Laboratory rabbit housing: An investigation of the social and physical environment

A summary of the report to the UFAW/Pharmaceutical Housing and Husbandry Steering Committee (PHHSC), based on a Ph.D. thesis (Seaman, 2002)

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Introduction

- Female rabbits can often be successfully group housed in the laboratory (e.g. Heath and Stott, 1990; Batchelor, 1991; Stauffacher, 1992), and it has been recommended that female rabbits should be housed in groups where possible (Home Office, 1989; Morton *et al*., 1993). This, however, is not always possible for experimental reasons. Rabbits housed in single cages have been found to perform stereotypic behaviours (e.g. Morton *et al*., 1993; Gunn and Morton, 1995), including bar-biting and fur pulling.

- An alternative to social housing is to allow singly housed rabbits to gain visual and minimal tactile contact with conspecifics in adjacent cages, and some designs of cages allow such contact. It is, however, not known how important such limited contact is to rabbits. When such contact is possible, it is often dependent upon both of the rabbits being in a particular area of their cage at the same time. Individuals therefore do not have control over gaining contact or over the duration of contact.

- A natural response for a wild rabbit under threat is to run to a bolt-hole for cover. Rabbits housed in cages without a platform/bolt-hole have been found to be more restless and more easily affected by their environment than rabbits housed with a platform (Hansen and Berthelsen, 2000). Lehmann (1987) described such restlessness as "not a characteristic of well-being". Although rabbits are seen to use the platform/bolt-hole when it is provided, it is not known how important this is.

Aims

The aims of the research were:
1) to identify resources that may be important in the housing of laboratory rabbits (from a survey of the pharmaceutical industry, visits to laboratories and consultation with the industry)
2) to test the motivation of rabbits for the identified resources

Methods

- Based on background information, it was decided that the main areas of focus would be the provision of social contact to singly housed female rabbits and the importance of a platform within cages.

- Short and long-term motivational tests were carried out to determine the importance of social contact and a cage platform. Platform use was determined using 24 hour observations, with various cage manipulations.

- Following a pilot study, it was decided that a weighted push-door would be used to assess motivation, where the rabbit had to push through the door to gain access to a resource (see Figure 1).

Short-term motivational tests

- The rabbits were given the opportunity to push through a weighted push-door in a runway (see Figure 1) to gain access to 1 minute of visual and minimal tactile contact through a mesh panel with an unfamiliar rabbit, a familiar rabbit or nothing (control).

- The weight on the door was increased in stages to determine the maximum weights the rabbits would push through.

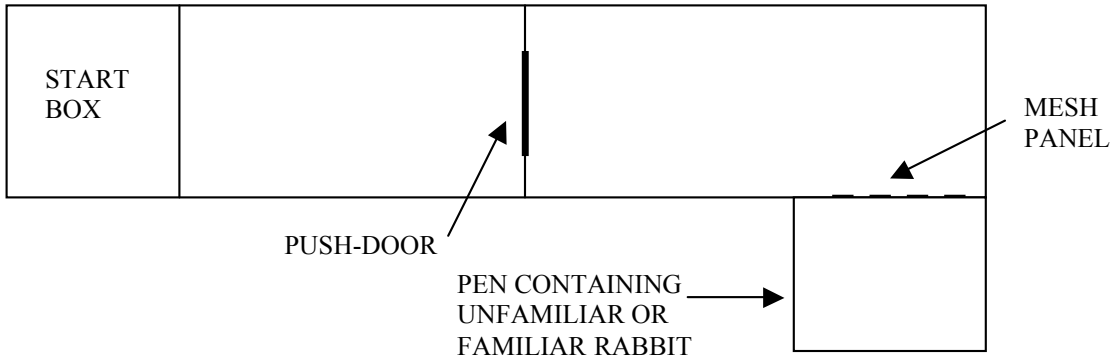

Figure 1 - Experimental apparatus (2.75m long, 0.4m wide, 0.6m high)

- This was carried out for both singly housed and socially (pair) housed rabbits. The socially housed rabbits were separated from their cage-mate during the experiment. The experiment was carried out both when they were housed in the cage adjacent to their cage-mate (i.e. in olfactory contact) and when housed in a separate rack of cages from their cage-mate (i.e. out of olfactory contact).

Long-term motivational test

- Rabbits were housed in plus-shaped sets of apparatus for the duration of the experiment (Figure 2). The 'arms' of the plus were termed resource cages and the central area was termed the home cage.

- Four resources were available in the resource cages: food, social contact through a mesh panel, a cage platform and an empty space. Food and an empty space were expected to be of high and low value respectively; the importance of social contact and a platform could therefore be compared to the importance of these resources.

- Each resource cage could only be entered through a one-way weighted push-door. Weights were increased every two days.

- The maximum weights pushed through for each resource were recorded, as were the number of times rabbits entered each resource cage at each weight and the total and mean duration of visits to each resource cage.

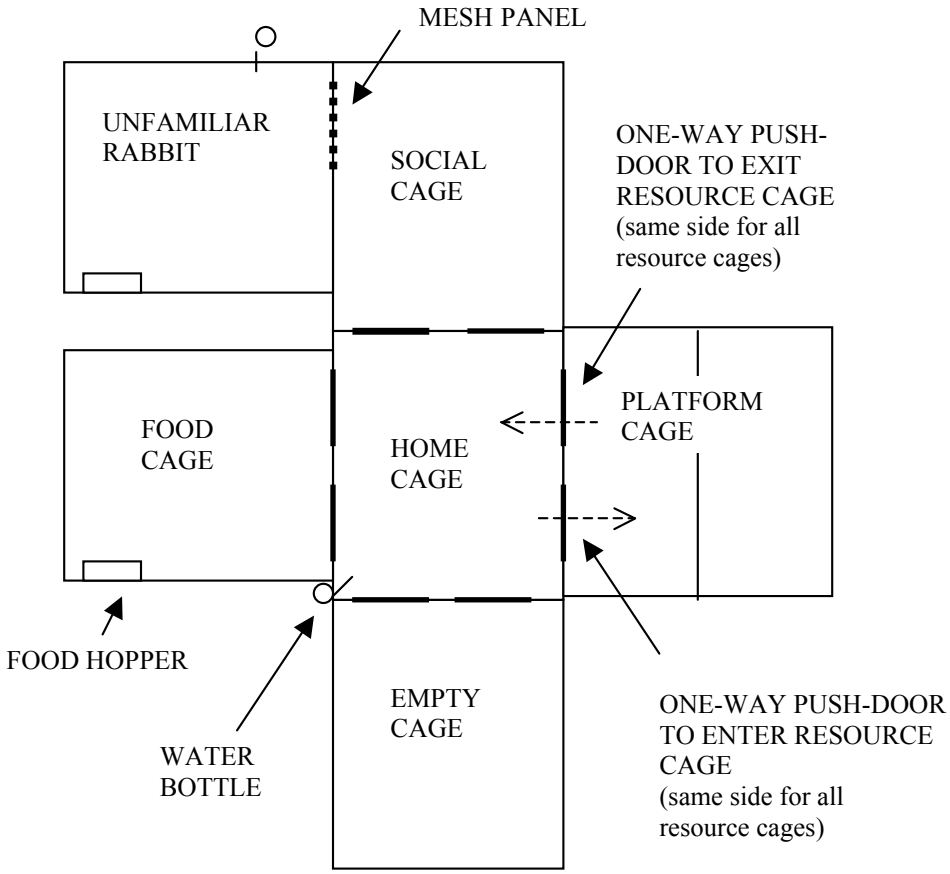

Figure 2 - One of the four plus-shaped sets of apparatus showing the resource available in each resource cage

Platform use

- The cage environment of ten socially (pair) caged and eleven singly caged rabbits was manipulated to investigate how platform use was affected by social stimuli from conspecifics.

- Singly caged rabbits were housed both with and without a platform, and both with and without visual and minimal tactile contact with the rabbit in the adjacent cage (through a mesh panel).

- Socially caged rabbits were housed in their pairs, next to their cage-mate and next to an unfamiliar rabbit, both with and without visual and minimal tactile contact.

Results

Short-term motivational tests
Singly housed rabbits

- Rabbits pushed through significantly heavier weights for social contact than they did in the control, when there was no rabbit in the pen. No difference was found in how hard the singly housed rabbits worked to reach the unfamiliar or familiar rabbit.

- During the control test only three rabbits pushed through the push-door, even when it was unweighted.

Socially housed rabbits

- There was no difference between how hard the socially housed rabbits worked for contact with an unfamiliar rabbit or a familiar rabbit (their cage-mate).

- When housed in a separate rack from their cage-mate (i.e. out of olfactory contact), the rabbits worked significantly harder for social contact compared to the control, especially for contact with their cage-mate.

- However, when housed in the cage adjacent to their cage-mate (i.e. in olfactory contact) the rabbits did not work significantly harder to obtain social contact than in the control.

Long-term motivational test

- *Maximum price paid* (max. weight pushed through): Using this measure, food, social contact and a platform were of equal most importance and an empty cage was of least importance.

- *Total expenditure (TE) per day* (weight on door x number of times pushed through): Using this measure, food and social contact were of equal most importance and a platform and empty cage were of equal least importance.

- *Number of visits to resource cages*: The rabbits made significantly more visits to the food, social contact and platform cages than to the empty cage and more visits to the food and social contact cages than to the platform cage.

- *Total duration of time in resource cages*: The rabbits spent significantly more time in the food, social contact, platform and home cages than they did in the empty cage.

- *Mean duration of time in resource cages*: Visits to the food, platform and social contact cages were significantly longer that those to the empty cage. Visits to the platform cage were significantly longer than those to the food and social contact cages.

- *Behaviour in the social contact cage*: In the social contact cage, the rabbits spent significantly more of their time near to the rabbit behind the mesh panel than they did away from it.

- *Behaviour in the platform cage*: In the platform cage, the rabbits spent significantly more time in front of the platform than either on or under it.

Platform use

Singly caged rabbits

- When housed without a platform, rabbits spent significantly more time at the front of the cage than at the back, however, when housed with a platform at the back of the cage they spent significantly more time at the back of the cage than at the front.

- When housed with a platform, rabbits spent more time on the platform than in front of or under the platform. They moved onto the platform more times when visual contact was possible than when it was not, with bouts also being longer in duration.

- The rabbits spent longer facing the adjacent cage than orientated away from it, both with and without visual contact and spent longer facing the adjacent cage when visual contact was possible than when it was not.

Socially caged rabbits

- In each cage manipulation the socially housed rabbits spent more time in front of the platform than on or under it.

- When visual contact was possible, more time was spent facing the adjacent cage than orientated away from it.

- Dominant rabbits spent longer bouts of time on the platform than the subordinate rabbits.

Discussion

Both singly and socially housed rabbits worked to gain visual and minimal tactile contact with a conspecific. There was no difference between how hard they worked for an unfamiliar or familiar conspecific, suggesting that social contact with unfamiliar and familiar rabbits was equally rewarding. Singly housed rabbits pushed through heavier weights than the socially housed rabbits, suggesting that singly housed rabbits were more motivated for contact than previously socially housed rabbits. This may have been due to the contact being more novel to the singly housed rabbits.

Olfactory cues were found to be important. During the short-term test on singly housed rabbits, several of the rabbits did not push through the push-door in the control when there was no rabbit at the end of the runway. However, when further trials were carried out with an unfamiliar rabbit at the end of the runway, these rabbits pushed through the push-door again. This suggests that the olfactory and auditory cues from the

unfamiliar/familiar rabbit stimulated the rabbits to push through the door. This suggests that if rabbits can smell and hear other rabbits, they are motivated to gain visual and minimal tactile contact with them. Olfactory cues were also found to be important in the experiment with the socially housed rabbits. When the previously pair housed rabbits were housed in olfactory contact with their cage-mate they were less motivated to gain visual and minimal tactile contact than they were when they were house out of olfactory contact. This suggests that olfactory contact with a familiar rabbit is important, and it may at least partly compensate for the lack of visual and minimal tactile contact.

During the long-term motivational test, the two measures used found slightly different results, with the importance of the platform varying with the analysis used. However, with both measures used, food and social contact were found to be of equal importance. The rabbits were therefore highly motivated to gain limited social contact with a conspecific. The rabbits made frequent short visits to the food and social contact cages and continued to make frequent visits as the weight on the doors increased. The rabbits did not alter their visits to make fewer longer visits to the social contact cage as the work effort to gain contact increased. This suggests that it was the frequency of visits to the social contact cage that was important, rather than the total duration of time spent in close proximity to another rabbit.

In the social contact cage, it was found that rabbits spent over a third of their time out of direct visual contact with the other rabbit. This suggests that whilst rabbits are motivated to be in close proximity to another rabbit, they do not necessarily want to be in direct visual contact all the time. In the platform cage the rabbits spent almost all of their time in front of the platform, rather than on or under it. This suggests that the rabbits were motivated to be in close proximity to the platform, i.e. to a bolt-hole.

Observations of platform use found that the singly housed rabbits spent more time on the platform than under or in front of it, whereas the previously socially housed rabbits spent more time in front of the platform than on or under it. This was found both when visual contact was available and when it was not. Olfactory cues from rabbits in adjacent cages may be stronger when rabbits are on the cage platform than when they are on the floor of the cage, and the results may suggest that the singly caged rabbits were more motivated to gain contact than the previously socially housed rabbits were. This is similar to the results of the short-term motivational tests, where singly housed rabbits pushed through heavier weights than previously socially housed rabbits.

Conclusions and Recommendations

- The results indicate that laboratory rabbits are motivated to gain visual and minimal tactile contact with conspecifics. Social contact was found to be of equal importance to food. When in close proximity to another rabbit, however, the rabbits did not spend all of their time in direct visual contact with the other rabbit.

- Rabbits were also found to be motivated for a cage platform, although it appeared to be proximity to a bolt-hole that was most important.

- It is therefore recommended that singly housed female laboratory rabbits are housed in cages that allow them to gain visual and minimal tactile contact with conspecifics, but that they also have the opportunity to avoid such contact. It is also recommended that rabbits are provided with a cage platform, both to provide them with a bolt-hole and to enable them to gain social contact with rabbits in adjacent cages.

References

Batchelor, G.R., 1991. Group housing on floor pens and environmental enrichment in sandy lop rabbits (I). *Animal Technology*, 42(2): 109-120.

Gunn, D. and Morton, D.B., 1995. Inventory of the behaviour of New Zealand White rabbits in laboratory cages. *Applied Animal Behaviour Science*, 45: 277-292.

Hansen, L.T. and Berthelsen, H., 2000. The effect of environmental enrichment on the behaviour of caged rabbits (*Oryctolagus cuniculus*). *Applied Animal Behaviour Science*, 68: 163-178.

Heath, M. and Stott, E., 1990. Housing rabbits the unconventional way. *Animal Technology*, 41(1): 13-25.

Home Office, 1989. *Code of Practice for the Housing and Care of Animals Used in Scientific Procedures*. Her Majesty's Stationery Office, London.

Lehmann, M., 1987. Interference of a restricted environment – as found in battery cages – with normal behaviour of young fattening rabbits. In *Rabbit Production Systems Including Welfare: A Seminar in the Community Programme for the Coordination of Agricultural Research*, (T. Auxilia, ed), pp. 257-268.

Morton, D.B., Jennings, M., Batchelor, G.R., Bell, D., Birke, L., Davies, K., Eveleigh, D.G., Heath, M., Howard, B., Koder, P., Philips, P., Poole, T., Sainsbury, A.W., Sales, G.D., Smith, D.J.A., Stauffacher, M. and Turner, R.J., 1993. Refinements in rabbit husbandry. Second report of the BVAAWF/FRAME/RSPCA/UFAW Joint Working Group on Refinement. *Laboratory Animals*, 27: 301-329.

Stauffacher, M., 1992. Group housing and enrichment cages for breeding, fattening and laboratory rabbits. *Animal Welfare*, 1: 105-125.