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Will a hiding box provide stress reduction for shelter cats?

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ABSTRACT

Domestic cats (*Felis sylvestris catus*) can experience serious stress in shelters. Stressful experiences can have a major impact on the cats' welfare and may cause higher incidences of infectious diseases in the shelters due to raised cortisol levels causing immunodeficiency. Though several studies showed preference for hiding places and stress reducing effects of hiding boxes on cats in combined studies, none of these studies determined if proper hiding enrichment would be effective in a quarantine cattery. These stress reducing effects are crucial in the first weeks after admission in which novelty stress is highest. The aim of the present study was to determine the effect of a hiding box on the stress levels of newly arrived cats in a Dutch animal shelter. Therefore, 19 newly arrived shelter cats were randomly divided into two groups, with ($N = 10$) and without a hiding box ($N = 9$). To determine the stress levels of recently admitted cats, behavioural observations were done during a 14-day period according to the Kessler and Turner Cat-Stress-Score (CSS).

The main results of this study are, that: (1) a significant difference was found between groups in the mean CSS on observation day 3 and 4, whereby the hiding box group had a lower mean CSS ($p < 0.01$); (2) the mean CSS of the hiding box group showed minimal variance, meaning that the hiding box had its effect on most experimental cats, whereas, high variance could be seen in the group without hiding boxes; (3) the mean CSS for both groups was equal at day 14, but this level of recovery was already reached around day 3 in the hiding box group.

These findings suggest that cats provided with a hiding box were able to recover faster in their new environment compared to cats without a hiding box, as measured by the CCS.

In summary, the hiding box appears to be an important enrichment for the cat to cope effectively with stressors in a new shelter environment the first weeks after arrival. Further research is needed to study the effect of a hiding box for group housed cats, its long term effects, and correlation with outbreak frequencies of infectious diseases.

1. Introduction

In the Netherlands about 34% of families keep cats as pets, resulting in 2.9 million cats in total and 1.7 cats per household on average (Borst et al., 2011). Despite this popularity, a large number of cats ends up as stray animals or become unwanted and are relinquished. Animal shelters of the Dutch Society for the Protection of Animals alone take in around 35,000 cats per year (Dierenbescherming Nederland, 2013) and the numbers are increasing.

The shelter environment contains many stressors, e.g. contacts with unfamiliar people, animals and objects in an

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unknown environment, which can be extremely stressful for cats in particular (e.g. McCune, 1992; Carlstead et al., 1993; Kessler and Turner, 1997; Neilson, 2002 Bradshaw et al., 2012). Chronic stress affects the stress physiology (e.g. increase of cortisol) with consequences for the animal's health due to immune suppression increasing the susceptibility to infectious diseases (e.g. feline upper respiratory tract infection [FURI]: Gaskell and Povey, 1977; Tanaka et al., 2012) with the risk for outbreaks of infectious diseases within the shelter (Speakman, 2005; Tanaka et al., 2012). This relationship between stress and immunodeficiency emphasises the importance of stress reduction in shelter cats and it is crucial to reduce stress as fast as possible after admission. The estimated length of a regular acclimatisation period to a new environment is about two weeks period (e.g. laboratory animals: van Ruiven et al., 1996; dogs: Kis et al., 2014).

Environmental enrichment is often used as an intervention to improve the complexity of the environment of captive animals and to meet their behaviour needs (Ellis, 2009), eventually reducing stress. Hiding behaviour is an intrinsic part of the biology of the cat and provisions to execute this behaviour in a shelter cage has earlier been studied in domestic cats in more detail. Results of Carlstead et al. (1993) showed that cats that were exposed to stressors increased their attempts to hide. This study additionally showed a significant decrease in urine cortisol if the cat was able to hide as compared with no hiding opportunities. In a study of Rochlitz et al. (1998), it was found that the experimental cats spent most of their time in their hiding box during the first two weeks after being housed in a novel environment. The urine cortisol creatinine ratio and the time spent hiding by the cats in this study gradually decreased during the observation time. Apparently, Gourkow and Fraser (2006) and Rochlitz et al. (1998) observed that animals without hiding boxes, made efforts to hide by turning their litter box upside down, creating an alternative hiding place. Kry and Casey (2007) emphasize the importance of hiding opportunities for cats, however, they concluded in their introduction that none of the available studies determined if proper hiding enrichment would decrease stress beyond that of conventional housing designs.

An example of a practical hiding enrichment is the BC ASPCA Hide and Perch box® originally designed in Canada. While a hiding box might be particularly useful in the stressful first weeks after admission, many Dutch shelters reject its use during this period due to arguments of limited cage space and hygiene. So far, no specific studies in quarantine catteries have been found available in the literature and we argue that a hiding box can be a stress reducing application, also in space limited quarantine conditions.

Therefore, the aim of the present study was to determine the potential effects of a hiding box on the stress level of newly arrived cats in cages used in quarantine situations, during the first two weeks in a Dutch shelter (which includes the time for quarantine). It was hypothesized that newly arrived cats that were able to hide in a hiding box would have significantly lower stress levels as based on the Kessler and Turner Cat-Stress-Score (CSS) and would adjust faster compared to the cats that were not able to hide in a box.

2. Material and methods

The study protocol was approved by the representatives of the University of Utrecht Institutional Animal Care and Use Ethical Committee.

2.1. Study site, housing and standard procedures

Data were obtained in a Dutch animal shelter. This shelter was of a medium size and accepts between 600 and 800 cats on a yearly basis. In general, new cats entering a Dutch shelter facility are held in a holding area for the legally required two weeks (Burgelijk Wetboek: art.5, lid 8) before being moved to an adoption area. Cats in holding areas are typically not on display and are not available for adoption.

The holding area was divided into several smaller quarantine rooms with traditional shelter design: upper and lower rows of metal cages lining one wall per room, preventing visual contact between the cats. The rooms featured natural day light from roof windows, combined with fluorescent lighting lit between 0800h and 1700 h daily. The ambient temperature was manually regulated by means of a central heating system and natural ventilation through the windows. During the study, the mean ambient temperature in the quarantine room of the hiding box group was 19.1 °C (±0.36SD) and for the control group it was 19.6 °C (±0.39SD). The ambient temperature of the two quarantine rooms did not drop below 15 °C during the observation period (no index observations if temperatures drop below 15 °C: advice of Kessler and Turner, 1997).

The study was conducted in two similar adjacent quarantine rooms in the holding area, which could be entered from the main facility through a small portal room. Direct contact with other employees, the public and dogs was thus prevented. Only the observer and the caretaker of the cats had access to the animals. As a standard, all cats were provided with a solitary cage [L × W × H: 70 × 74 × 72 cm] containing a water dish, a food bowl, three towels, a litter tray and a perching shelf [L × 74 cm] on 35 cm height. One towel covered the shelf, the other two covered the bottom of the cage. When the cage had a hiding box, one or two towels covered the cage floor inside the box.

Daily care for these cats was delivered by only one shelter staff member who was specifically assigned to this task. The cats received a high quality dry kibble cat food (VitalCare®, produced by Prins) and fresh water twice daily. The cages of the cats were cleaned daily after feeding in the morning. During cleaning cats were kept in transport boxes and returned to their cleaned cages.

2.2. Subjects

For this study 19 cats were selected on the basis of the following criteria: