Feline House Soiling: Elimination and Marking Behaviors

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Deposition of urine and/or feces in inappropriate locations in the home continues to be the most common behavioral problem for which cat owners seek professional counsel.1-3 House-soiling is also the primary behavioral reason given for relinquishment of cats to shelters.4 This is not surprising considering the facts that the consequences of this behavior can be quite unpleasant to human beings dwelling in the home and cleaning bills or replacement of soiled objects can quickly escalate into a significant expense. This article reviews appropriate diagnosis and treatments for elimination in inappropriate locations.

Diagnosis

Identification of Culprit(s)

In multicat households, the first challenge in diagnosis may be identification of the culprit(s). Sometimes, owners have only found the evidence of inappropriate soiling and have never witnessed the actual deposition of the urine/feces. More commonly, the owners have witnessed a small percentage of the actual depo­sitions, perhaps implicating one cat but not absolving others of guilt. There are several methods that can aid in identification of the culprit(s), but all have their limitations. Segregation of cats can help to identify participants. If urine/feces are found inappropriately deposited in the segregated location of one of the cats, that cat can be a confirmed participant. The actual segregation may influence the social dynamics of the household enough to modify the cats' elimination behavior, however. In fact, segregation is sometimes used as part of the treatment program for cats with house-soiling problems.5

Another method of identifying participants involves video monitoring. With advances in technology, it is possible for the average owner to set up some type of surveillance program. Cats that have unpredictable target spots and infrequent episodes may make this option nonproductive, however.

Finally, the administration of products to change the properties of the urine/feces can aid in the identification of culprit(s). Fluorescein dye, given either orally (50 mg of fluorescein per cat) or subcutaneously (0.3 mL of Fluorescite Injection 10% per cat) to each possible culprit in a sequential manner may help to elucidate participants.6 Compounding pharmacists can create capsules containing fluorescein for oral administration. Alternatively, one can make an oral capsule by using the fluorescein-impregnated ophthalmic strips generally used in clinical practice for identification of corneal irregularities. To do this, the tip of the strip that contains the fluorescein (orange-colored part of the strip) is torn off from the white part of the strip. The orange part is then folded to fit inside an empty gelatin capsule. A total of six large fluorescein strips (9 mg of fluorescein per strip) should be folded up into capsule(s) and administered orally. Although urine from nontreated cats fluoresces a yellow-green color when viewed with a fluorescent black light in a darkened room, one can distinguish urine from cats that have received fluorescein because it is a much more vibrant yellow green when viewed with a fluorescent black light for 24 hours after administration. It is important to warn owners that if the cat targets light colored upholstery or carpet, the fluorescein-treated urine may leave a stain that is visible to the naked eye and resistant to cleaning. Once again, if there is a sporadic participant or infrequent soiling, this technique may miss that cat’s contribution.

To identify the cat depositing feces inappropriately in the home, the owner can make small shavings of nontoxic crayons using a kitchen cheese grater. Each cat can have one-half teaspoon of a specific color of crayon shavings added to its moist food. For example, Cat 1 would receive green crayon shavings, Cat 2 would receive purple crayon shavings, and Cat 3 would receive red crayon shavings mixed into canned cat food or a special moist food treat, such as tuna. The nontoxic crayon shavings should pass through the intestinal tract intact, and feces can then be examined for the crayon shavings, identifying the “owner” of that fecal deposit. Using this example, if the owner finds feces on the carpet with purple crayon shavings in it, Cat 2 is a confirmed participant in the problem.

Medical Evaluation

When a pet presents with a house-soiling problem, it is widely accepted that infectious, inflammatory, or metabolic changes could contribute to the problem.7-10 Any disease that influences the frequency, urgency or quantity of urination/defecation could easily present as inappropriate elimination. Cystitis, renal failure, diabetes, inflammatory bowel disease, and hyperthyroidism are all examples of diseases that can
directly influence elimination patterns and may result in inappropriate elimination. Cats that experience waxing and waning disease processes, such as feline lower urinary tract disease (FLUTD), may be especially challenging to diagnose and treat, because the clinical signs are transient in nature. Congenital, neurogenic, and musculoskeletal causes should also be investigated as potential causes of house soiling. The prevalence of radiographic degenerative joint disease (DJD) in cats older than 12 years of age was found at an astounding incidence of 90% in one study. These cats may have discomfort in accessing a litter box or positioning in the litter box and may therefore select an alternative location for elimination. In managing elimination problems, it is imperative that the veterinarian considers the entire animal and its health status. It is important to recognize that medical and behavioral conditions may not be mutually exclusive. A medical problem may initiate a problem, but after resolution of the medical problem, the pattern may be sustained as a result of behavioral reasons.

**Historical Information**

A thorough history is important in the diagnosis of any disease process but is paramount in behavioral medicine. Obtaining an accurate picture of the nature of the problem (urine, feces, or both), the frequency of the problem, the duration of the problem, and the location (eg, vertical versus horizontal deposition, location within the home) of the problem all aid in the proper diagnosis. Social interactions between people and other animals are important to gather and interpret with respect to the elimination issue. Information about litter boxes, including number, locations, size, cleaning routine, litter type, and box type, is necessary to evaluate the case properly. House calls can be enlightening in problem elimination cases, because a great deal of information can be gathered that might have been more challenging to extract via interview alone.

**Behavioral Diagnosis**

Once medical problems have been investigated and addressed, the behavioral reasons for the unacceptable elimination should be pursued. There are two large diagnostic categories that should be considered marking behavior and inappropriate elimination (Fig. 1). Within each of these categories, a more specific diagnosis may be achieved based on underlying motivations.

**Marking**

Marking is done with the intention of communication rather than to void the bladder/bowels. Although deposition of urine and deposition of feces have both been described as methods of marking, urine marking is the predominant form of marking seen in the domestic cat. The classic marking cat is one that backs up to a vertical surface with the tail held vertically and twitching while emitting a spray of urine on the vertical target. The back feet of the cat may be treading during this activity, and the eyes are often half closed. Cats may also mark by depositing urine on a horizontal surface from a squatting position. With both vertical and horizontal marking, a small quantity of urine is typically deposited rather than a full bladder voiding. Both male and female cats can engage in urine marking, but male cats are more likely to exhibit the behavior. In one study of feral cats dwelling in an outdoor location, urine marking tended to occur along well-traveled paths instead of the territory perimeter, suggesting that the intent of the mark may not be to deter intruders but to provide individual and temporal information. In the home, urine marks are usually found in socially significant areas, such as near windows or doors or on items that have the scent of a particular person and/or animal. The substrate under the cat’s feet (eg, carpet, tile, linoleum) while the cat is depositing the mark does not seem to be important. This is in contrast to cats with inappropriate elimination, which often exhibit a pattern of similar substrate choice for deposition of the urine/feces (Table 1). Sexual status, social status, territorial disputes, arousal, and anxiety can all influence the likelihood of urine marking.

**Elimination Outside the Litter Box**

In contrast to marking, elimination is about evacuating the contents of the bladder and/or bowels. The cat chooses an
elimination spot other than the litter box for this activity. The natural posture for voiding the bladder/bowels is the squat; therefore, the depositions are usually found on horizontal surfaces. Because the objective is to evacuate the bladder/bowels, a large quantity of urine and/or a pile of feces is usually observed. Aversions or preferences are often the underlying motivation for a change in elimination spot. Common litter box aversions include inadequate litter box cleanliness, litter box location, litter box size, litter substrate, and litter box type. Common preferences include location and substrate preferences. It is common to find that the cat returns to either a certain location or a particular type of substrate (eg, always on carpet) for its inappropriate elimination. Many cats still use the litter box for some elimination. It is important to recognize that there may be different initiating and maintenance factors for this behavior. For example, a cat may elect to eliminate on the carpet when the litter box gets dirty (litter box aversion caused by inadequate cleanliness). Even when the owners clean the litter box, however, that cat may continue to eliminate on the carpet because it now has a location and/or substrate preference.

### Treatment

#### Marking

Once a diagnosis has been established, treatment can be properly targeted. The first treatment consideration for cats that urine mark should be neutering/spaying the offending cat. Although neutering/spaying can significantly decrease urine marking, it does not always control this normal communication behavior. In one study, approximately 90% of male cats significantly reduced or stopped urine marking after neuter surgery.\(^{14}\) Other surgical interventions are not usually performed to treat urine marking; however, two techniques, bilateral ischiocavernosus myectomy and olfactory tractotomy, have been described in the literature as effective at reducing or controlling urine marking\(^{15,16}\).

Because the frequency of urine marking increases when the population of cats increases, restricting the number of cats in a given household or area may help to prevent or treat the problem.\(^{3}\) Although population reduction may help, most owners are unwilling or unable to do this because of pet attachment and/or lack of control of the feline population.

If an underlying stressor can be identified, it should be modified or removed. Stressors can vary widely from the addition of a new baby to a change in the owner’s work schedule. A thorough historical profile can help to elucidate potential stressors. Agonistic social interactions between resident or visiting cats is often a contributing factor to marking and should be addressed. A survey by Borchelt and Voith\(^{17}\) reported that 70% of cohabitating cats had an occasional fight and that more than 80% swatted/hissed at each other. A simple step to decrease social stress includes the creation of an “environment of plenty” in multicat households. This involves providing an abundance of resources so that two cats never are forced to cross paths to get to a valuable resource. Valuable resources for cats include single cat-sized resting perches, food, water, and litter boxes. In households with multiple cats, it is important to use vertical space to help create a larger relative living space. This is easily done by installing shelving at different vertical heights or cat trees with multiple perches around the home (Fig. 2). If there is an offensively aggressive or “bully” cat in the household, that cat can be fitted with a belled collar to give the other cats advanced warning as to that cat’s movements, allowing them to avoid the bully if they so desire. Periodic segregation of cats in a multicat household may also help to decrease social tension. The facial pheromone Feliway (Veterinary Product Laboratories, Phoenix, AZ) has been shown to decrease stress in clinical settings; thus, treatment in the home may also have beneficial stress-reducing properties.\(^{18}\) For more serious social conflicts, complete segregation with gradual reintroduction may be necessary. If a cat that dwells indoors only is getting upset by viewing outdoor cats through the windows, remotely activated pet deterrent devices like the Scarecrow (a motion-activated sprinkler, Contech Electronics, Victoria, B.C., Canada) can be placed in the yard to deter visitor cats.

#### Table 1 Characteristics of Marking Versus Inappropriate Elimination

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<tr>
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<th>Marking</th>
<th>Inappropriate elimination</th>
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<tr>
<td>Posture</td>
<td>Stand or squat</td>
<td>Squat</td>
</tr>
<tr>
<td>Quantity of urine</td>
<td>Small</td>
<td>Medium to large</td>
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<tr>
<td>Litter box use</td>
<td>Normal</td>
<td>Reduced or absent</td>
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<td>Location</td>
<td>Socially significant</td>
<td>Acceptable substrates</td>
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![Figure 2](image-url) Multiple vertical perches help to create an environment of plenty in multiple cat households.
Alternately, the indoor cat’s view of visitor cats can be blocked by closing shades or putting poster board on the lower part of the window.

A study examined the effects of environmental management on the frequency of urine marking.19 Forty-seven cats exhibiting vertical urine marking were enrolled in the study. Owners collected baseline frequency of urine marking for 2 weeks without making any changes in home management. Owners were then given instructions to clean urine-marked spots with an enzymatic cleanser (Anti-Icky-Poo; Mister Max Quality Products, Lakeside, CA) for 2 weeks. Additional instructions included providing one litter box per cat plus one additional litter box, scooping the box daily, and changing the box weekly. The number of urine marks recorded during the baseline phase (11.7 ± 1 marks) was significantly higher than the number of urine marks recorded during the environmental management phase (9.7 ± 1.3 marks). This indicates that environmental management should be considered as part of the treatment for feline urine marking.

Encouraging other forms of marking behavior such as bunting (facial rubbing) and scratch marking should be part of the treatment plan for the urine-marking cat (Fig. 3). The facial pheromone Feliway is applied to the environment on previously urine-marked spots and/or prominent locations on a daily basis until bunting is observed. There have been variable results reported with this treatment, with some of the better results suggesting an 80% to 90% success rate.20 Even if lower efficacy is more realistic, it is still a valuable treatment option with no apparent negative side effects. One necessary caution is to avoid applying Feliway when treating with cleansers, because the pheromone may be altered by the cleansing product. To encourage scratching marking, scratch pads or posts should be placed in prominent locations around the house (Fig. 4).

Drug therapy can be considered for the treatment of urine marking in cats. Drug therapy has a history of being used to help control urine marking, and recent studies have furthered our knowledge about the most successful treatments.21-24 To date, there is no US Food and Drug Administration (FDA)-approved drug therapy for the treatment of urine marking in cats; thus, off-label treatment should be discussed with owners before instituting therapy.25 For many

Figure 3 A cat exhibiting bunting where the facial pheromone Feliway was sprayed.

Figure 4 Cat using a scratching pad for visual and scent marking.
years, progestins (megestrol acetate) were used as a treatment for urine marking in cats. Low treatment efficacy, serious side effect profiles, and better drug options have rendered progestins nearly obsolete, however. Benzodiazepines, although often effective, also had problematic side effect profiles as well as the potential for abuse and caused acute hepatic failure in some cats. Serotonin-enhancing medications are currently the most promising class of drugs in the treatment of urine marking. Several studies have been conducted to evaluate treatment efficacy of the serotonin-enhancing medications; however, to date, most of the studies are not designed with a rigorous double-blind placebo-controlled model. The exception to this was a double-blind placebo controlled study evaluating the efficacy of fluoxetine (Prozac) dosed at 1 mg/kg/d in the treatment of urine-marking behavior in cats. Seventeen cats completed the study, and there was a significant reduction in the weekly number of vertical sprays in the cats in the drug group compared with the cats in the placebo group. All the cats receiving the drug experienced a greater than 90% decline in urine marking. Other clinical trials that have not employed a double-blind placebo-controlled model have looked at the efficacy of clomipramine (Clomicalm, Anafranil) and buspirone (Buspar), and they indicate efficacy at controlling urine marking. Other serotonin-enhancing medications like paroxetine (Paxil) are also being used to treat urine marking; however, aside from positive anecdotal reports, data are currently lacking on their efficacy. Side effects are always a concern when instituting drug therapy, and some of the more frequently reported side effects are noted in Table 2. It is important to remember that the full extent of side effects may not yet be identified because of the lack of large-scale controlled clinical trials.

Complementary medicine may also offer some treatment options for urine marking, such as acupuncture or naturopathic remedies. Once again, clinical data are lacking to support efficacy, but future studies may elucidate treatments.

### Elimination Outside the Litter Box

The treatment for elimination outside the litter box focuses on two main components: identifying and providing the cat with its “ultimate” litter box and making inappropriate target spots unattractive or unavailable. The diagnosis should help to direct treatment. For example, if the cat was diagnosed with house soiling because of inadequate litter box cleanliness, providing a scrupulously clean litter box is indicated in the treatment plan. If the issue seems to be a location preference, however, identifying and providing the cat with a litter box at or near the preferred location would be the first course of action.

Because most cats prefer clean boxes, it is always appropriate to discuss litter box hygiene with owners. They should...
offer adequate litter boxes; a general rule is to offer the same
number of boxes as there are cats plus an additional box.
These boxes should be scooped at least once daily and
dumped and washed with soap and water on a routine basis.
If the cat is using a clumping or absorbent litter, washing the
box once every 1 to 4 weeks should suffice. If the cat is using
a nonclumping/nonabsorbent litter, washing weekly is sug-
gested. Some cats require more frequent cleaning, and others
are less particular. It is suggested that the owners smell the
box for residual odor after washing and dry the litter box,
because plastic retains odors and needs periodic replace-
ment.

Litter preferences vary between individual cats; however,
in studies, most cats prefer unscented and finely particulate
litter material as is typical of the clumping type litters com-
pared with other litter options.29 Large particulate matter is
generally not preferred by cats. To help determine the attrac-
tiveness of the new silica (“pearl”) litters, a preference study
was conducted on shelter cats.30 Fifty-four shelter cats were
given two novel litter options (clumping and pearl) for a
12-hour overnight period, and use was recorded. A total of
74 uses were recorded: 58 (36 urination/22 defecation) were
in clumping litter, 13 (11 urination/2 defecation) were in
pearl litter, and 3 (1 urination/2 defecation) were out of the
litter box. These results suggest that most cats prefer a clump-
ing type litter compared with silica litters for elimination. To
determine a particular cat’s preference, a litter box cafeteria
can be set up. The cat is offered a selection of litters, and
preference is identified by use (Figs. 5-8). In challenging
cases where no commercial litter seems to be accepted by the
cat, offering nontraditional options, such as cloth baby dia-
pers, carpet, newspaper, or sand, can sometimes result in
treatment success. If the cat can be attracted back into the box
with these nontraditional “litters,” if the owner desires, he or
she can try to add a commercial litter to the nontraditional
litter gradually.

The litter box cafeteria can also be used to identify type
of box preference (Fig. 9). In most cases, covered litter
boxes are discouraged because they trap odors and are
small and owners may be less likely to scoop routinely
(“out of sight is out of mind”). Box size may be an undera-
preciated cause of litter box aversion. Many boxes are
considerably smaller than the cat, perhaps resulting in
discomfort or awkwardness in posturing for elimination
(Fig. 10). Large plastic storage boxes or plastic kiddie pools
may make good alternative litter boxes for large-sized cats.
Novel box types intermittently hit the market, often de-
signed to reduce the need for owner scooping/cleaning.
Although they may be a solution for some cats, they should be fully investigated for potential drawbacks, such as mechanical problems, size, and noise associated with automatic cleaning machinery.

Inappropriately soiled spots should be well cleaned. One study showed that enzymatic cleansers did the best job at removing urine odor, at least to the human nose. Professional cleaning or replacement of soiled items is often necessary to remove residual urine odor completely.

Making inappropriate target spots unattractive or unavailable is best instituted after the owner has started to pursue the quest for the ultimate litter box; otherwise, the cat may just select an alternative inappropriate location. Ideas for making target spot(s) unattractive include the placement of double sided sticky tape, an upside down vinyl runner (nub side up), aluminum foil, heavily scented potpourri, or ultrasonic deterrent devices at the inappropriate spot(s). There are unlimited possibilities to make a location unattractive, but the welfare of the animal should always be a priority.

For households where it is difficult to make chosen locations unavailable or unattractive, or for cats that seem to have a problem during specific periods, confinement to a smaller area with a litter box cafeteria may be necessary. With consistent litter box use, freedom can then be gradually restored.

Drug therapy is generally not indicated for cats that eliminate outside their litter box. An exception to this may be the cat that is too frightened or anxious to use the litter box, perhaps as the result of a particularly negative experience when using the box or a social conflict with other cats in the household. Exhausting other management options is suggested before resorting to drug therapy in elimination cases, because many cats respond without medi-
cation. For example, if the cat had a particularly negative experience in a box, try offering the cat another box with different attributes (e.g., different style of box, different location of box), because this may overcome the negative box association. The cat with social conflicts may benefit from creating an environment of plenty, because it then does not have to cross the path of another cat to get to the litter box.

It is important to note that punishment is not a recommended treatment for elimination problems. Correct application of punishment requires that it be delivered during or immediately after the behavior occurs and every time the behavior occurs and that it be efficacious at inhibiting the unwanted behavior without hurting the animal. Because it is unlikely that any of these criteria can be met, punishment does not solve the problem and may even intensify it.

**Summary**

Although challenging at times, managing cats with elimination issues can be rewarding. The frustration in management of these cases is often a result of the lack of a proper diagnosis and random treatment application. A systematic approach to these cases should help to achieve treatment success. Also, new information should lead to further advancements in treatment.

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