

The effect of hiding enrichment on stress levels and behaviour of domestic cats (*Felis sylvestris catus*) in a shelter setting and the implications for adoption potential

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Abstract

This study investigates the effect of hiding enrichment on stress and behaviour of kennelled cats. Forty-three cats were studied either with a BC SPCA Hide & Perch™ box as enrichment, or with an open bed as control. Observations consisted of Stress Score, approach test and scan sample, recorded daily over the five days following a cat's entrance into the adoption centre, and again on the 14th day if the cat was still present. Days until adoption was noted for cats adopted during the study period. A survey was given to adopters of study cats in an attempt to determine the motivations underlying their choice of cat.

A significant reduction in stress was noted between all study days in the enriched group. Stress levels in this group declined further between the fifth and the 14th day, while those of the control group increased. Cats in the enriched group were significantly more likely to approach and displayed relaxed behaviours much more frequently. No significant difference was found between the two groups in days until adoption, percentage adopted, or in the reasons provided by the new owners in the adoption survey; however temperament was found to be the highest ranked reason for choosing a cat from either group.

Results of this study suggest that the welfare of kennelled cats is greatly improved if they are provided with the opportunity to perform effective hiding behaviour, and that the ability to perform such a behaviour does not decrease the likelihood of those cats being adopted.

Keywords: adoption, animal welfare, behaviour, cat, hiding enrichment, stress

Introduction

In the past, most research in the field of animal welfare focused on those animals used for production or maintained in a zoo setting. In recent years however, increasing attention has been given to welfare issues of domestic animals kept as companions. The cat (*Felis sylvestris catus*) has recently become the most popular pet, with 8 million owned in the UK alone (Rochlitz 2000) and attention to welfare issues of this species is emerging. Among the general population, the largest welfare issue for companion animals is believed to involve some sort of intentional abuse (Watt & Waran 1993). Although heinous, this type of crime does not affect a large proportion of the animal population and therefore may not be truly considered as the largest issue (Podberscek 1997). One of the larger issues concerns the quality of life of those cats without a home (Rukavina 2001). Whether a cat is a stray or, for one reason or another, it becomes unwanted by its owner, its destination is typically some form of kennel or shelter system. Although the number of healthy cats euthanised in these systems is an ethical rather than a welfare issue, the lives of those animals while they are within the system is very much a welfare issue. It is the responsibility of the people involved in the

management of such facilities to ensure the favourable welfare of the animals while present.

Stress is a normal aspect of life and is experienced by all living animals (Dawkins 1998). Problems arise when the amount of stress experienced by an animal exceeds a certain level and becomes distress. At this point, the coping mechanisms of the animal are no longer adequate (Moberg 2000) and there are serious implications for the animal's welfare. Biological functions may be impaired, such as decreased fertility and immunosuppression (Archer 1979). Psychological impacts may also be noted, often manifested in abnormal behaviours such as stereotypies or self-mutilation (Wechsler 1995; Toates 2000). It is for this reason that stressors, especially those created by human intervention, should be minimised.

Entrance into a shelter system may be an extremely stressful experience for a cat and may lead to levels of distress. Previously, the cat would have lived in a home situation or as a stray or feral, spending its life freely outdoors. Whatever the cat's origin, it is likely that the shelter system presents several aspects of novelty. A new environment that contains new people, new animals, and new smells contributes to the novelty of the situation. A cat may feel

mere curiosity when exposed to a novel stimulus provided it is otherwise comfortable and some degree of familiarity exists (Holmes 1993). When exposed to an entirely novel situation, however, on average, cats will experience stress to some degree (Levine 1985). In addition to the stress resulting from novelty, stress is also created through the act of being confined, and the inability to perform many natural behaviours (Landsberg 1996). Although some kennels have an excellent standard for cage size, it is unlikely that even these large enclosures are comparable to the size of home range, be it a house or outdoor territory, previously enjoyed by the cat (Heidenberger 1997). Procedures such as deworming and de-fleaing, as well as more invasive procedures such as neutering, are often routine in shelter systems. Although these processes are designed to aid the cat, they are also quite likely to result in stress. Shelters often meet exceptional standards for care of an animal's physical health, however, the assurance of positive psychological health may be minimal.

It is unlikely that the need for shelters will be completely eliminated at any point in the near future. Millions of cats worldwide will continue to be exposed each year to the inevitable stressors associated with shelters. It is, therefore, crucial that the focus be on minimising this stress through enrichment and providing the cats with a situation that better helps them cope with their new environment.

Forms of enrichment which have been investigated in the past and which are used in shelters include both social and inanimate enrichment. Although there is individual variation in cats as to preference for any type of enrichment, many generalisations can be made. Upon initial entrance, enrichment should focus on allowing effective coping behaviours for acute stress, such as provision of perching areas (Rochlitz 1999). Proper use of a synthetic formula of feline facial pheromone has been found to be effective in reducing anxiety (Griffith *et al* 2000). The husbandry routine of the shelter also has an impact on the cat's ability to adapt. By performing tasks such as cleaning and feeding at similar times of day the cat may come to expect when certain events will happen. Predictability has been shown to be of great importance in reducing stress levels of many animals (Carlstead *et al* 1993b). The structure of the kennel itself is of importance and details ranging from material used for its construction (Smith *et al* 1994) to interaction with elements outside the kennel (Newberry 1995) can influence welfare. Factors such as reduced transit time to the shelter and time between entrance to the shelter and allocation to a kennel have also been shown to influence time required by a cat to adapt to the shelter (McCune 1994). Social contact with either people or conspecifics influences the welfare of the cat (eg Kessler & Turner 1999a). If the cat is properly socialised, interaction with others can greatly improve its welfare. However if the cat is not socialised, then contact results only in further stress production. Generally, frustration resulting from boredom and limitations on the opportunity to engage in natural behaviours leads to the development of chronic stress (McCune 1994;

Toates 2000). Enrichment devices that attempt to alleviate this type of stress include toys and feeding enrichment such as puzzle feeders (McCune 1995). The novelty of such stimuli is extremely important to their effectiveness, and therefore these devices must be continually changed.

The ability to hide is a necessity for cats when exposed to a stressor (eg McCune 1994; Smith *et al* 1994; Rochlitz 2000). However, when a shelter considers enrichment for a cat, this method may often be overlooked. The argument commonly presented is that if a cat takes advantage of the opportunity to hide, its visibility to the public is limited. As it is less likely to be seen by the public, it is less likely to be adopted. Therefore, even if the animal's short-term welfare may improve through the provision of such enrichment, it is theorised that the effect on adoption potential more than counteracts this benefit. This, however, may be a misconception. When a cat is better able to cope with a stressful situation it is usually more adaptable, extroverted and friendly (Loveridge *et al* 1995), making it an even more likely candidate for adoption (Turner 2000).

To date, no research has been found for which the primary goal was to determine the effects of hiding enrichment on stress in shelter cats, or whether this enrichment affects the adoption potential of the animal. Secondary observations have noted that an attempt to hide resulted in reduced stress levels (Carlstead *et al* 1993b) and that cats showed a preference for hiding enrichment (Smith *et al* 1994). Preliminary observations suggest that cats provided with a hiding box have reduced stress, adapt more readily to a shelter, perform more natural behaviours, and appear more 'friendly' (Soules 2002). However, none of these studies determined if proper hiding enrichment would decrease stress beyond that of conventional housing designs.

The purpose of this study was to determine the effect of hiding enrichment on stress levels of cats at initial exposure to a shelter system. The impact of hiding enrichment on the likelihood of adoption of these cats was also investigated.

Materials and methods

Animals and environment

Forty-three domestic short-hair cats were studied at Kirkintilloch Cats Protection Adoption Centre. Upon arrival at the shelter, the cats were allocated to either the enriched group or the control group. Randomisation was achieved by allocating alternate cats entering the shelter into the two treatment groups. Twenty-two cats were allocated to the enriched group, consisting of 14 females and eight males, ranging from six months to 18 years of age (median age six years). The other 21 cats were allocated to the control group, consisting of 13 females and eight males, ranging in age from one to 15 years (median age seven years). Enriched and control kennels were located randomly throughout the adoption centre. Cats generally arrived at the adoption centre between 1400 and 1700h. Day one of data collection was the day following the cat's arrival, as a minimum of two hours adjustment is required for accurate

Cat Stress Scores to be achieved (Kessler & Turner 1997). All cats in this study were housed singly in pens that consisted of an indoor area containing a water dish, a food dish and a toy, and an outdoor area, containing a shelf and litter tray. The outer portion was accessible through a cat door in the back wall of each indoor section. The front doors of the kennels were made of transparent plexi-glass, such that views of the inside of the adoption centre as well as visual contact with cats housed across the hallway, were possible. As the walls of each pen were solid the cats were unable to view their neighbour, although auditory and olfactory communication were possible. A single tier system existed, such that all kennels were located at the same height. Indoor portions of kennels of enriched cats contained a BC SPCA Hide & Perch™ box (a two-tiered cardboard box with a lower hiding space [$53 \times 30 \times 22$ cm; length \times breadth \times height] with two access openings, and an open upper sitting area [$53 \times 30 \times 9$ cm; length \times breadth \times height] [supplied by the BC SPCA, BC, Canada]) as well as a heating pad and duvet. Indoor sections of kennels of control cats contained a 'bed' (an open plastic basket, measuring $60 \times 40 \times 10$ - 18 cm; length \times breadth \times height) with a heating pad and duvet. Data were collected for each cat between 1530 and 1630h, except where otherwise noted, on days one through five as well as day 14 for any cat that remained in the kennel at that time. The same observer collected all data, which consisted of a Cat Stress Score, scan sample and approach test. Adoption data were also collected for any study cat homed during the course of this study.

Cat Stress Score

Cats were assigned daily Stress Scores according to the Cat Stress Score system developed by Kessler and Turner (1997). This scoring system ranks the level of stress perceived in the cat based on observations of its posture and behaviour as described in the ethogram devised by the UK Cat Behaviour Working Group (1995). The scores range from one (no stress) to seven (extreme stress). Cats were assigned an initial score, with a second score given on reassessment following 15 minutes of no interaction. The two scores were then averaged to assign the cat its daily Stress Score. The change in score between day one and each of the other observation days was determined for the purposes of analysis.

Approach test

Two approach tests were used on each cat, separated by 15 minutes of no interaction. In the first approach test, the observer stood 10 cm in front of the closed doors of the kennel. The initial reaction of the cat was noted as approach, retreat, or no reaction. The latency of the cat to approach the front of the kennel was also recorded, up to a maximum time of 60 seconds. If the cat was located at the front of the kennel at the start of the test, the observer stood at the opposite side and latency to approach was determined as the time taken by the cat to approach that opposite side of the

kennel. Cats that did not approach were assigned maximum time scores of 60 seconds. The same data were recorded for the second approach test, which was conducted in a similar fashion to the first approach test, except in this test the doors of the kennel were opened. To maintain consistency in the tests, no noises or actions were made by the observer during either of the approach tests. Change in latency to approach between days one and five was determined for analysis as an increase, decrease, or no change.

Scan sample

Scan samples were taken twice daily for each cat. The first reading occurred between 1300 and 1400h, while the public was allowed access to the cats. The second recording was taken between 1530 and 1630h, after the shelter was closed to the public. General observation was made of the cat's location in the kennel; either in or on the BC SPCA Hide & Perch™ box/bed, behind the BC SPCA Hide & Perch™ box/bed, or elsewhere in the kennel. Activity was also noted as restful sleep, alert rest (differing from restful sleep by constant attentiveness to external stimuli), sitting, or active (all other activities involving movement). Location and activity results were totaled over all study days for the purposes of analysis.

Adoption

A record was kept of the number of days the cat was present in the adoption centre before being adopted, for those cats that were adopted by the end of the observation period. A survey was given to adopters in order to assess the importance of various factors in deciding which cat to adopt. Factors included age and sex of the cat, appearance of the cat and kennel, and temperament of the cat. Each item of the survey consisted of a number scale of one to five, with one being strongly disagree, three being neutral, and five being strongly agree. A space was also provided for the adopter to list additional factors that were considered important in choosing their specific cat. Adoption data were collected for an additional two-week period following the end of other observations. This time scale was decided upon by averaging the days until adoption of cats adopted earlier in the experiment. Any cats not adopted by the end of this additional period were given a maximum score of 60 days for analysis purposes.

Statistical analysis

Due to the non-normal distribution of the data, non-parametric statistics were used to analyse continuous data. Mann-Whitney *U* tests were used to analyse the change in Cat Stress Score, latency to approach, and adoption data. Chi-square tests were used to analyse approach reaction, change in latency to approach, and scan samples, due to the categorical nature of the data. Data from all cats of one group were combined as previous studies have found that there was no statistically significant difference in results obtained from cats of different sex, age, or breed (Kessler & Turner 1997). Data were analysed using Minitab version 13.32.

Results

Cat Stress Score

Differences were noted between the two treatment groups in the median Stress Score found on each observation day (Figure 1). As there was already a significant difference noted on day one of data collection, analysis of the Stress Score noted on individual days gives unclear results with regards to the effect of the enrichment on stress. This effect is better determined through an analysis of the change in Stress Score over the study days, thus negating the initial difference between treatment groups. Between day one and each subsequent observation day, a significant change in Stress Score was noted for the enriched group compared to the control group (Figure 2). Stress Score changes between day one and two were found to have a significant difference ($w = 459.0, P = 0.0003$). The median change in Stress Score for the enriched group was -0.75 , and 0.25 for the control group, indicating an average increase in stress in the cats of the control group, while that of the enriched group had decreased. The median change in Stress Score for the enriched group between days one and three was -1.00 , and for the control group was -0.25 which was also significant ($w = 582.5, P = 0.0009$). A significant difference between the groups was found between days one and four ($w = 502.5, P = 0.0009$). The median change in Stress Score for the enriched group was -1.37 and for the control group was -0.50 . Between days one and five, a significant difference in Stress Score change was also noted ($w = 574.0, P = 0.0005$). The median change in Stress Score for the enriched group was -1.75 and for the control group, the median difference was -0.75 . Two weeks after the cats first arrived in the shelter, a significant difference was still noted for change in Stress Score between the two groups ($w = 110.0, P = 0.0059$). The median change in Stress Score for enriched cats was -2.25 , and for control cats was -0.375 .

Approach tests

Approach test 1: kennel door closed

Initial reaction:

A significant difference was noted between the reaction of the enriched and the control cats throughout all observation days ($\chi^2 = 9.686, df = 2, P = 0.008$). Enriched cats approached more often, with a total of 18 percent of reactions being approach. They also retreated less often, with only one percent of reactions noted as retreat. The control cats, however, were less likely to approach and more likely to retreat, with only 10 percent approaching, and eight percent retreating.

Latency to approach:

No significant difference in latency to approach was noted between the two groups on any of the observation days. This is due perhaps to the high proportion of cats that did not approach and were therefore assigned maximum time scores of 60 seconds resulting in skewed data. Cats of either group that did approach showed a continued decrease in latency throughout the days with a slightly larger decrease

noted for the enriched cats (latency median for enriched group = 37.5 seconds on day one, 5.0 seconds on day five; latency median for control group = 17.5 seconds on day one, 12.5 seconds on day five). However, this change was not found to be significantly different ($\chi^2 = 1.22, df = 2, P = 0.543$)

Approach test 2: kennel door open

Initial reaction:

Throughout all observation days, the enriched group approached 32 percent of the time, and retreated nine percent of the time, while 59 percent of the time showing no reaction. Cats in the control group approached 25 percent of the time and retreated 14 percent of the time, while 61 percent of the time showing no reaction. These differences, however, were not found to be significant ($\chi^2 = 2.213, df = 2, P = 0.331$).

Latency to approach:

No significant difference in latency to approach was noted between the groups on any of the observation days, although a much higher proportion of cats were observed to approach at some time when compared to approach test 1. For cats that did approach, those in the enriched group showed a decrease over days while those in the control group remained constant (latency median for enriched group = 21.0 seconds on day one, 2.0 seconds on day five; control group = 5.0 seconds on day one, 5.0 seconds on day five). Again, this difference in change was not significant ($\chi^2 = 5.411, df = 2, P = 0.067$).

Scan samples

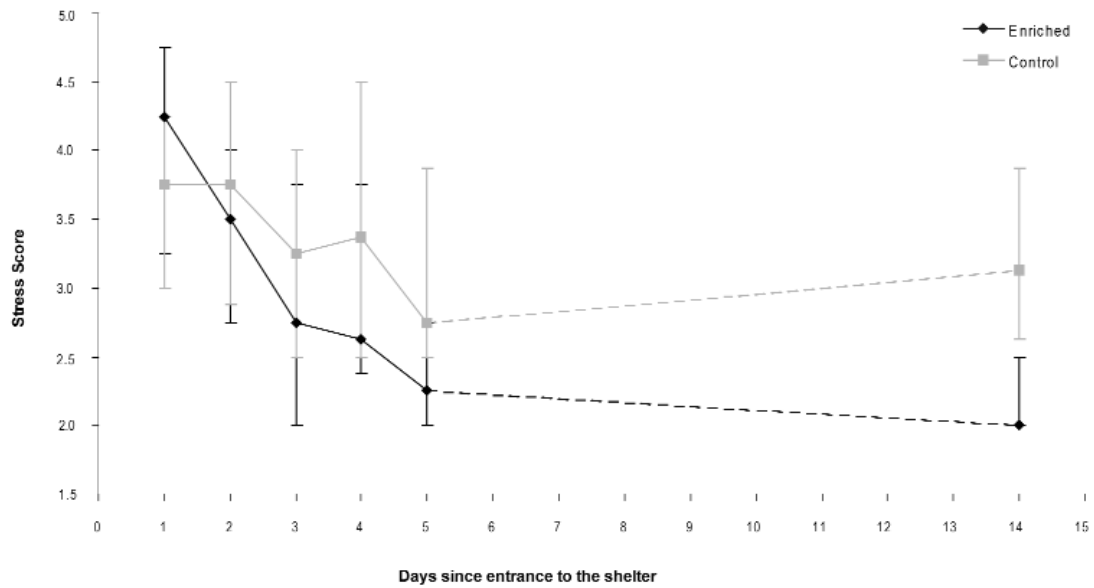
Activity

A significant difference was noted between the activities of the two groups totaled over all observation days ($\chi^2 = 8.152, df = 3, P = 0.043$). The cats in the enriched group were sleeping restfully more often than those in the control group. Sleep consisted of 20 percent of all observed activities in the enriched group, as compared to the control total of 11 percent. Control cats were resting alert and sitting more often than the enriched cats. Seventy percent of activities of the control cats were alert rest, and 14 percent sitting, while these totals were 65 percent and nine percent, respectively in the enriched group. Active behaviours were identical in both groups, comprising six percent of all behaviours observed for each group (Figure 3).

Location

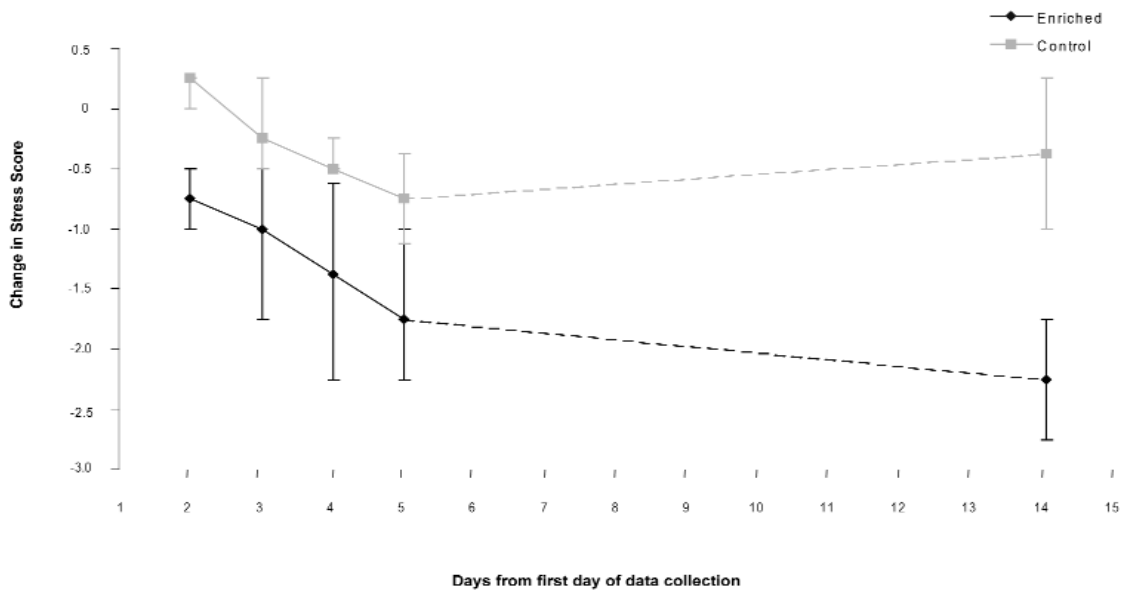
A significant difference was noted in the location of the cats in the two groups during the scan samples indicating a preference for the BC SPCA Hide & Perch™ box over the control bed ($\chi^2 = 34.248, df = 2, P < 0.001$). Cats in the enriched group were observed either in or on their BC SPCA Hide & Perch™ box 77 percent of the time, and located elsewhere in the kennel 23 percent of the time. At no time were any of the cats attempting to hide behind their BC SPCA Hide & Perch™ box. Cats in the control group used their basket 61 percent of the time, and were located elsewhere in the kennel 39 percent of the time. Thirty-six

Figure 1



Median Stress Score (\pm interquartile) of cats in enriched and control treatments on each observation day.

Figure 2



Median change in stress score (\pm interquartile) of cats enriched and control treatments between later observation days and day one.

percent of these instances occurred when the cat was attempting to hide out of view behind its basket (Figure 4).

Days until adoption

No significant difference was noted in the number of days required for adoption of cats in the enriched group as compared to the control group ($w = 388.5, P = 0.977$). Twenty-one percent of enriched cats were adopted, with a

median of 12 days. Twenty percent of control cats were adopted with a median of 13 days.

Adoption survey

No significant difference was found between the two groups for ratings of the various questions on the adoption surveys. The median score for the importance of sex or age of the cat was 3.0 for the enriched group and 4.0 for the control group,

however this difference was not significant ($w = 59.0$, $P = 0.3545$). The median score for the importance of physical appearance of the cat was 4.0 for the enriched group and 3.5 for the control group, and again, this difference was not significant ($w = 73.0$, $P = 0.6234$). The median score for importance of the appearance of the kennel was 3.0 for the enriched group and 2.5 for the control; this difference was also not significant ($w = 74.0$, $P = 0.5484$). For both groups, the temperament of the cat was the most important factor. This was slightly more so for the enriched group (median score 5.0) than the control group (median score 4.5), however the difference between the two groups was not significant ($w = 71.5$, $P = 0.7234$).

Other influencing factors were listed for four of the adopted cats, three from the control group and one from the enriched group. Alternative reasons listed included suitability with children (enriched cat), indoor nature of the cat, lack of allergic reaction, and sympathy.

Discussion

Cat Stress Score

Results of this study support previous suggestions that hiding enrichment is beneficial for cats entering a novel or otherwise stressful environment (Smith *et al* 1994; Rochlitz 1999; Soules 2002). Enriched cats showed much lower stress levels than control cats. The implications of the significant decrease in Stress Score noted between the two groups are extremely important to the welfare of cats maintained in any captive environment.

It may be presented that the reduced stress could be the result of the provision of perching areas rather than, or as well as, hiding areas. Due to limitations of resources, it was not feasible to have a study group that was allowed access to only a hiding area. Any hiding enrichment device placed in a kennel would inevitably provide a perching area on top. In order to provide a hiding area alone, the top of the enrichment would need to connect to the ceiling of the enclosure, or the area would need to be formed directly into a wall of the kennel. However, although it has been stated that the provision of perching areas can aid in stress reduction, such perches are generally a great height above ground level. This height provides the cats with a viewing location that allows them to effectively scan their surroundings (Rochlitz, 1999). The impact on stress levels from the slight elevation of 22 cm provided by the perch of the BC SPCA Hide & Perch™ boxes may be considered minimal.

Kessler and Turner (1999b) suggested that a Stress Score of lower than three is acceptable as this merely represents a baseline level of stress present in any living animal. An elevation above this level represents the response to an acute stressor and is not a problem if these levels are not sustained. That is, if either the stressor is removed or the animal is able to cope successfully with the stress (Moberg 2000). The results from the control group show that these animals were maintained at a relatively high stress level. Only study day five showed a median stress score of less

than three, with the median score rising above this value again by day 14, indicating that the stressor had not been removed for the majority of the animals. The fact that enriched cats had an acceptably low Stress Score, obtaining and maintaining a score of less than three as of the third study day, indicates that these animals were able to cope effectively with this stress. The increase of stress in the control group after two weeks is potentially indicative of the development of chronic stress. This work has not assessed chronic stress; however, the absence of this increase in the enriched group, suggests that coping effectively with the acute stress first encountered upon entry into the shelter, may prevent chronic stress from occurring.

Approach test

The results of this study clearly indicate a higher incidence of approach by a cat to a person at their kennel when the cat is provided with hiding enrichment. Although a cat has the ability to hide, and may utilise such facilities in order to cope more effectively with stress, it is also more likely to leave its enclosure and approach a person present at its kennel. A cat that responds by approaching a potential owner, even through a closed door, projects a more favourable personality (Turner 2000).

Although no significant difference was found for the cats to approach when the cage door was open, this may be due to the fact that this second test, although performed after a time of no interaction, was still performed following the first test for which significant results were obtained. In previous studies, a similar problem was noted, whereby the interest in the observer by the cat appeared to have diminished by the second trial of the day (Hoskins 1995). It is this decreased interest, rather than an increased fear or stress response that resulted in the cat's lack of reaction.

Scan sample

Carlstead *et al* (1993b) noted a behaviour in their study cats which they termed 'attempting to hide'. This consisted of the cat attempting to conceal itself as much as was possible with the resources available. Control cats in this experiment were often observed performing this type of behaviour, typically by crouching behind their beds. It is reasonable, based on the appearance of these cats and the description given by Carlstead *et al*, to presume that they too were attempting to hide. This actually made them less visible to the public than a cat hiding in its BC SPCA Hide & Perch™ box. In addition, this coping strategy was apparently ineffective at reducing the stress experienced by the animal.

Smith *et al* (1994) noted a higher proportion of time spent alert by cats not yet adjusted to a new environment. Vigilance has often been associated with anxiety-related behaviour problems in house cats. When a cat is anxious about the presence of other cats, either inside or outside the house, it may often be observed sitting vigilant in an area where it can view these 'intruders' (Beaver 1992). Upon visual confirmation of the presence of another cat, the stress level of the already anxious cat will increase further and behaviour problems such as spraying are a common result

(Hart & Pedersen 1991). Results from this study confirm this alert type of behaviour in cats with a higher stress level. The cats of the enriched group appeared generally less anxious as they performed more true resting behaviour and less alert resting behaviour than did the cats of the control group.

Adoption results

Days until adoption

No significant difference was found between the two groups for the number of cats adopted or the number of days it took for those cats to be adopted. The claim that providing hiding areas to cats in adoption centres reduces their visibility to the public and will therefore reduce the likelihood of their adoption is not valid. This claim may be made with the best intentions for the cat, hoping that faster adoption of the animal results in the best welfare outcome. However, from the stress results of this study, cats forced to stay in the adoption centre without the ability to use a BC SPCA Hide & Perch™ box have a greatly reduced welfare while their adoption potential is not actually improved.

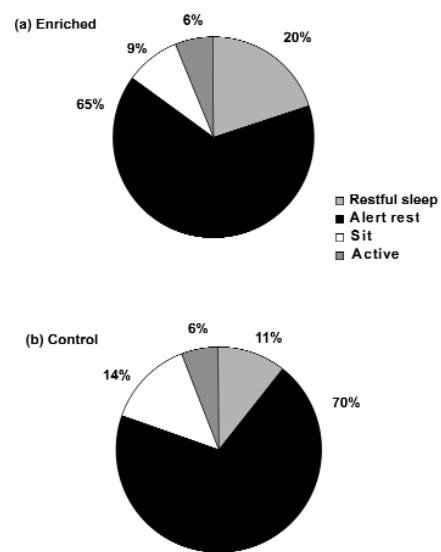
Adoption survey

For both the control and the enriched group, the adopters rated the temperament of the cat as being the main factor influencing their decision to adopt the cat they chose. This is an important factor to consider when deciding what enrichment to provide to animals kept in shelters. Each cat has its own distinct personality (Feaver *et al* 1986; Mendl & Harcourt 2000), however, it is generally agreed that a cat which is less stressed is more likely to portray 'friendly' characteristics and generally appear more appealing to a potential owner (Turner 2000). The results of this study agree with this statement. The enriched cats, which had lower stress, approached more rapidly, hid behind kennel furniture less, and spent less time actively resting. The general public may interpret these behaviours as the cat possessing a less nervous temperament. Although cats provided with hiding enrichment might be slightly less visible to the public, the portrayal of a more favourable personality may counteract any resulting negative impact on adoption potential.

Further applications

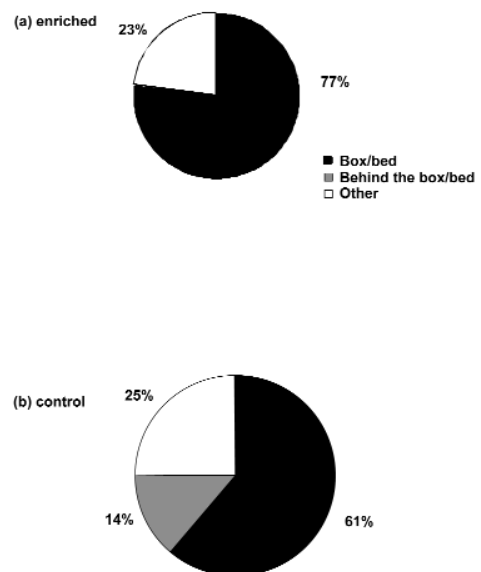
There are differing opinions of the long-term effects of confinement on stress levels in cats. Field (2002) found a significant increase in behavioural indicators of stress in cats present in a shelter for eight weeks as compared to the same cats tested after only two weeks. There were indications of the development of chronic stress after an initial acute stress response had subsided. Rochlitz *et al* (1998), however, found a significant decrease in physiological and behavioural indicators of stress after five weeks in a quarantine facility. In the quarantine facility, despite the drastically reduced overall level of enrichment, the cats were provided with a hiding area that was not made available to the cats in the shelter system studied by Field. Results from this study seem to suggest that the ability to hide delays, if not elimi-

Figure 3



Proportion of total observation in which cats of the a) enriched and b) control treatments engaged in various behaviours.

Figure 4



Proportion of total observations in which cats of the a) enriched and b) control treatments were noted in various locations.

nates, the chronic stress response, however the long-term effects were not investigated beyond a two week time span. It would be of interest to investigate if the cause of the discrepancy between the previously mentioned studies is the result of better adaptation through the provision of hiding enrichment. If this coping mechanism proved effective at minimising both acute and chronic stress, it would have crucial implications for the welfare of cats maintained in a captive environment, be it a shelter, a quar-

antine facility or a laboratory, and may be applicable to non-domestic cats maintained in zoos, as suggested by Carlstead *et al* (1993a).

It may also be interesting to investigate the effects of this type of enrichment on pair- or group-housed animals. In the pilot study for this experiment it was noted that when a pair of cats were given a BC SPCA Hide & Perch™ box, one would often sleep in the hide portion while the other slept in the perch. This effectively allows for increased resting areas for the cats without occupying increased floor space, which is generally limited in shelters. By increasing resting areas in such a way, there may be a reduction in stress caused by competition for resources between group-housed animals (Heidenberger 1997). It may alternatively be the case that with the provision of only one hiding area there could be an increase in competition for that resource, resulting in increased stress levels. This could only be determined through further investigation.

Animal welfare implications

Cats are exposed to a number of stressors upon entering a captive facility such as a shelter. The welfare of the animal depends on its ability to cope effectively with these stressors. The natural instinct of a cat when exposed to a threatening situation is to retreat, however if physical removal is not possible, then it will attempt to conceal itself from view. By providing cats entering an adoption centre with enrichment that allows them to perform this coping behaviour, a drastic reduction in stress is observed. The likelihood of the cat being adopted is no different if it is given this enrichment, however its welfare while in the adoption centre is greatly improved.

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