



Litter box preference in domestic cats: covered versus uncovered

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Abstract

Feline inappropriate elimination (periuria and/or perichezia) remains a very common behavioral complaint of cat owners. Treatment recommendations often include improving the attractiveness of the litter boxes available to the cat. One frequent recommendation is to avoid covered litter boxes, although this has not previously been tested experimentally. The goal of this study was to assess whether, all else being equal, cats preferentially used uncovered litter boxes over covered litter boxes. Twenty-eight cats were enrolled in the study and offered the choice of a covered or uncovered box. Waste was scooped daily from each box, and the weight of waste in the different box styles was compared and evaluated using paired *t*-tests and χ^2 analyses. Overall, there was no significant difference between use of the two box styles. Eight individual cats did exhibit a preference (four for covered, four for uncovered), but individual preference results are not evenly distributed, with more cats than expected showing no preference between litter box types. We postulate that, if boxes are kept sufficiently clean (ie, once daily minimum cleaning), most cats will not show a preference for either box type. The observation that a minority of cats in the study exhibited a preference supports the recommendation of providing individual cats with a ‘cafeteria’ of litter box styles, including a covered box, to determine whether such a preference exists. These findings add to existing literature on the topic of feline inappropriate elimination and provide additional information for clinicians recommending treatment options for cats exhibiting this behavior.

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Introduction

Feline inappropriate elimination [deposition of urine (periuria) and/or feces (perichezia) in areas around the home, but outside of the litter box] remains the most common behavioral problem seen in small animal clinics and the primary behavioral reason why cats are relinquished to shelters.^{1–4} Litter box management has broad applicability in feline inappropriate elimination disorders because even when the disorder is deemed medical in origin, behavioral problems may occur as a consequence. For example, if the cat experiences pain while in the litter box, the cat may avoid using the box thereafter.⁵ Horwitz⁶ found that past history of urinary tract disorders was significantly associated with current inappropriate elimination behaviors in a retrospective study of 144 cats. Ideal litter box management should be considered in all periuria and perichezia cases, even when medical causation is identified. When medical problems are treated or ruled out, a behavioral history is taken and a specific behavioral diagnosis is made (eg, to distinguish between marking behavior and inappropriate toileting). A behavioral treatment plan is then proposed. These plans usually include ideal litter box management and

environmental modification aimed at reducing stress, sometimes augmented by use of pheromones and/or anxiolytic drugs.^{1,2}

Common recommendations for improving the litter boxes available to the cats include: (i) cleanliness — boxes should be cleaned at least once per day and litter completely replaced weekly; (ii) type of litter, with fine-grained clumping clay litter being the most commonly recommended;^{6,7} (iii) number of boxes, with the general, but untested, recommendation of ‘number of cats plus one’ (eg, in a two-cat household, there should be three boxes available); (iv) large box size, especially for larger cats;⁸ and (v) style of box, with many sources recommending against self-cleaning (some cats may find the noise of the cleaning mechanism aversive^{1,2}) or covered

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(either because this style of box tends to trap waste odors or because cats may find the restricted view provided by this box style disconcerting, particularly in multi-cat homes²). Extensive research has been done on litter type preference in particular.^{6,9–11} Much less research has focused on box style. A number of authors^{1,5} have recommended conducting a litter box ‘cafeteria’ experiment to determine litter and litter box preferences, if any. Horwitz⁶ found no significant association between litter box style (covered versus uncovered) and inappropriate elimination in a retrospective study of 144 cats, although Horwitz notes that the mean number of days between cleanings for problem elimination cats with covered litter boxes was five, while control cats were more likely to have boxes cleaned daily.

Given the lack of conclusiveness about preference for uncovered versus covered litter box styles, the goal of this study was to test whether, all else being equal, cats actually preferred uncovered litter boxes. We based our assessment of preference on actual observed use: when presented with both box types, with other factors, such as cleaning schedule, box size and litter type, being equal, did cats use one type significantly more than the other? Answering this question empirically would augment existing literature on the topic of feline inappropriate elimination and provide additional information for clinicians providing treatment recommendations for cats exhibiting this behavior.

Materials and methods

Twenty-eight cats were enrolled in the study; only cats with no recent history (within the past 12 months) of elimination disorders were enrolled. We defined elimination disorders as periuria/perichezia of any kind, including behavioral. Each cat was given exclusive access to two litter boxes for the 14-day study period. If other cats were present in the household, the study cat was separated from these cats for the duration of the study. Litter boxes were constructed from identical 82.5 × 50.2 × 47.3 cm plastic storage tubs (Figure 1). For the covered box, an opening measuring 27.3 × 31.75 cm was cut into one end of the box (bottom of the opening was 10 cm from the ground). The latched cover was left on for the covered box. For the uncovered box, the sides/top of the boxes were removed at a height of 15.2 cm on all sides except the front entry, which was cut down to 10 cm from the ground to match the height of the covered box opening. Litter boxes were filled with a fine-grained clumping litter (Fresh Step, scented; Clorox), and refilled as necessary to maintain an approximately 5 cm-deep layer in both boxes. We wished to present cats with an ‘ideal’ litter box in as many ways as possible, based on recommendations for most cats,^{2,8,10,11} so study litter boxes were large and filled with a clumping clay litter with a carbon odor-absorbing additive. Litter boxes were



Figure 1 Covered and uncovered study litter boxes

placed side by side and relative positions reversed at the end of the first week of the study to avoid location preference influencing use. Each day, participants scooped (using identical scoops) any waste found in the boxes into separate, labeled plastic bags. Bags were weighed by the study investigators each day. As urine clumps tended to consolidate or crumble after collection by the cats’ owners, we did not attempt to count the number of clumps per box in this study. As all cats in our study were kept inside for the duration of the study, fed their normal diet and were not suffering from medical problems, we assumed there would not be a large variation in the amount of urine/feces deposited during each box visit by an individual cat.

Use of the two box styles by all cats (based on weight of waste, in grams) was compared first using a paired-design *t*-test on pooled data for all cats. Next, use by individual cats was assessed, again, using a paired-design *t*-test. A χ^2 test was used to assess whether the distribution of individual cat preferences (none, covered, uncovered) varied from a null model of equal distribution between the three categories. We also looked at preferences in light of age, sex, size, previous experience with a covered litter box and social setting (single or multi-cat household immediately prior to the start of the study), using a χ^2 analysis to look for significant relationships between preference and these factors.

Results

Of the 28 cats enrolled in the study, 27 were used in analysis (Table 1); one cat was eliminated owing to owner non-compliance with study guidelines. The age of the cats ranged from 3 months to 15 years (mean = 3.1 years, SD = 4.2), and weights from 1 kg to 8.2 kg (mean = 4.3 kg, SD = 1.7). Fifteen (56%) cats were male and 12 (44%) were female. Twenty-one cats (78%) were using an uncovered box at the start of the study, but 16 (59%) had used a covered litter box at some point in their life. No cats eliminated outside of the boxes during the study period.

Table 1 Characteristics of cats enrolled in the study

Cat	Sex	Age (years)	Weight (kg)	Current litter box type*	Social setting at time of study	Lifetime experience: ever lived in multi-cat household?	Preference ($P < 0.05$)
1	M	0.5	2.7	Covered	Multi-cat	Yes	Covered
2	M	1	6	Uncovered	Single	Yes	None
3	M	3	5	Uncovered	Single	Yes	None
4	F	0.9	6.5	Uncovered	Single	No	None
5	M	1	6	Uncovered	Single	No	None
6	M	0.25	1	Uncovered	Single	No	Uncovered
7	F	5	4.8	Uncovered	Multi-cat	Yes	None
8	M	12	6	Uncovered	Multi-cat	Yes	None
9	F	2	2.7	Uncovered	Multi-cat	Yes	None
10	M	0.5	4.2	Covered	Single	Yes	None
11	F	0.5	1.5	Uncovered	Single	No	None
12	M	0.4	2.5	Uncovered	Single	Yes	None
13	M	1	4.5	Uncovered	Multi-cat	Yes	None
14	M	1	6	Uncovered	Multi-cat	Yes	Uncovered
15	F	12	2.4	Uncovered	Multi-cat	Yes	None
16	F	10	3	Uncovered	Multi-cat	Yes	Uncovered
17	M	0.5	5.2	Uncovered	Multi-cat	Yes	Covered
18	F	1.25	4.5	Uncovered	Multi-cat	Yes	Covered
19	F	1.5	3	Uncovered	Single	No	None
20	M	0.75	3.5	Uncovered	Single	No	None
21	M	6	5.5	Uncovered	Single	Yes	None
22	F	0.6	2.7	Uncovered	Single	No	None
23	F	2	4	Covered	Single	Yes	Covered
24	F	0.8	4.5	Covered	Single	No	None
25	M	3	5	Covered	Single	Yes	None
26	M	14.9	8.17	Uncovered	Single	Yes	Uncovered
27	F	2	5.2	Both	Single	No	None

*Prior to the start of the study, all cats but two were using clumping clay litter (various brands); cats 20 and 21 were using non-clumping clay litter

Overall (pooled data all cats), no preference was seen; there was no significant difference in the amount of use of covered versus uncovered boxes ($t_{376} = 0.44$, $P = 0.66$). Variances for the waste weights in the two box types (covered versus uncovered) were equal based on a Levene's test for equality of variances ($P = 0.247$). When individual cats were assessed, 19 (70%) showed no preference (no significant difference in the amount of use of the two boxes) (Table 1). Four cats (15%) used the covered box significantly more than the uncovered box; four (15%) preferred the uncovered box, using it significantly more than the covered box. Based on a χ^2 analysis of individual cat preferences, preference results are not evenly distributed; more cats than expected showed no preference between litter box types ($\chi^2 = 16.67$, $P < 0.05$).

Assessing covariates to preference (age, sex, size, multi-cat household, prior experience with a covered box) proved difficult, as the sample size of cats with a preference was too small ($n = 8$ cats, four in each of the two preference categories). No significant relationships were seen in the χ^2 analyses on preference and the

various possible covariates. A few possible trends were seen in the data. Of the six 'large' cats in the study (body weight ≥ 6 kg), none preferred the covered box (two preferred the uncovered box, and four displayed no preference). We found no relationship between social status of cat immediately prior to the study (living in a single or multi-cat household) and litter box preference ($P = 0.157$), but cats living in multi-cat households ($n = 10$) appeared more likely to have a preference, either for uncovered ($n = 2$; 20%) or covered ($n = 3$; 30%). Of the cats living in single-cat households immediately prior to the start of the study ($n = 17$), 14 (82%) had no preference, 1 (6%) preferred covered and 2 (12%) preferred uncovered boxes.

Discussion

Provided large boxes, using fine clumping litter and daily scooping, the majority of cats in our study did not exhibit a preference between covered and uncovered litter boxes. Treatment recommendations for inappropriate elimination include cleaning the litter box at least once

daily for a single-cat household (more frequently for a multi-cat household). We propose that provided that this is done by the owner, most cats will willingly use a covered box, with some cats actually preferring the covered box. Covered litter boxes seem preferred by many cat owners. Reasons for this might include a reduction in the amount of litter spread around the box, reduced visibility of the waste and better containment of odor. However, it has been suggested that the presence of the cover may result in the owner not cleaning the box with sufficient frequency ('out of sight is out of mind').¹ If true, this could lead to an avoidance of a covered litter box, even by a cat which would otherwise accept, or prefer, that style. Carney¹² suggested that covered boxes need to be cleaned more frequently than uncovered boxes owing to the tendency to trap odor; in our study, one cleaning per day was sufficient for cats to continue using the covered boxes.

However, our study did find that some individual cats have preferences for one box type or the other, supporting the treatment recommendation^{1,5} of offering cats with behavioral elimination disorders a litter box 'cafeteria' in order to establish whether such a preference exists. As the cats in our study were not currently suffering from an elimination disorder, it is possible that cats with current elimination disorders may exhibit stronger or different preferences, but when setting up a litter box 'cafeteria' for these cats, the selections should include a covered box. We suspect that it is currently uncommon for veterinarians to include a covered box in the 'cafeteria', but the results of this study suggest this may be beneficial.

Our study litter boxes were larger than commercially-available litter boxes. This was done intentionally in order to assess the effects of the cover without the confounding variable of box size and in order to present cats with an 'ideal' litter box in all respects other than the study variable. However, it may be necessary for some cat owners wishing to use a covered box to move from a commercially-available litter box to a larger one, particularly if their cat is large (≥ 6 kg). Such boxes are easy to construct from widely-available plastic storage tubs.

Although our sample size for cats with a preference for box style was too small to demonstrate relationships between covariates (such as body size), there were some suggestive patterns that would merit further research. Specifically, none of the larger cats in the study showed a preference for covered boxes, although two of these cats did show a preference for uncovered boxes. This observation aligns with suggestions that using boxes that are too small may be physically awkward and aversive for larger cats.^{1,8} The concept that cats in multi-cat homes may avoid covered boxes^{2,6} could not be tested directly in our study (as cats in multi-cat homes were isolated from other cats in the

home for the duration of the study), but we did not see any significant pattern of avoidance of covered boxes by cats who were living in multi-cat homes in the time immediately preceding the study. A final, ad hoc observation involves the use of scented litter in our study boxes. The influence of litter fragrance on cat litter box use is unclear, with one study listing fragrance as a risk factor for inappropriate elimination⁶ and another not.¹³ We did have one participant report that their cat had avoided the covered box when it contained scented litter; this Persian (brachycephalic) cat showed a preference for the uncovered box during the study period ($t_{13} = 5.64, P < 0.0001$), but began to use the covered box after the study had concluded when the scented litter was replaced by the owner with unscented. The covered box style may intensify litter fragrance, making it aversive to some cats when the box is filled with scented litter.

Conclusions

Two future study directions suggested by this article are the evaluation of the effect of scented versus unscented litter on litter box choice, and the question of preference when box size is also a factor. Future work could include performing a similar study design using unscented litter, smaller litter boxes or cats with current elimination disorders. A less direct, but broader, question is the effect of litter box management on the prevention of the development of behavioral inappropriate elimination disorders: can an ideal litter box mitigate other aversive factors, such as pain experienced in the litter box due to an underlying medical problem?

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Conflict of interest The authors declare that there is no conflict of interest.

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