1996) also showed that R/R is boredom-related due to lack of foraging enrichment.

It has been suggested that baboons have an inherently rewarding behavioural need to forage. Jones and Pillay (2004) conducted a study investigating whether members of a Hamadryas baboon troop at Johannesburg zoo would forage in non-provisioned areas of their enclosure when excluded from a high-quality, clumped, monopolisable food source by another baboon. Foraging behaviour and aggressive interactions were studied during two control treatments and four experimental treatments in which the baboons were offered either an empty small box (SBE), a small box containing food (SBF), an empty big box (BBE), or a big box containing food (BBF).

Results from this study show that introducing a non-monopolisable food source (BBF) increases foraging levels within the group. However, there was an increase in aggression, offsetting any apparent enrichment benefits. When a monopolisable food source (SBF) was provided that only the alpha male could access, group members that were excluded from the box increased their foraging behaviours elsewhere in the enclosure due to behavioural contagion. Aggression was not observed. This study shows that foraging behaviours can be encouraged independently of consummatory behaviours by using the SBF treatment as a

form of environmental enrichment. This suggests an alternative to standard foraging enrichment protocols, which promote foraging behaviour through slowing down the consummatory process (Jones and Pillay, 2004). A limitation of this study is that it applies largely to social species that forage as a group.

Limitations of the study conducted by Bourgeois and Brent (2005) are that the social enrichment techniques used only pair/trio housing, involving only adolescent males in a laboratory setting. Factors that must be considered when socially housing primates are group size, dominance issues and the social composition of the group. Self-directed behaviour (SDB), such as scratching and body shaking, is a good indicator of stress and anxiety in non-human primates (Maestriperi et al., 1992). A study by Castle et al. (1999) found that when a baboon was in close proximity to a dominant individual, SDB rates were significantly higher than when close to a subordinate. In zoos, population control may be required to prevent overcrowding and associated detrimental effects on animal welfare. Plowman et al., (2005) conducted a study to evaluate the behavioural welfare effects of population control for a mixed group of eighty-three *Hamadryas* baboons at a UK zoo. In response to over-population, management actions that involved three planned removals of several individuals took place over a 5-year period. The occurrence of SDB before, during and after the implementation of population management measures was used to assess their possible effects on psycho-social stress in the group.

Results of the study showed that SDB was significantly more frequent in situations of greater social tension. SDB rates decreased with group size, particularly following the removal of large numbers of juvenile and sub-adult males, indicating improved welfare for the remaining group. This is consistent with findings that most aggression occurred between adult males, juvenile males and oestrus females. SDB was also more frequent in a smaller temporary cage, which had no visual barriers compared to an enclosure with caves and rocks. Visual avoidance may be an important tension-reduction strategy (Kummer, 1995), and Hosey (2005) suggests that restricted space need not be a welfare problem if structural complexity and enrichment in the enclosure is sufficient to avoid abnormal behaviours and tension, and promote species-typical behaviours.

Conclusion

The results of these studies demonstrate that environmental enrichment techniques involving social stimulation and foraging enrichment reduce abnormal behaviours by inviting species-typical social and foraging behaviours, thereby promoting psychological well-being and improved welfare of captive *Hamadryas* baboons. However, preventing over-population and manipulating social make-up (age and sex) of the group to prevent dominance-related aggression and reduce self-directed behaviour associated with tension and stress, must be considered when socially housing baboons. Further research is needed into species-specific behaviours and social interactions to develop optimal social enrichment protocols.

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