Observations on a Caging System for Housing Stump-tailed Macaques

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SUMMARY

This paper describes the introduction of a modified caging system and the benefits to both the animals and staff.

INTRODUCTION

The stump-tailed macaque, (Macaca arctoides), is one of the largest of the macaque family, adult males attaining weights approaching 25 kg. Our colony consists of fifty macaques, all laboratory bred, ranging in ages from two to twenty two years. They are used experimentally on long term studies and as such the majority have been in our care for fifteen to twenty years, (Figure 1).

Figure 1

It is common practice to house monkeys of this size singly in cages measuring 0.7 m x 1.0 m x 1.2 m with little or no behavioural enrichment. Commercially produced primate cages are invariably of metal based materials giving rise to a cold, noisy, bland, clinical environment. In our experience this type of caging system allows the animals to create a level of noise that heightens aggressive behaviour to both the staff and themselves. Prior to the new caging system most of our animals exhibited some form of stereotypic behaviour, ranging from eye prodding and acrobatics up to more serious problems of self-inflicted injuries. It was decided that the rehousing of our macaques was essential and that a rethink on cage design was required. The new design had to take into account various criteria, including welfare of the animals, type

of experimental procedure, method of handling, space available for the caging, and a restricted budget. It is well documented that macaques, like most other primates, show vertical flight reactions, therefore sufficient height of cage is essential to allow the non-human primate to follow its natural instincts. Shelving incorporated within the cage not only provides varied high and low sitting positions but also increases the available floor area. The cubic capacity within the cage can be utilised by making the top and front parts of the cage out of weld mesh and attaching climbing bars to solid surfaces to assist mobility and exercising. Foraging is an essential part of the normal behavioural activity of macaques, and catering for this vital mental stimulus will reduce boredom and therefore some forms of stereotypy.

Cage design and materials

The main construction of our cages is of hardwood frames with formica side panels bonded onto marine ply sheet. The top and doors are hardwood frames infilled with 1. square weld mesh, the edges protected internally with aluminum strips. The cages are fitted directly to the floor and all components are sectional for easy replacement if broken or damaged. The overall cage dimensions are 0.7 x 1.2 x 3.2 m high with a wooden slatted shelf measuring 0.7 x 0.6 m, at a height of 2.0 m. The front of the cage consists of a top access door measuring 1.2 x 0.7 m and a lower door measuring 2.0 x 0.7 m. A gap between the doors allows for the insertion of a horizontal board which splits the cage into top and bottom sections at shelf height, and is used to confine the monkey during cage cleaning or the catching process. Metal climbing bars are fitted to the formica sides, running front to back at a height of 0.5 m and 1.5 m.Although the actual floor area 0.84 sq. metres falls short of the Home Office Code of Practice guide-line, the area of the shelf added to it increases the total area available and thus satisfies the Home Office Inspectorate, (Figure 2).

Figure 2

Husbandry

There are two rooms housing macaques in the Simian unit. They are maintained at a temperature of 22°-24° centigrade and are air-conditioned to prevent overheating. The relative humidity is maintained at 50-60% by steam injection, and forced input and extract ventilation produces 15 air changes per hour, the incoming air being filtered through 5 micron filters. The temperature, humidity and room pressures are monitored through a centralised alarm system outside the unit giving continuous twenty-four hour surveillance of environmental conditions within each room. Timed switching provides fluorescent lighting for twelve hours per day between 0800 hours and 2000 hours; this is preceded and followed by a

short period of twilight but dim lighting is maintained throughout the night. There is no natural light in either of the two macaque rooms. Each room contains sixteen cages, eight per side, and has sloped concrete floors with a central drainage channel, (Figure 3).

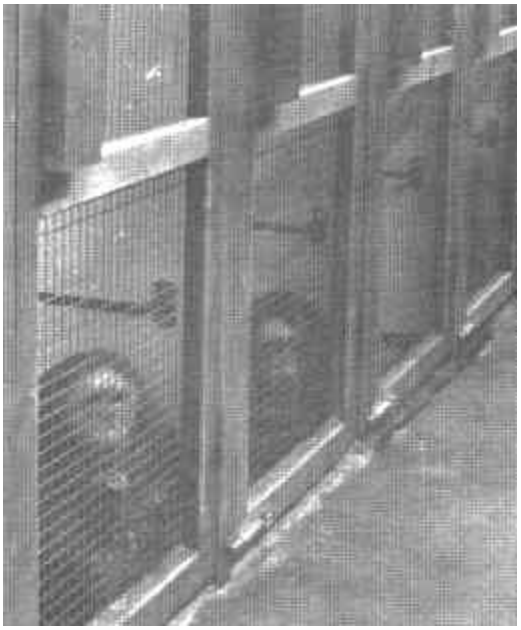

Figure 3

The cages are cleaned out three times weekly, firstly removing the substrate, then washing down with water at normal mains pressure, The formica sides are easily cleaned with "Hederol", (Proctor & Gamble), or "Virkon", (Antec International Ltd.), and then rinsed using clean water. Whilst cleaning the cages the macaques can be isolated in either section by using the horizontal sliding board. In practice, they quickly learn the routine and sit quietly on the shelf showing little sign of aggression. Whilst the cage dries the animals spend a great deal of time on the floor and appear to enjoy the water. When the floor surface is dry a substrate of mixed sawdust and shavings is added, and a handful of rolled grains, manufactured as a sheep feed, is spread onto the surface. This is in addition to their principal diet of a commercial pelleted feed, MP(E) (S.I.S. Witham, Essex), mixed fruits and vegetables. Water is supplied at the top of the cage from an automatic drinking system using brass no-bowl drinkers, (Modular Systems & Developments Co. Ltd., London).

RESULTS

We rehoused our macaques early in 1984 and changed from the metal cages that were considered to be the only practical method of housing laboratory primates, to our own purpose built wooden cages. From the first few days, the reduction of cage stereotypy and aggression towards the staff was quite marked. The new caging system had a dramatic effect on the animals welfare and this was attributed to a number of factors. The removal of metal grids at the bottom of the cage and the introduction of direct access to a substrate mixed with cereals and seeds, had a beneficial effect on the psychological well-being of the macaques by allowing foraging and, in our experience, up to 60% of our macaques' day is now spent in this pursuit, (Figure 4).

Figure 4

Another factor is the carrying out of our cage cleaning routine with the animal in the cage, which has improved the interactions between animals and staff. This is probably because as the cage is "invaded"routinely three times a week for cleaning, the macaques no longer consider the staff a threat, and the fierce territorial defending that was apparent in the metal cages is broken down, adding to the general tranquility within the room.

The sound deadening qualities of the materials and construction of the cage have also assisted in the calming of the macaques' behaviour; after all there is no point in banging something if it doesn't make a noise! In metal cages one monkey bangs his cage, quickly followed by all the others in the room until it reaches a.crescendo of noise and aggression. Another factor which we consider has improved the relationship between animals and staff, has been the change from barred to mesh fronts, which has allowed close contact without fear of grabbing or scratching, and promoted "grooming" and socialisation.

Our macaques are used in procedures once a month which last approximately one hour. The animals are anaesthetised using an intramuscular injection of xylazine ("Rompun ", Bayer U .K. Ltd, Bury St. Edmunds, Suffolk) and ketamine ("Vetalar", Park Davis Ltd, Pontypool, Gwent) which allows initial manipulation followed by a sufficient depth of anaesthesia to complete the procedure. As a result of the excellent animal staff interactions achieved, it is not now necessary to use a crush barrier or other catching system to administer the anaesthetic. Most non-human primates exhibit some form of posturing which can be used to the technicians benefit. This macaque exhibits a natural submissive gesture of presenting his hindquarters which can be used by the "dominant" technician to give the injections, without causing undue stress and without provoking any reaction from the other monkeys in the room. A dividing board is used to restrict the monkey to the top of the cage after injection to prevent him feeding, and to stop him from falling once the drug has taken effect. It must be strongly emphasised however that this approach is only possible because of time spent with the animal in gaining their respect and trust, and has to be carried out with compassion and caution by trained staff.

It is possible to incorporate a restraint system within our cages. Vertical flight by primates is a natural response and this can be used as part of the catching technique. It has been observed that it is easier to restrain a monkey at the back of the cage rather than try to force him to towards you as with conventional crush barriers. The top door can act as a barrier and

slides on steel runners towards the back of the cage thus restricting the animals movements. By simply changing some aspects of the catching system it is possible to reduce the stress on the animal being caught or restrained.

CONCLUSION

Recently there has been much discussion as to housing, social and environmental enrichment of laboratory primates. Cage design, social enrichment and welfare is of paramount importance. We have shown that it is possible to look beyond the "metal box" system of housing by using different construction materials, and developing social and environmental enrichment by looking at the animals natural behaviour. Our caging system has been well received by the Home Office and has proved both suitable and practical for both our macaques and experimental procedures. Whilst our system has proved successful for us, we are not insisting that all monkeys can, or should, be kept in this way, but merely advising others look at their present cages and consider ways of adapting them to the benefit of the animals.
