

Thinking outside the box: feline elimination

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Summary Feline elimination problems are the leading behavioral complaint of cat owners. When presented with a feline elimination problem there are three main diagnostic categories: medical problems, marking or toileting problems. It is important to first perform diagnostic tests to rule out and/or address underlying medical issues and all feline housesoiling patients should receive a comprehensive physical examination. When the elimination problem persists after a medical problem has either been ruled out or remedied, a behavioral diagnosis should be obtained. The primary distinction that must be made in a behavioral diagnosis is whether the cat is engaging in marking behavior or selecting a spot other than the litterbox for elimination (a toileting problem). The motivation for urine marking may be territorial behavior or anxiety/stress whereas toileting problems are often triggered by medical causes, aversions, preferences or anxiety. Marking animals should be neutered and additional treatment measures may include reducing conflict and stress in the environment. Drug therapy has been long used to help control urine marking and recent studies have furthered our knowledge about the most appropriate treatments. Treatment for toileting problems should focus on providing an attractive litterbox while reducing the attractiveness or accessibility of inappropriate target spots.

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Introduction

Feline elimination problems are the leading behavioral complaint of cat owners when they consult referral behavioral practices. As with any presenting problem, it is important to first arrive at a diagnosis before implementing treatment. When presented with a feline elimination problem there are three main diagnostic categories: medical problems, marking or toileting problems.

Elimination in cats and kittens

The queen stimulates the kittens to eliminate by licking the perineum until about 5–6 weeks of age (Beaver, 1980/1992). Then kittens naturally seek out sand-like material for elimination purposes. An

adult cat without elimination problems will use the litterbox on average 5 times per day (Crowell-Davis and Sung, 2000). Urine marking is considered a normal communication behavior in both male and female cats. Sexual sterilization drastically reduces the incidence of urine marking (Hart and Barrett, 1973).

Diagnostics

It is important to first perform diagnostic tests to rule out and/or address underlying medical issues. Medical problems that could be involved in an elimination problem encompass a wide range of diseases including pathology of the bladder, gastrointestinal tract, endocrine system and musculo-skeletal system. All feline housesoiling patients should initially receive a comprehensive physical examination.

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If the cat is urinating inappropriately, the diagnostic work-up should include:

- Urinalysis via cystocentesis
- Urine culture and sensitivity
- CBC and chemistry panel (+thyroid in older cats)
- Imaging (radiographs, ultrasound)
- Endoscopy to evaluate lower urinary tract when indicated

If the cat is defecating inappropriately, the diagnostic work-up should include:

- CBC and chemistry panel (+thyroid in older cats)
- Rectal exam with anal gland evaluation
- Fecal floatation
- Additional tests on feces as indicated
- Radiographs when indicated
- Colonoscopy when indicated

History

A complete history is essential for the proper diagnosis and treatment of feline elimination problems. The history should include the information about: the frequency and pattern of elimination or marking (e.g., number of episodes per week; only when owner goes out of town); locations (e.g., cat only sprays near one window); substrates (e.g., cat only eliminates on carpet); elimination behaviors (e.g., whether the cat digs prior to elimination, tries to cover elimination); litterbox history (e.g., type of litter, any changes in litter, type of box, location of box); corrections and cat's response to corrections (e.g., the owner yells at the cat and the cat hides under the bed); social environment and history (e.g., a new cat in the neighborhood; a new baby in the family); cleaning strategies; diet history (e.g., type of food, feeding schedule and any dietary changes) and a medical history.

All of the historical information is valuable and important, however, it is extremely important to ask questions about litterbox cleanliness and social interactions. In addition to asking the client how often they scoop the litterbox, the client should be specifically asked how often they dump, wash and replace the litterbox with new litter.

Social interactions between cats can often be one of the precipitating factors for urine marking or toileting problems. A cat may avoid the litterbox because he gets attacked when he attempts to use the litterbox or is trapped after using the box. This cat may just develop a safer elimination area (toileting problem). Alternatively, a cat that lives in a hostile environment may start urine marking secondary to territorial issues/anxiety. The client should be carefully questioned regarding relation-

ships between animals and for signs of covert tension such as staring and overt tension such as hissing, growling and fighting. Since social tension between cats may be very subtle and therefore missed by owners, first-hand observation of the cats or detailed questioning may be necessary to properly assess the social atmosphere in multi-cat households.

Behavioral diagnosis

When the elimination problem persists after a medical problem has either been ruled out or remedied, a behavioral diagnosis should be obtained. The primary distinction that must be made in a behavioral diagnosis is whether the cat is engaging in marking behavior or selecting a spot other than the litterbox for elimination (a toileting problem).

The motivation for urine marking may be due to territorial behavior or anxiety/stress (reactionary marking). Urine marking is a normal behavior that is considered unacceptable in our homes. About 10% of prepubertally castrated male cats and 5% of prepubertally spayed female cats show problem urine marking (Hart and Cooper, 1984). Territorial marking behavior may be stimulated by multiple cats sharing a common living area, breeding season or the arrival of new cats into a territory. Situations that evoke anxiety or stress in a cat such as the addition of a new family member or a dramatic change in work schedules, may also lead to urine marking.

Toileting problems are often triggered by medical causes, aversions, preferences or anxiety. Any disease that causes polyuria may result in a cat urinating outside the litterbox because of the frequency or urgency associated with elimination. Geriatric cats with arthritis may have problems associated with access to the litterbox. For example, the arthritic cat may have trouble climbing over the edge of a high-sided litterbox.

Litterbox aversion is a common cause of inappropriate toileting. Cats are known for their fastidious nature. Therefore if the litterbox is dirty, cats will often choose another, cleaner, spot to eliminate. Each cat will tolerate a different level of litterbox cleanliness. However, in a cat whom you suspect litterbox aversion, the litterbox should be kept scrupulously clean. In addition to litterbox cleanliness, other aspects of the litterbox environment can result in litterbox aversion including the location of the box, the style of the box and the brand of litter.

Preferences may involve substrate preferences and location preferences. When a cat develops a

substrate preference it is selecting a substrate (e.g. carpet) that is more pleasing to the cat than the substrate that the owner is providing in the litterbox. If the historical information suggests that the cat is always choosing a certain substrate for elimination then this possible cause should be explored more carefully.

Finally, anxiety is sometimes the cause of inappropriate elimination. Cats that have been ambushed by another household pet when previously using the box may be nervous about placing themselves in that situation again. A cat that is uncomfortable with the presence of a new boyfriend or infant in the house may be too anxious to walk past those new family members to access the box. In both of these examples, the cat has developed a litterbox aversion due to social anxiety.

To discern between the two main behavioral diagnoses of urine marking and toileting problems there are several diagnostic criteria. Marking is a communication tool that often involves urine sprayed on vertical surfaces or small puddles of urine deposited on horizontal surfaces with special social significance. One tends *not* to see a particular pattern of substrate use, in fact the urine is often found in areas with different substrates underfoot. Inappropriate defecation is rarely involved. The cat continues to use the litterbox for both urination and defecation and there is no evidence of litterbox avoidance. Social problems between cats are often present with urine marking.

In contrast, the cat with a toileting problem usually deposits significant quantities of urine and/or feces on horizontal surfaces. A substrate-use pattern is often identified. For example, the cat always targets a certain type of carpet. The cat shows avoidance of the litterbox and decreased or absent usage of the litterbox. Historical collection may reveal a pattern of inappropriate litterbox cleaning, box type, litter type or box placement.

Treatment for urine marking

In some situations where the culprit is unknown, you may need to identify the culprit(s) so that the treatment is targeted at the correct cat. Confinement may help to identify the guilty cat. Alternatively, the fluorescein dye test can be used. Place six large (9 mg fluorescein/strip) fluorescein dye strips in a gelatin capsule and give orally to cat. The cat will eliminate bright yellow–green fluorescent urine for 24 h after administration when viewed with a fluorescent black light (Hart and Leedy, 1982). Since untreated urine will also fluoresce, the

owner must become familiar with normal fluorescence so they can appreciate the enhanced fluorescence. Be aware that the fluorescein treated urine may be visible to the naked eye on certain fabrics. Since urine acidity can affect fluorescence, there may be false negatives with this test.

To identify the culprit of inappropriate defecation, shavings of different colored non-toxic crayons can be added to the food of each cat. For example, in a two-cat household, Cat A can be given purple crayon shavings and Cat B green crayon shavings. If the feces deposited on the carpet has green crayon shavings in it, Cat B is a confirmed participant.

Marking animals should be neutered. Ninety percent of intact males show a significant decrease in marking behavior after castration (Hart and Barrett, 1973). Since estrus female cats show an increase in urine marking, ovariectomy will minimize this marking.

To treat urine marking the clinician should be trying to reduce conflict and stress in the environment. Stray cats and neighborhood cats should be discouraged from entering the territory of the resident cat. For example, if the owner feeds stray animals in the yard, this should be discontinued. The owner may need to block the view from windows if their cat is aroused by the presence of other cats outside the home. If there is tension between cats in a household, the cats may need to be separated for time periods during the day or one cat may need to wear a bell so that the other cat can avoid interactions. An “environment of plenty” should be created in multiple cat households. This involves creating multiple feeding areas, multiple elimination areas and multiple single cat sleeping perches at different vertical heights throughout the home. Positive interaction time (e.g. playing with a toy, grooming) should be spent with each cat on a daily basis.

Adequate environmental management of soiled areas and litterboxes may help to reduce marking. The UC Davis Behavior Service examined the effects of environmental management on the frequency of urine marking (Pryor et al., 2001a). Forty-seven cats exhibiting vertical urine marking were enrolled in the study. Owners collected baseline frequency of urine marking for two weeks without making any changes in home management. Owners were then given instructions to clean urine marked spots with an enzymatic cleanser (Anti-lcky-Poo™, Mister Max Quality Products 1-800-745-1671 in the USA) for 2 weeks. Additional instructions included providing one litterbox per cat plus one additional, 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 implemented as part of the treatment for feline urine marking.

If there are only a few target spots then the owner can attempt to make those areas aversive by covering them with aluminum foil, placing upside down contact paper (sticky side up), placing vinyl carpet runner (nub side up) or potpourri at the sites. Alternatively, the cats' food and water can be placed at the soiled site after proper cleaning. The owner should be cautioned that making the areas aversive may just result in the cat choosing another location to mark.

Other forms of marking such as bunting (facial marking) and scratch marking should be encouraged. To encourage scratch marking, scratching posts and/or pads should be placed around the home, with the highest concentration in areas where the marking is occurring.

Feliway, a synthetic analog of the feline facial pheromone, may have a role in encouraging feline facial marking. The extent to which this kind of marking—or that associated with scratching and interdigital glands—may be associated with urine marking is unknown and unexplored. It has been proposed that there are three principal functions of facial pheromone: (1) spatial organization, (2) relationships with other cats, and (3) emotional stabilization (Pageat and Gaultier, 2003). As part of this mechanism of action it is assumed that cats will not urine mark in locations where they have previously performed facial marking. Data to test this hypothesis are lacking, although the few studies that have been done are discussed here. Feliway is also thought to increase emotional stability and thereby decrease urine marking.

Treatment requires that the facial pheromone is sprayed directly on places soiled by the cat and also any prominent locations in the environment. A daily application is necessary until the cat is noted to exhibit facial rubbing on the site. If the cat does not exhibit facial rubbing, then daily application to the environment should be continued for one month.

Efficacy of 96.7% has been reported for eliminating recent onset (less than 3 months duration) urine marking with Feliway in a clinical trial involving 61 cats (29 castrated males, 22 spayed females, 9 intact females and 1 intact male) (Pageat and Gaultier, 2003). Environmental treatment with

Feliway was enacted for 28 days and then the cats were monitored for signs of relapse for an additional 21 days after treatment had ceased. It was noted that most cats had significant decreases in urine marking after 7 days of treatment with Feliway (Pageat, 1996).

White and Mills (1997) performed a similar study examining the effectiveness of Feliway in treating 57 cats with chronic (greater than 4 months duration) urine marking. After 35 days of treatment with Feliway the owners reported a decrease in urine marking in 91% of the cats. 57% of the cats did not exhibit any urine marking during the last 7 days of the trial.

Hunthausen (2000) reported the results of using Feliway in an open label fashion to treat urine marking. Fifty-seven households were included in the study. The mean number of urine marks per week prior to treatment with Feliway was 13.9. After 4 weeks of daily treatment with Feliway the mean number of urine marks 2.9/week, a significant decline in number of urine marks. Although the overall number of urine marks decreased, two-thirds of the households continued to experience some urine marking.

Frank et al. (1999) reported that while Feliway appeared to possibly play a role in helping to decrease marking behaviors in some cats, pharmacological and behavioral intervention were required for true improvement in their study of spraying cats.

Feliway has recently been released in another form, that of a plug-in diffuser. The Feliway diffuser is plugged into a standard electrical outlet and provides a constant slow diffusion of the pheromone into the environment. The plug-in should last for about a month and covers 500–650 square feet. A double-blinded, placebo controlled trial sponsored by the manufacturer was conducted to evaluate the efficacy of the plug-in diffuser in the treatment of vertical urine marking in multi-cat households (Mills and Mills, 2001). Compared to a baseline week, the cats receiving the Feliway plug-in diffuser had a greater reduction in frequency of urine marking than did the cats in the placebo plug-in group.

In summary, pheromonal analogues may be a useful component of an integrated treatment program. They do not seem to be as efficacious as traditional pharmacologic solutions, but new studies may elucidate social scenarios in which they may best act. Also, because they are thought to facilitate social interactions, complete evaluations of the behavioral interactions should be investigated.

Table 1 Medications useful in feline urine marking

| Examples of drugs used to treat urine marking/spraying | | | | |
|--|--------------------------|--------------------------------|---|--------------------|
| Drug | Drug class | Feline dose | Side effects* | Cost/month in US\$ |
| Buspirone, Buspar | Azapirone | 0.5–1.0 mg/kg po q. 12–24 h | Increased intercat interactions with some propensity for agonistic outcomes (10%) | \$50 |
| Amitriptyline, Elavil | Tricyclic antidepressant | 0.5–1.0 mg/kg po q. 12–24 h | Sedation, anticholinergic effects | \$4 |
| Clomipramine, Anafranil | Tricyclic antidepressant | 0.5 mg/kg po q. 24 h | Sedation, anticholinergic effects | \$13 |
| Fluoxetine, Prozac | SSRI | 0.5–1 mg/kg po q. 24 h | Inappetence, mild lethargy | \$10 |
| Paroxetine, Paxil | SSRI | 0.5–1.0 mg/kg po q. 24–48 h | Urinary and fecal retention, mild lethargy | \$20 |
| Cyproheptadine, Periactin | Antihistamine | 0.25–0.5 mg/kg po q. 12 h | Sedation, increase in appetite, dry mouth | \$5 |
| Diazepam, Valium | Benzodiazepine | 0.2–0.4 mg/kg po q. 12–24 h | Acute hepatic failure (rare); sedation | \$5 |

*Partial list of potential side effects.

Drug therapy has been long used to help control urine marking (Table 1). However, to date, no drugs have been licensed by the FDA to treat urine marking in cats. Recent studies have furthered our knowledge about the most appropriate treatments. Lately, the concentration of experimental efforts has been using the serotonin enhancing drugs to manage urine marking. Prior to instituting drug therapy a physical examination, complete blood count, chemistry panel and urinalysis should be conducted on the cat.

Although there is anecdotal information about the efficacy of amitriptyline, there are no published controlled studies documenting its efficacy. One limiting factor when using amitriptyline is the extremely bitter taste, making it difficult to orally administer the medication. Another drawback to treatment with amitriptyline is the significant sedative side effects. Owners are often unhappy with the “drugged” appearance of their pet while taking this medication.

Clomipramine has received attention as a possible treatment for urine marking in several independent studies and the results have been promising. Although none of these studies have employed the “gold-standard” double-blind placebo controlled protocol, they make attempts to account for bias. Dehasse (1997) published a paper in investigating 23 vertical urine spraying cats. All cats were put on a placebo (5 days)–drug (7 days)–placebo (3 days) trial with the owner being blinded as to what phase of treatment the cats were receiving. During the drug phase (clomipramine 5 mg/cat once daily) the average

number of urine marks per day dropped significantly from the first placebo stage (first placebo stage average number of urine marks=2.16 marks/day; drug phase average number of urine marks=0.49 marks/day). Eighty percent of the cats had a significant (>75% reduction in urine marking) during the drug treatment phase. Of those, 35% completely ceased urine marking during the treatment phase.

A study by Landsberg (2001) examined the effects of clomipramine dosed at approximately 0.5 mg/kg once daily on vertical urine marking in cats. The treatment duration was one month. Twenty-one of 25 cats enrolled in the study had a significant (>75%) reduction in urine marking during treatment with the medication. The remaining four cats showed a 50–75% reduction in urine marking. Side effects reported included lethargy, decreased appetite, stool and urine retention and decreased affection. There were no changes in blood or urine parameters comparing pre-treatment to post-treatment samples.

Kroll and Houpt (2001) performed a double blind crossover study in eighteen client-owned cats evaluating the comparative efficacy of clomipramine (5 mg/cat/day) versus cyproheptadine (2 mg/cat/day) in the treatment of urine marking. Treatment with clomipramine was significantly more efficacious in reducing/resolving urine marking than was treatment with cyproheptadine.

A double-blind placebo controlled study evaluating the efficacy of fluoxetine (1 mg/kg/day) in the treatment of urine marking behavior in cats was presented by Pryor et al. (2001b). Seventeen cats

completed the study and there was a significant reduction in weekly number of vertical sprays in the drug group (8.6 marks per week pre-treatment to 1.4 marks per week while receiving drug) as compared to the placebo group (no change in average number of urine marks between pre-treatment and treatment phase).

A recent prospective double-blind, positive control trial using either fluoxetine or clomipramine to treat urine marking in cats showed no difference in efficacy between the two drugs in the first 8 weeks of treatment (Tynes et al., 2002). At 16 weeks of treatment the cats receiving the fluoxetine showed significantly greater reduction in urine marking than cats receiving clomipramine.

The recommended route of administration for the medications discussed above is oral. Although transdermal gels are gaining popularity for ease of administration, little is known about actual absorption rates and pharmacokinetics of medications administered transdermally. Such factors could differ dramatically between oral and transdermal routes.

If a medication is effective at controlling the urine marking, it should be continued for an additional 2–4 months. Then one can attempt to wean the cat off the medication over 2–4 weeks via dose reduction or reduction in frequency of dosing. If there is a relapse in marking during the weaning process, return to the lowest effective dose and maintain treatment for another 2–4 months before attempting to wean the cat again (Overall, 2001). Some cats require long-term treatment to control the problem behavior and they should receive regular (every 6–12 months) physical exams and laboratory evaluations.

Treatment of toileting problems

The treatment for toileting problems should focus on providing a very attractive litterbox while reducing the attractiveness or accessibility of inappropriate target spots. The soiled areas should be cleansed with an enzymatic cleanser. Sometimes the cat will have to be confined away from areas in the house where s/he has chosen to eliminate. Alternatively, those soiled areas can be made aversive with plastic, upside down contact paper, aluminum foil, food, etc. If the cat has chosen one or two areas in the house to eliminate, the new attractive litterbox should be placed at those locations. If the cat uses the box, it can gradually (1 inch per day) be moved to a more appropriate location, if necessary. If anxiety is associated

with the inappropriate elimination, anxiolytic drug therapy may be instituted. However, in most cases of toileting problems, drugs are not necessary or indicated for successful treatment.

Educating clients about proper litterbox cleanliness is imperative. Boxes should be scooped at least once daily, preferably twice daily. The frequency of complete litterbox changing (dump, wash with soap and water, fill with new litter) depends on the type of litter, the number of cats and the individual cat(s). However, a minimum cleaning schedule involves changing clay litters weekly and scoopable litters once every other week.

The minimum number of litterboxes in a home should equal the number of cats plus one. The litterboxes should be the correct size. For example, a 16 lb. cat will need a jumbo-sized litterbox. Uncovered litterboxes are preferable to covered boxes because “out of sight is out of mind” and owners will often forget to clean the covered boxes. The litterboxes should be placed in easily accessible locations around the home.

It may be beneficial to identify the favorite litter by conducting litter trials. Cats are offered a choice of litters and the litter that is preferentially chosen is then used in the boxes. One study (Borchelt, 1991) showed that unscented, finely particulate matter (“clumping” or “scoopable”) litter is preferred by most cats. To help determine the attractiveness of the new silica (“pearl”) litters a preference study was conducted on shelter cats (Neilson, 2001). Fifty-four shelter cats were given two novel litter options (clumping and pearl) for a 12-h overnight period and usage 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 litterbox. These results suggest that most cats prefer a clumping type litter compared to pearl litters for elimination. Identification of a favored location or box style can also be determined by giving the cat multiple options. Finally, owners should be cautioned against disturbing the cat when it is using the litterbox. Owners should not attempt to give medications when the cat is using the litterbox. Children and other pets should not be allowed to harass the cat when it is using the litterbox.

With both marking and inappropriate elimination, the owner should avoid punishing the cat when soiled areas are discovered. If the animal is caught during the event, the owner can use a startle technique to stop the behavior, but realize that this will not solve the problem.

Conclusion

Although getting the cat back into the litterbox is challenging, it is possible. The cat should have a complete historical evaluation and physical examination. After a diagnosis is made, a rational therapeutic plan can be pursued. Veterinarians should be providing preventative educational information to clients during the initial kitten visits to help avoid the development of these problem behaviors.

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