

Key considerations in the breeding of macaques and marmosets for scientific purposes

Laboratory Animal Science Association and the Medical Research Council

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The working group is comprised of representatives from LASA and the MRC, and the UK's major commercial and academic primate breeders. LASA and the MRC are grateful to those who took part in the discussions either through participation in the working group or through subsequent consultation.

Introduction

The Laboratory Animal Science Association (LASA) and the Medical Research Council (MRC) share a common philosophy on the use of animals in scientific research. Both organisations believe that, where animals have to be used for scientific purposes, they should receive high-quality care, and an environment that caters as fully as possible for their physical, behavioural and psychological requirements, throughout their lifetimes. To reflect this commitment, the two organisations, under the auspices of the Centre for Best Practice for Animals in Research (CBPAR), have convened an expert working group¹ to define the general principles which underpin good practice in the breeding of macaques and marmosets for scientific purposes.

This statement sets out these **principles** — providing a summary of key issues that both primate breeders and users should regularly and critically review to maintain and develop high standards of welfare and care. Recognising that a number of different breeding systems and management practices exist (eg, age at weaning), and that the relative merits of alternative approaches have yet to be formally determined, the working group recommends that primate breeders and users, primatologists, and animal welfare scientists should undertake a co-ordinated programme of research and assessment.

The working group has confined its deliberations to the most commonly used species in the UK. These are rhesus macaques (*Macaca mulatta*), long-tailed cynomolgus — or crab-eating macaques (*Macaca fascicularis*), stump-tailed macaques (*Macaca arctoides*) and common marmosets (*Callithrix jacchus*).

1 Principles of breeding and supply

Primates have long gestation periods and maternal dependency times and do not

reach sexual maturity for several years. This is particularly true of macaques; however even marmosets do not reach maturity until their second year. This means that primate breeders have to predict demand some years in advance. Scientists however, are often unable to anticipate their needs so far ahead.

These factors can make it hard to manage a breeding colony and match supply to demand. Forward planning and communication are necessary to overcome these difficulties.

- 1.1 Close communication between breeders and researchers is essential to match supply and demand as closely as possible, and to ensure continuity of husbandry and care at user establishments. Every effort should be made to ensure there is adequate communication at a national level to optimally match overall supply and demand, and to avoid unnecessary importation with the associated stress of long-distance transport.
- 1.2 Users should endeavour to provide feedback on the subsequent 'performance' of primates supplied for experimental programmes so that information on the suitability of use can be incorporated into future breeding plans.
- 1.3 Users should make every effort to ensure that their anticipated requirements are realistic.
- 1.4 Unless there is scientific justification, researchers should not restrictively specify characteristics of animals such as gender or weight because this may cause an unnecessary surplus.

2 Selection of breeding stock

Appropriate selection of breeding stock is needed to guard against excessive inbreeding and to select for favourable anatomical and behavioural characteristics, and against undesirable characteristics. The aim should be to produce high-quality breeding and stock animals which are well adapted to the captive situation. Selection programmes carefully managed to achieve these goals have the potential to improve animal welfare and the quality of scientific data obtained.

- 2.1 Animals chosen for breeding should be selected on the basis of health, genealogy, behaviour, temperament, conformation, potential reproductive performance and mothering ability. All of these characteristics should be regularly reviewed.
- 2.2 Primates which show abnormal behaviours or are nervous or fearful should preferably not be selected as replacement breeders.
- 2.3 The duration of an animal's breeding life should be determined by both its condition and its role within the colony.

- 2.4 The health status of any primates introduced into an existing colony should not compromise the existing health profile or staff safety.
- 2.5 Given the animal welfare concerns including those associated with capture, wild-caught primates should not be introduced into breeding colonies.

3 Husbandry and care of breeding animals

The early experiences of all primates are critical in influencing their development and ability to cope with later events, changes or other stressors. A complex social and physical environment is required to produce normal adults. High standards of husbandry and care are essential to maximise the number of young successfully produced and weaned, and to ensure that the health and welfare of the colony are optimised.

- 3.1 All breeding facilities should provide animals with a spacious, complex and stimulating environment that encourages the expression of a range of normal behaviours. Primates should be given some degree of choice and control over their environment. It is important that environmental enrichment is provided to suit the whole range of ages found in a breeding colony.
- 3.2 Unless there is compelling justification on welfare or veterinary grounds, primates should normally be housed in harmonious social groups.
- 3.3 All aspects of primate care and working practices should be regularly reviewed, with a commitment to developing appropriately innovative environments and refining practices to better meet the animals' needs.
- 3.4 Individual records should be maintained of all aspects of breeding, husbandry, health and training to provide each animal with a 'passport' that should accompany the animal throughout its life.

4 Peri-parturient and post-natal care

Birth can be a stressful process for both the mother and the offspring. Not all decisions with respect to issues such as hand-rearing and suitability of females for breeding are straightforward. Breeding establishments should therefore consider these issues in advance and have strategies in place to cope with welfare issues pertaining to the newborn infants and the mother.

- 4.1 It may be necessary to use contraceptives to provide a recuperative period or for colony management purposes to avoid disrupting stable family groups. Veterinary advice should be sought.

- 4.2 Birth by caesarean section should not be permitted on more than two occasions. In such cases, careful consideration should be given to the subsequent fate of the mother, who may be retained to sustain the offspring and group dynamics; if retained, attention may need to be given to contraceptive techniques.
- 4.3 With improved standards of nutrition and health, the incidence of triplet and quadruplet births in marmosets has increased. In such cases the offspring should be raised by rotational feeding, or two should remain with the mother, the other being hand fed or euthanased to avoid unnecessary suffering and, wherever possible, tissues collected for research purposes.
- 4.4 It may sometimes be necessary to foster or hand-rear macaques but animals should not be maintained in isolation. They may subsequently be unsuitable for breeding but may facilitate human/animal socialization programmes.

5 Weaning and segregation

The removal of offspring from the breeding colony into peer groups is potentially stressful for the young. Every effort should be made to minimise any unnecessary stress to the weaned animals, and disruption to the group dynamics (weaning here refers to removal of offspring from their natal group).

- 5.1 Captive bred macaques are frequently weaned earlier than their mother would naturally stop caring for them in the wild, in order to provide appropriately sized stock for experimental use, or to maintain health status. In other cases it is simply the management practice of the laboratory. Given the potential welfare implications of early weaning (eg, stress involved in separation from parents and changed nutritional status) it is important that weaning ages are reviewed regularly to ensure that the practices are as humane as possible and fully justified.
- 5.2 Macaques should be kept for as long as possible in their natal groups, particularly if they are to be retained as future breeders. Behavioural indicators should be used to determine the minimum age of separation — in general this should be no less than 12 months.
- 5.3 Marmosets can be weaned into peer groups at eight to 14 months; this needs to be carried out with care to minimise aggression. With smaller breeding colonies it may be more desirable to retain offspring in family groups for as long as possible. Further research is needed to determine which of these approaches is best practice.

6 Staff

Empathetic and motivated staff are critically important to ensuring that the

breeding facility has an appropriate 'culture of care'.

- 6.1** All facilities should have a sufficient number of trained and competent staff who are aware of the natural history and needs of the species. Staff should be able to recognise where husbandry conditions and practices can impact on welfare in order to ensure that all aspects of care are refined.
- 6.2** There should be an appropriate well-resourced programme of continuing professional development in primate health and welfare for all veterinary and animal care staff.
- 6.3** Animal care staff should be encouraged to broaden their experience and knowledge by visiting other facilities.

7 Socialisation, handling and training

Welfare can be improved and stress minimised by ensuring that primates are well socialised with humans and trained to co-operate with husbandry and other procedures. Familiarity with humans makes it possible for animal care staff to observe uninterrupted behaviour patterns and identify any animals showing precursors to abnormal behaviours so that appropriate remedial action can be taken.

- 7.1** Primates should be regularly socialised with humans, preferably with different members of care staff and researchers. Due regard must be given to protecting the health of the animals against diseases which may be transmitted from humans.
- 7.2** Cage design, for example walk-in cages or customised rooms, should be used to encourage primates to feel more confident approaching humans.
- 7.3** Primates should be trained to co-operate with restraint and handling using positive reinforcement techniques. Techniques should be regularly reviewed.
- 7.4** Where primates are to be handled relatively frequently by researchers, there is benefit in more frequent handling during early development.

8 Re-use and Retirement

Both re-use and retirement are potentially controversial. There is a tension between the desire to re-use animals so as to reduce the total numbers of animals used, and consideration of the implications of re-use on the individual animal concerned. Retirement may seem to be humane but there are potential welfare costs to the animal involved depending on its age, state of health and the

conditions in which it is to be kept. There may also be welfare costs to the animal if it needs to be transported to a new site or integrated into a new social group.

- 8.1** Careful consideration should be given at the project planning stage to the fate of the animals at the end of the programme of work. Animals which have undergone scientific or other procedures may subsequently be used for breeding. Appropriate approval should be secured from the relevant authorities to allow this.
- 8.2** Older breeders may be suitable for scientific use, but this should be determined only by suitability for and conditions of use. Substantial changes to husbandry routines need to be carefully introduced and the animal's welfare monitored.
- 8.3** Where animals are euthanased every effort should be made to use their tissues and blood so as to avoid the unnecessary killing of another animal.
- 8.4** Where animals are suitable for retirement, a high-quality, well resourced and secure environment should be found which can provide long-term accommodation and care. The crucial consideration is the quality of life that the animal experiences.

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