DOMESTIC CAT BEHAVIOUR PROBLEMS

House-soiling Problems in Domestic Cats

Trudi Atkinson

CABI

House-soiling Problems in Domestic Cats

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About the Author

Trudi qualified as a veterinary nurse (VN) in 1986 and worked in general mixed practice for 17 years. Her work as a VN led to an interest in companion animal behaviour, a subject that she went on to study at the University of Southampton. In 1999 she was accepted as a full member of the Association of Pet Behaviour Counsellors (APBC) and gained accreditation as a Certificated Clinical Animal Behaviourist (CCAB) in 2003.

She was initially accredited as a clinical behaviourist for both dogs and cats. However, because cats have always been her preferred interest, in more recent years she has concentrated solely on the behaviour of domestic felines.

She is a founder member of the Fellowship of Animal Behaviour Clinicians (FABC) and served on the main committee during the organization's formation and launch. She retired from all clinical and committee work in 2021 and now concentrates solely on writing and working with International Cat Care on their feline behaviour and nursing courses.

Trudi's first book, *Practical Feline Behaviour*, was published by CABI in 2018.

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Introduction

Cats are one of the world's most popular companion animals (PFMA, 2022), and it is not difficult to see why. Not only are they visually and tactually attractive to us (Borgi and Cirulli, 2016) they can also provide an important source of companionship and emotional support (Stammbach and Turner, 1999).

However, house-soiling by domestic cats is a problem that can be highly disruptive to the cat/human relationship and is one of the most common behavioural issues for which cat owners and caregivers seek help from veterinary professionals and behaviourists (Denenberg *et al.*, 2005). It is also a common reason why healthy pet cats are relinquished or even euthanized (Patronek *et al.*, 1996; Salman *et al.*, 2000; Casey *et al.*, 2009).

What is House-soiling?

House-soiling is *the deposition of urine and/or faeces within the home, in a location that is undesirable for the owner or caregiver, regardless of purpose, cause or contributory factors*.

In other words, whenever a cat passes urine and/or faeces in the home in any area that the cat's owners or caregivers consider undesirable, this comes under the term of house-soiling; no matter if the urine or faeces is deposited by the animal for eliminatory or marking purposes, and irrespective of underlying cause.

The term 'inappropriate', as in 'inappropriate urination or defaecation', is sometimes used to describe incidents of house-soiling, especially when referring to episodes of eliminatory house-soiling (as opposed to marking behaviour). This is also indicative that the location used by the cat is regarded as unacceptable. However, there is a problem with this description in that house-soiling can only be 'inappropriate' from the human perspective. The use of the term 'inappropriate' might also imply that the animal is intentionally acting 'inappropriately' and is therefore at fault – a suggestion that is not just incorrect, but one that could further harm the cat/human relationship. There are

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many reasons for feline house-soiling but doing so purposely 'out of spite' or for any other anthropomorphic reason is simply beyond a cat's cognitive ability.

Having the ability to understand the animal's perspective and being aware of potential underlying causes and contributory factors greatly increase the chances that feline house-soiling problems can be avoided, and when problems already exist increase the prospect of successful treatment or management.

The aim of this book, therefore, is to explore and to explain the many and various reasons why domestic cats urinate or defaecate in the house in areas other than in litter trays, and to provide advice on how such problems might be prevented and correctly addressed when they do occur.

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1 Normal Elimination and Elimination Behaviour

For the first few weeks of a kitten's life urination and defaecation can only occur when the kitten is stimulated to do so by the mother cat licking the kitten's ano-genital region. Voluntary elimination develops at around 3–4 weeks of age and the response to perineal stimulation disappears at around 5 weeks of age (Thor *et al.*, 1989). At around the same age kittens start to play and dig into loose substrate material and elimination will often follow (Borchelt, 1991).

It is debatable as to what role the mother cat plays, but research has shown that kittens do copy the mother cat's behaviour (Chesler, 1969). This might not have much influence on the general behaviour of digging and eliminating in a loose substrate, which is likely to be innate, but it is possible that learning where to dig and eliminate is acquired by observation of the mother's behaviour (Villeneuve-Beugnet and Beugnet, 2018).

As long as the mother cat reliably uses a litter tray and both the mother and her kittens are provided with sufficient and appropriate litter trays and litter substrate, early 'house-training' of kittens can, in many cases, be a fairly simple and easy process. Kittens that have become accustomed to using a litter tray while with the breeder will therefore arrive at their new homes 'ready house-trained'. The only requirement of the new owner/caregiver is to offer their new charge equally sufficient and appropriate litter trays and substrate provision.

However, this is not always the case. Some kitten owners can have great difficulty in house-training their new pet, and house-soiling problems that develop later in life are far from uncommon (Beaver, 2003).

Environmental factors, past learning and experience, as well as the cat's physical health can all be influential factors causing a cat to choose to eliminate in areas other than those considered appropriate by the owner or caregiver. And changes to normal elimination behaviour can be one of the first indicators that something is wrong with the cat's health, environment and/or general welfare.

It is important therefore to know what is physically and behaviourally normal. This knowledge can help a practitioner, cat owner or caregiver to recognize developing problems, or to identify underlying causes when a house-soiling problem already exists.

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Urination – What is Normal

There are two common postures that cats adopt to expel urine from the bladder: a squatting position, which appears similar to a normal sitting position, but with the back end raised slightly off the ground and with the tail extended horizontally behind the cat (Fig. 1.1); or a standing position, with the tail raised vertically (commonly referred to as 'spraying') (Fig. 1.2).

The former is the usual stance when the purpose is to relieve pressure on the bladder, which is the behaviour we are most concerned with in this chapter. On the other hand, the latter is the more usual posture adopted when a cat is using urine as a form of marking behaviour. (For more detail on 'spraying' and other forms of marking behaviour, see Chapter 4, this volume.)

Fresh cat urine should be clear and pale yellow in colour with a slightly sour odour, although the urine of mature entire males often has a notably more pungent smell.

The amount of urine that is expelled, the number of latrine visits and the time spent passing urine can vary due to factors such as the size of the cat, its diet and the state of its health (see Chapter 2, this volume). Environmental factors should also be taken into consideration. For example, if a cat only has access to an outdoor latrine area and if access to that area is denied for part of the day, or if a cat experiences difficulty in accessing an indoor litter tray, then the length of time that the cat spends urinating and the volume voided are likely to be greater due to build-up of urine in the bladder. In a study by McGowan *et al.* (2017) it was also found that when a latrine environment and/or litter tray itself is suboptimal, cats are more likely to visit the litter tray significantly less often than when the environment and litter tray provision are both felicitous for the cat (see Chapters 3a and 3b, this volume).

Fig. 1.1. Normal urination posture. (iStock.)

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Fig. 1.2. 'Spraying'. (iStock.)

Another factor that needs to be taken into account when measuring the amount of urine passed and the amount of time a cat spends passing urine via squat urination, is if the cat is regularly urine marking (spraying). If so, it should be noted how often the cat 'sprays' and the approximate quantity of urine that is voided in this manner (see Chapter 4, this volume).

Defaecation – What is Normal

A squatting position is also adopted to pass faeces. This is different from the urination position in that the back is more rounded, and the perineum is held higher off the ground (Fig. 1.3).

Healthy cats will usually pass faeces once or twice daily, and often at approximately the same time each day. Slight or short-lived changes to this routine are rarely of any significance, but severe and/or chronic changes might be indicative of a possible health issue. However, as with urination, the time and frequency of defaecation can also be influenced by environmental factors.

The faeces of a healthy cat should be brown to dark brown (but not black) in colour and of a consistency that is not hard and dry or overly soft or watery, although a small amount of mucus is not uncommon. An unpleasant odour is normal, and most changes in odour are usually due to changes in the cat's diet.

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Fig. 1.3. Normal defaecation posture. (iStock.)

Digging and Covering

Most mammals do not cover their urine or faeces, but domestic cats are one of the few that do (Fig. 1.4). It is not fully understood why – it might be for hygiene reasons, possibly to help reduce parasite infestation or the spread of pathogens; or to reduce scent signals that could attract rivals or predators, although there is no conclusive evidence to support these theories.

Observers of feral and free-ranging cats report that when defaecations and squat urinations occur away from the core territory these are more likely to be left uncovered, whereas attempts to cover urine and faeces are more likely to occur when deposited within or close to the core area (Liberg, 1980; Panaman, 1981; Macdonald *et al.*, 1987; Feldman, 1994).

However, in a study by Sung and Crowell-Davis (2006) involving pet cats in a domestic environment, it was found that no matter how close to or far from the core area litter trays were located, the amount of time spent digging and covering was very much the same. But because all the cats in their study were housed entirely indoors, with all litter trays located within the house, it is unclear if the behaviour would be the same if the cats also had the opportunity to eliminate away from the house (for example in the garden). However, one interesting observation was that the cats using the litter trays positioned

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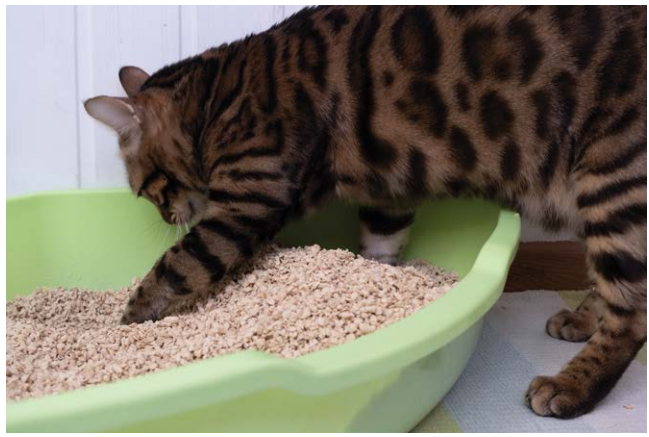

Fig. 1.4. Domestic cats are one of the few mammals that cover or bury their eliminations. (iStock.)

closest to their areas for eating and sleeping did engage in more sniffing of the litter tray after using it, possibly indicating that the strength of odours close to the core area is something that might be of concern or otherwise of importance to the cats.

Even so, it does appear that most domestic cats do cover or attempt to cover their waste when using an indoor litter tray. Mills and Munster (2003) in a study of 56 cats in a residential cattery found that when sufficient litter depth was provided, attempts were made to cover 93% of urine patches and 96% of deposited faeces. Likewise, in a recent simple survey of 229 cats that I recently conducted by questioning veterinary nurses on social media, I found that 91.5% of the cats were reported to routinely cover or attempt to cover eliminations.

My own survey also highlighted the following variations to the behaviour: 69.5% were reported to cover both urine and faeces; 17% covered faeces only; and 5% would only attempt to cover urine; while 8.5% were reported to never or very rarely cover or attempt to cover after eliminating.

In response to questions regarding digging or scraping prior to eliminating, 69% were reported to routinely dig. Of those, 49.5% would dig or scrape prior to both urinating and defaecating; 16% were said to dig only prior to defaecating; and 4% only prior to urinating; while 31% were reported to never or very rarely dig or attempt to dig into the litter substrate before urinating or defaecating.

Previous authors have reported that it is not uncommon for domestic cats demonstrating house-soiling behaviour to be less likely to dig or spend less time digging whenever they do use a litter tray (Horwitz, 1997; Overall, 1997; Sung and Crowell-Davis, 2006). A lack of or

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minimal digging might therefore be particularly relevant as a warning sign that house-soiling could develop if it is not already an issue.

A possible reason for this correlation in behaviours might be that any factor negatively influencing the cat's experience when using the litter tray, as well as being a deterrent to using the litter tray and so reducing the number of visits, might also reduce the length of time that the cat spends in the litter tray whenever it does use it.

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Feline Health and House-soiling

2

The possibility that house-soiling might be due completely or in part to a disease condition or other physical change must always be considered, especially if the behaviour is uncharacteristic, episodic or a recent development. However, undiagnosed and chronic conditions can also be linked to long-term behavioural change. Therefore, even if the house-soiling is a long-standing behaviour, the likelihood of a contributary medical problem should not be dismissed without veterinary examination.

Not all physical conditions have symptoms that are clearly evident to the owner or caregiver; veterinary examination and further investigation, if indicated, are therefore essential if the reason for the house-soiling is not initially obvious, or if there is no improvement after making basic environmental changes (see Chapters 3a and 3b, this volume).

Failure to recognize and correctly address physical conditions linked to house-soiling can not only significantly reduce the likelihood of a successful and long-term resolution of the behaviour problem but can also be severely damaging to the cat's health and overall welfare – especially as some associated medical conditions can be potentially serious, even life-threatening, without early diagnosis and treatment. Therefore, if a cat exhibits certain symptoms (as listed in Chapter 5, this volume) veterinary advice must be sought as matter of urgency.

The Links between Physical Health and House-soiling

Pain and discomfort

Context association

When an animal experiences acute pain it might not have the cognitive ability to understand that the source of the pain is internal. It can believe instead that the pain is linked to the context (i.e. the location, circumstances and surroundings)

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that it is in at the time. For example, a cat that experiences pain while it is in or close to the litter tray might associate the painful experience with the litter tray or with the location the litter tray is in. Even a single experience, if sufficiently severe, can cause a long-term aversion to the litter tray and/or the location.

If an association has been made only with the litter tray and not the location, the cat might continue to use the location but eliminate outside the litter tray. But if an association has also been made with the location, the cat is more likely to choose a completely different area in which to eliminate. If pain or discomfort is experienced repeatedly when eliminating, it is not unusual for cats to frequently change locations.

If the cat experiences pain only when urinating and not defaecating, it might continue to defaecate in the litter tray but choose to urinate elsewhere. Similarly, if pain is only experienced during defaecation the cat might continue to urinate in the litter tray but defaecate elsewhere.

Pain experienced while using the litter tray might also become associated with other external events or stimuli that occur or are present at the same time. This could include the presence of people and/or other animals, certain sounds, or even the time of day. This might explain why, when there appears to be no other reason, some cats will use a litter tray at some times but not others. However, the amount of pain or discomfort a cat experiences can also vary from day to day depending on the nature of the condition, which can be another reason for intermittent house-soiling.

Mobility issues

A cat might choose an alternative and more easily accessible location if it experiences pain, discomfort or difficulty when trying to reach the area where it is expected to urinate or defaecate. For example, a cat with mobility issues might soil elsewhere if available litter trays can only be reached by ascending or descending stairs (Fig. 2.1).

Similarly, getting to and then through a cat flap, or a partially open window, etc., can be difficult for cats with mobility problems. This can result in house-soiling if the cat is expected to eliminate outside and has no easily accessed indoor alternative. These cats are also likely to have a reduced ability to escape any threats that might be encountered away from the house, increasing their sense of vulnerability when attempting to eliminate outdoors (Fig. 2.2).

The size and shape of a litter tray can be another major issue for cats that suffer pain or difficulty associated with movement. Getting in and out of a high-sided or otherwise not easily accessed litter tray, for example one that only has an entrance/exit at the top, can be particularly uncomfortable and difficult for them. It is also important that the litter area is large enough to allow the cat

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Fig. 2.1. A cat with mobility issues might choose another area in which to eliminate if it is difficult or uncomfortable for them to reach the appropriate place: for example, if indoor litter trays can only be accessed by ascending or descending stairs. (iStock.)

Fig. 2.2. Cats in pain or experiencing mobility problems can also feel reluctant to eliminate outdoors because of an increased sense of vulnerability due to their reduced ability to escape from threats that might be encountered outside. (iStock.)

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to find the most comfortable position to eliminate. This can be very difficult if the area is too small or is an 'odd' shape. (More detailed information regarding litter tray design can be found in Chapter 3a, this volume.)

Excess volume or frequency of urination or defaecation

Short- or long-term house-soiling can occur when a cat suffers from a physical condition that results in the passing of urine or faeces more frequently and/or in larger quantities than normal.

Cats will generally prefer to use a clean litter tray. The more soiled it is, the less likely that the cat will want to reuse it, and the increased likelihood that the cat will eliminate elsewhere (Neilson, 2004). Some cats will refuse to reuse a litter tray if it contains *any* amount of urine and/or faeces, even if the quantity is very small and the surrounding litter substrate is clean (Ellis *et al.*, 2017). Frequent and regular 'scooping' of the litter tray is therefore essential. But if a cat is passing excessively large or frequent quantities of urine or faeces it can be far more difficult for an owner or caregiver to keep a litter tray clean (Fig. 2.3).

If a cat is frequently urinating or defaecating, it is also possible that it might be experiencing an urgent need to eliminate. Depending on the condition that the cat is suffering from, it might also be difficult or uncomfortable for the cat to retain urine or faeces. Unless the litter tray or outdoor elimination area is nearby when the cat experiences this sense of urgency, it might have little option than to eliminate in a more immediate location.

Fig. 2.3. Most cats prefer to use a clean litter tray. But it can be difficult for an owner or caregiver to keep a litter tray clean if the cat is passing excessively large or frequent quantities of urine or faeces. (iStock.)

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Reduction or alteration to sensory or cognitive abilities

Needless to say, a cat needs to be able to find its latrine area, whether it is the nearest indoor litter tray or access to outside. Any damage or reduction to the cat's senses or cognitive abilities can make this more difficult for the cat to achieve, and thereby be another possible contributory cause of house-soiling.

Disease Conditions Most Commonly Linked to Feline House-soiling

The conditions mentioned here are not an exhaustive list. Any condition resulting in the physical changes mentioned above could be an underlying cause or contributory factor to soiling within the home.

Diseases of the urinary tract

Feline lower urinary tract disease (FLUTD)

Feline lower urinary tract disease (FLUTD) is a blanket term for conditions affecting the bladder and urethra, the most common of which is *cystitis* (inflammation of the urinary bladder).

A cat with cystitis may demonstrate any, but not necessarily all, of the following symptoms:

- passing frequent small quantities of urine;
- unproductive straining;
- blood in the urine, or dark-coloured urine;
- vocalizing due to pain when attempting to urinate;
- excessive licking of the penis or vulva;
- over-grooming of the lower abdomen (Fig. 2.4); and
- urinating indoors in places other than the litter tray due to pain and/or a sense of urgency.

A cat showing any of the symptoms listed above must be examined by a veterinary surgeon as soon as possible. If cystitis is non-productive – in other words, if no or very little urine is being passed – this can be indicative of a possible urethral blockage, a serious and potentially life-threatening condition (see 'Kidney disease' section below).

It is not uncommon for episodes of FLUTD to recur, although bouts can sometimes be short-lived and self-resolving, lasting no more than a few days (Gunn-Moore, 2003). This can make it far more difficult to correctly identify

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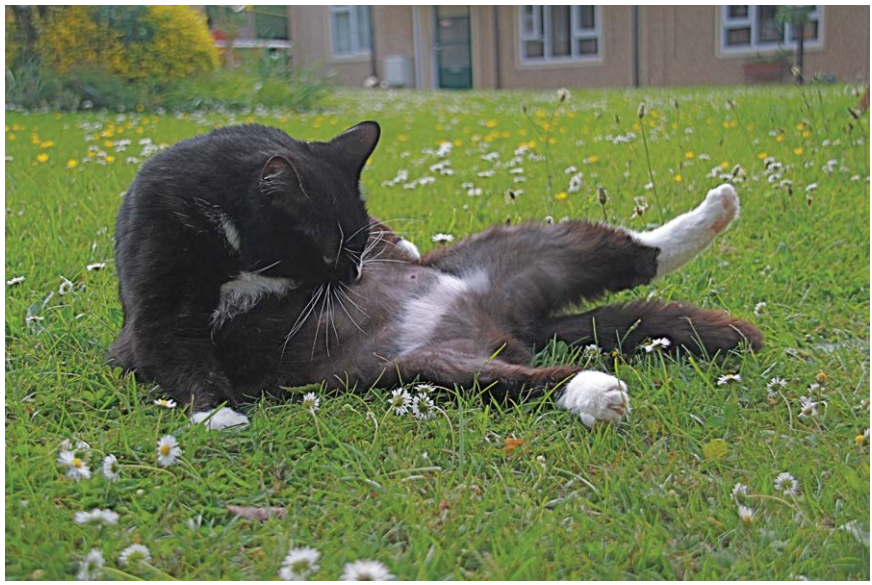

Fig. 2.4. Excessive licking of the penis or vulva and/or over-grooming of the lower abdomen can be signs of pain associated with feline lower urinary tract disease. (Courtesy of Celia Haddon.)

an underlying cause, which adds to the importance of veterinary examination as soon as symptoms are noticed.

Causes of cystitis include the following:

- bacterial infection;
- uroliths (stones) in the bladder and/or excess crystals in the urine;
- injury; and
- neoplasia (tumours).

However, in the majority of cases (> 50%) no physical reason for the condition can be found. This is usually referred to as *feline idiopathic cystitis*, *feline interstitial cystitis*, *sterile cystitis* or *stress-related cystitis*. There is an increasing trend towards referring to this condition as stress-related cystitis because of the increasing evidence of a link between this disease and the amount and type of stress experienced by affected cats (Buffington, 2004; Cameron *et al.*, 2004; Westropp *et al.*, 2006; Buffington *et al.*, 2014). Stress experienced in early life, or even before birth, appears to predispose some cats to suffer from this condition. Plus, episodes of stress throughout the cat's life can act as a trigger factor resulting in episodic bouts of the disease. However, bouts of FLUTD, due to any cause, do appear to be less common in older cats (Gunn-Moore, 2003).

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It is also not uncommon for cats suffering from a FLUTD bout to expel urine in a standing position as well as passing urine in a squatting position. One hypothesis for this is that a cat with a lower urinary tract disease might find it easier to pass urine in this manner. However, urine marking (spraying) by neutered cats is well recognized to be a sign that the cat is feeling insecure and/or threatened (see Chapter 4, this volume), so this might be yet another indication that the cat is experiencing significant levels of stress.

Because of the link between stress and FLUTD, understanding, identifying and correctly addressing sources of stress are therefore important and essential parts of treatment, especially if no other underlying cause of the condition can be found. Some common feline stressors are discussed in Chapter 5 (this volume). However, not all cats are similarly affected by the same stressors, and many are specific to each individual case. Therefore, especially if episodes of cystitis are severe or recurrent it is advisable that a full behaviour consultation is conducted, preferably by a fully qualified and experienced feline behaviourist.

Kidney disease

The primary function of the kidneys is to maintain and regulate bodily fluid and chemical content at a consistent and optimal level. When kidney function is reduced so that this can no longer be achieved, a cat can be said to be suffering from kidney disease. The term covers all stages of the disease from cases where there are no health concerns to those where the cat is suffering from severe health complications.

The terms kidney failure, kidney insufficiency, renal failure or renal insufficiency may also be used, although 'failure' is used less often nowadays due to advances in veterinary science which mean that even in severe cases, with treatment cats can often be successfully stabilized for prolonged periods, even years.

Kidney disease can be acute (occurring within 24 h) or chronic (present for more than 2 weeks).

Acute kidney disease can be caused by any one of the following:

- Poisoning. Common items that can cause acute renal disease in cats if ingested include:
  - lilies (all parts of the plant, including the pollen);
  - ethylene glycol (antifreeze); and
  - grapes or raisins.
- Reduction in the blood supply to the kidneys. For example, due to:
  - heart failure;
  - dehydration; or
  - injury resulting in blood loss.
- Failure of urine excretion. For example, due to:
  - urethral blockage; or
  - rupture of the bladder.

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Chronic kidney disease (CKD) is a progressive condition, meaning that it gets worse over time, but the speed at which the disease progresses can vary greatly from one individual to another, and depending on the nature of the disease.

Causes of CKD can be congenital; in other words, the cat is born with a condition that will sooner or later result in a reduction of kidney function. For example:

- polycystic kidney disease – an inherited disease common in Persians and related breeds;
- renal agenesis – being born with only one kidney; and
- renal dysplasia – abnormal development of one or both kidneys.

CKD can also be acquired. For example, as a result of:

- prolonged damage following acute kidney disease;
- inflammatory conditions;
- viral and bacterial infections; and
- cancer.

Clinical signs of kidney disease can vary. But the most common symptoms include:

- reduced appetite;
- lethargy;
- vomiting;
- halitosis (bad breath);
- polydipsia (increased thirst); and
- polyuria (increased urination).

It is normal for some loss of kidney function to occur as a cat ages. To allow for this most cats are born with superfluous kidney tissue, known as a 'functional reserve'. The downside of this is that the clinical signs of kidney disease are often not evident until more than two-thirds of the functioning kidney tissue has been lost. For this reason, routine health screening is recommended for older cats. Subtle signs such as slight increases in thirst or weight loss should also be taken seriously, especially in middle-aged to elderly cats, and veterinary advice should be sought as soon as possible.

The renal tubules are one of the most important functioning parts of the kidney. These are microscopic tubular structures of which there are approximately one million in each kidney. They act as a filtering system, removing waste products and toxins from the blood, which are then expelled in the urine. They also reabsorb water to prevent too much fluid being expelled from the body in the urine.

Polydipsia (excess drinking) and polyuria (excess urine production) are common symptoms of kidney disease because the renal tubules become less efficient at water reabsorption, which results in the cat producing large volumes of dilute urine. This excess water loss causes dehydration, which in turn increases the cat's thirst. The increased volume and frequency of urination can

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also result in house-soiling. *But, even if house-soiling is occurring, the cat must NEVER at any point be denied access to fresh water*. If the cat is not provided with enough fresh water or is unable to drink the amount of fluid it requires, this will result in increased dehydration causing even further damage to the kidneys.

(Caney, 2011)

Diseases of the digestive tract

Diarrhoea

Diarrhoea is the passing of very soft, liquid faeces. Because of the increased liquidity there is usually an increase in volume and frequency, and often a sense of urgency, all of which can result in episodes of house-soiling.

Diarrhoea can be acute or chronic and can originate from the large intestine, the small intestine or both.

Causes of diarrhoea include:

- Dietary:
  - scavenging;
  - dietary intolerance or sensitivity;
  - pica (the ingestion of inedible items); and
  - poisoning.
- Viral or bacterial infections.
- Intestinal parasites.
- Liver disease.
- Inflammatory bowel disease (IBD).
- Stress.

Veterinary advice should be sought for all cases of diarrhoea, but it must be considered an emergency if any of the following apply:

- severe and frequent bouts of very liquid diarrhoea;
- blood in the diarrhoea;
- black or very dark, tarry diarrhoea;
- extreme or unusual lethargy or depression;
- behaviour that indicates the cat might be in pain or discomfort (e.g. vocalizing while defaecating, reluctance to move); and
- if there is any reason to believe that the cat may have ingested anything toxic or inedible.

Constipation

Constipation might not appear to be an obvious cause of house-soiling, but it can be for the following reasons:

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- pain and discomfort when attempting to defaecate, which can become associated with the litter tray, causing the cat to choose an alternative location; and
- faecal incontinence as a result of constipation – a build-up of faeces can cause stretching of the rectum and anal sphincter allowing leakage of watery faeces.

Musculoskeletal pain and reduced mobility

Degenerative joint disease (DJD)

Degenerative joint disease (DJD) refers to any degenerative condition of the joints, all of which can potentially cause significant pain and reduced mobility which in turn can be linked to house-soiling.

Osteoarthritis (OA)

The most common DJD is osteoarthritis (OA), a disease that involves deterioration of the joint cartilage and underlying bone. OA is often incorrectly referred to as arthritis, but this is a broad term meaning inflammation of a joint (which in many cases does not occur with OA).

In cats OA most commonly affects the hip, elbow and stifle joints (Lascelles *et al.*, 2010). It can also affect the spine, when it is called spondylosis. Although a more common condition of older cats, OA can affect cats of any age (Clarke *et al.*, 2005; Lascelles *et al.*, 2010). The condition can be primary or secondary:

- *primary* – not associated with any other disease or injury; or
- *secondary* – linked to an existing pathology.

Common causes of secondary OA include hip dysplasia, previous traumatic injury of the joint and congenital conditions such as osteochondrodysplasia, a genetic mutation that causes abnormal development of cartilage. It is this condition that causes the folded ears of Scottish Fold cats and is present to some degree in all cats of this breed (Malik *et al.*, 1999; Bennett *et al.*, 2012) (Fig. 2.5).

OA is far more common in domestic cats than is generally thought, and many cats with OA remain undiagnosed. This is most likely because in many feline cases the disease affects the limbs equally on both sides, with the result that affected cats do not always show detectable signs of lameness (Lascelles *et al.*, 2010).

However, there are signs that can indicate a cat might be suffering from a DJD including OA. These signs include:

- a general reluctance or hesitancy to jump up on to or down from high surfaces;
- sleeping more and choosing to rest in more easily accessible locations;

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- 'bunny hopping' (moving the back legs together, rather than separately) when going downstairs;
- spending more time indoors (cats with DJD can feel more vulnerable to predators or feline rivals);
- hunting and/or playing less;
- using a scratch post or a scratch pad less, leading to overgrown claws that catch on carpets or other material;
- a reduced tolerance to being handled and/or during interactions with other household pets; and
- house-soiling due to increase difficulty and/or pain when attempting to access or use a litter tray or an outdoor elimination area (Bennett *et al.*, 2012).

Fig. 2.5. Scottish Fold cats are predisposed to osteoarthritis due to a genetic mutation that causes abnormal development of cartilage. (iStock.)

Endocrine disease

Hormones are chemical messengers produced in one part of the body and transported via the bloodstream to another part of the body where they activate or influence physiological activity. This is known as the *endocrine system*. An endocrine disease (or disorder) is when the production of a hormone is either too high or too low, or when the target organ does not respond to the hormone as it should. House-soiling episodes may be linked with the following endocrine disorders.

Diabetes mellitus

The raising of blood glucose levels after eating stimulates the secretion of the hormone *insulin* from an area of the pancreas known as the islets of Langerhans. The action of insulin is to increase the uptake of glucose into

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the cells, where it is metabolized to provide energy. Any excess is converted to glycogen and stored in the liver until required, when it is converted back to glucose. This process is disrupted when an individual has diabetes mellitus, resulting in continually raised blood glucose.

There are two types of diabetes mellitus (sometimes called 'sugar diabetes'):

- *type 1* – insufficient production of insulin by the islets of Langerhans; and
- *type 2* – resistance to insulin.

The constant high level of glucose in the blood forces the kidneys to produce more urine in an effort to remove the excess. Polyuria (excessive urination) is therefore a common symptom of diabetes mellitus, which can sometimes lead to house-soiling problems.

Other common symptoms of diabetes mellitus in cats include:

- increased thirst;
- increased appetite; and
- weight loss.

Diabetes insipidus

Although also given the initial title of 'diabetes', diabetes insipidus has nothing to do with blood sugar and involves the production and action of a different hormone: *antidiuretic hormone* (ADH). The action of ADH, which is produced by the posterior pituitary gland at the base of the brain, is to regulate the final concentration of urine in the renal collecting ducts before it leaves the kidney tubules and is emptied into the bladder ready to be expelled from the body.

There are two types of diabetes insipidus (sometimes called 'water diabetes'):

- *central* – a lack or an insufficient production of ADH by the posterior pituitary; and
- *nephrogenic* – the walls of the collecting ducts fail to respond to ADH.

Both types of diabetes insipidus cause a reduction in the amount of water that is reabsorbed back into the body, resulting in the production of large quantities of highly dilute urine. Diabetes insipidus is far less common than diabetes mellitus.

Hyperthyroidism

The hormones thyroxine (T4) and triiodothyronine (T3) produced by the thyroid gland target all body cells, where they play an important role in the regulation of growth and metabolism. An overactive thyroid gland (hyperthyroidism) is a common condition of older cats. Symptoms include increased appetite and weight loss, polyuria, and behavioural changes such as increased restlessness, agitation and anxiety. The increased urine output plus the behavioural effects of hyperthyroidism may lead to or contribute to house-soiling.

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Neurological disease

Depending on what part is affected and how, diseases of the nervous system can have notable effects on behaviour, motor and sensory functions.

Incontinence

Urinary and/or faecal incontinence is far less common in cats than it is in dogs but should still be considered in cases of feline house-soiling. Urinary tract disease and congenital disorders of the bladder or urethra can result in urinary incontinence, but the most common cause is acquired or congenital damage to the spinal cord (Lonc *et al.*, 2020).

An example of congenital damage is Manx syndrome. Due to a genetic mutation, Manx cats are born either with a very short tail (known as a 'Stumpy Manx') or with no tail (known as a 'Rumpy Manx') (Fig. 2.6). The same genetic mutation that causes a 'Rumpy Manx' can also inhibit development of the spinal cord. Affected cats can suffer from a number of painful and debilitating symptoms including both urinary and faecal incontinence (DeForest and Basrur, 1979).

Damage to the spinal cord resulting in incontinence can also be acquired via disease or injury. Incontinence can be a symptom of diseases such as feline dysautonomia, FeLV-associated degenerative myelopathy, degenerative

Fig. 2.6. Manx cats can be either 'Stumpy' (with a very short tail) or 'Rumpy' (with no tail), as seen here. The same genetic mutation that causes the lack of a tail can also affect the development of the spinal cord causing incontinence and other debilitating conditions. (iStock.)

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lumbosacral stenosis, intervertebral disc disease and neoplasia (cancer) of the spinal cord (Marioni-Henry, 2010; Thomas, 2018; Lonc *et al*., 2020). However, most of these conditions are fairly rare in cats.

A more usual cause of incontinence associated with spinal cord damage is traumatic injury. The most common of such injuries in cats is sacrocaudal luxation, more commonly known as a 'tail-pull injury' (Couper and De Decker 2020).

Cognitive dysfunction

Feline cognitive dysfunction syndrome (CDS) is a neurodegenerative disease of older cats that is similar to human dementia. House-soiling can be a common behavioural change associated with this condition, due to a breakdown in previous 'house-training', or because an affected cat can experience increased difficulty in being able to locate the litter tray or outdoor access.

Other signs associated with CDS include:

- confusion and anxiety;
- aimless wandering or pacing;
- spatial disorientation – getting trapped or lost in previously well-known locations;
- decreased awareness or response to stimuli;
- altered sleep and activity patterns;
- increased vocalizations that appear to have no purpose; and
- changes in relationships with others, such as increased attention-seeking or uncharacteristic aggression (Gunn-Moore *et al*., 2007; Landsberg *et al*., 2010).

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3a Providing the Ideal Elimination Area: Part 1 – Indoor Litter Trays

The majority of feline house-soiling problems arise because a cat is not happy with where it is expected to urinate and/or defaecate. If a cat perceives that an area or provision is unsafe, uncomfortable or in any other way insufficient or unsuitable, there is an increased risk that the cat will choose somewhere else to eliminate.

Understanding feline needs and preferences, reviewing what is currently on offer and making appropriate changes are important to prevent or to address house-soiling problems that already exist.

Unless a cat has year-round 24/7 unrestricted access to an outdoor space that meets all the cat's needs and requirements (see Chapter 3b, this volume), sufficient and suitable indoor litter trays *must* be provided.

How Many Litter Trays to Provide

The minimum recommended number of indoor litter trays to provide is one for each cat, plus one extra (Neilson, 2004). In other words, two litter trays should be provided in a single-cat household; three in a household with two cats; and four where there are three cats. However, in a multi-cat household with more than three cats, or where space is limited, this can be a difficult rule to follow. In such cases the aim should be to provide as many as practically possible and to ensure that those provided are in every other way optimal for *all* the cats in the household.

What are the reasons for this recommendation?

- Some cats will prefer to use one area for urination and another for defaecation (see 'Individual preferences' section below) (Carney *et al.*, 2014).
- Limitations on litter tray use and access for individuals can be affected by the social relationship between cats in a multi-cat household.

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The social relationship between household cats

A reluctance to share

The primary ancestor of the domestic cat (*Felis sylvestris lybica*) is a species with a predominantly solitary lifestyle. Despite the fact that our pet cats have evolved to be more social than their ancestor, they remain self-reliant, solitary predators – a factor that shapes not only their hunting behaviour but also most other aspects of their social structure, especially the sharing of resources, including the use of litter trays and other elimination areas. This can mean that even cats who are part of the same social group can sometimes be reluctant to share a litter tray (Fig. 3.1). When cats living in the same household do not regard themselves to be part of the same social group this reluctance to share is even more likely, a factor that can lead to house-soiling if an insufficient number of litter trays is provided.

Fear or anxiety

Although domestic cats have the ability to be social with other cats, this aptitude varies greatly between individuals and is influenced by several factors, including genetic influence and early experience with other cats. Therefore, it should never be assumed that all cats will automatically get along together simply because they are members of the same species. But unfortunately this is

Fig. 3.1. Not all cats in multi-cat households are happy to share a litter tray. (iStock.)

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not an uncommon assumption and, as household pets, cats very rarely, if ever, have any choice regarding which or how many other cats they are compelled to share their home with. This means that, sadly, many domestic cats live with other cats that they fear, consider as rivals, or are at best just about able to tolerate (Fig. 3.2). In these situations, cats may actively avoid using litter trays if they are in locations where they are likely to encounter other household cats.

Blocking

Where there is conflict or rivalry between cats living in the same household, it is not unusual for one or more cats to sit or lay in doorways, corridors or on stairs with the intention of blocking the others' access to important resources, which can include litter trays and access to outdoors. For this reason, it is not only essential that a sufficient number of litter trays is provided but also that they are positioned so that if access to one or more is blocked, there will aways be another available in a separate area.

The health of the cat

A cat's physical health can affect how frequently and/or how quickly it needs to use the litter tray, its ability to find or get to a litter tray, and how quickly

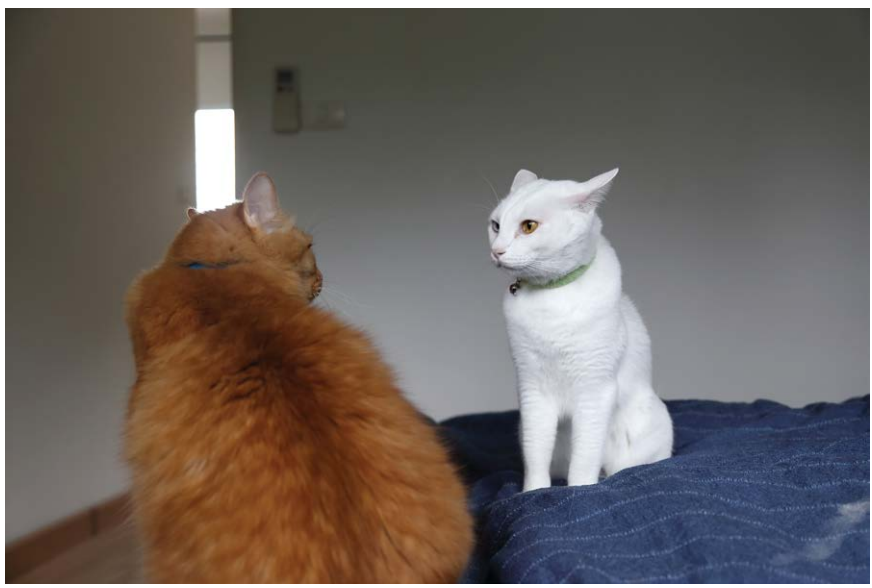

Fig. 3.2. Many domestic cats live with other cats that they fear, consider as rivals or at best are just able to tolerate. (iStock.)

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a litter tray will become soiled to the extent that the cat will no longer use it. In such cases additional litter trays in more areas will be required. (For more detailed information on feline health and house-soiling, see Chapter 2, this volume.)

The size and layout of the house

Additional litter trays might also be needed in larger houses or where there are multiple rooms and/or levels.

Individual preferences

Although many cats prefer separate areas for urination and defaecation, it is not unusual for cats to urinate and defaecate in a single location (i.e. in one litter tray). But it is possible that in such cases a cat might do so because it has no other option, or because the other options on offer are less suitable. If this is the case, there might be an increased risk that house-soiling could develop (if it is not already an issue). Therefore, it is advisable to offer a sufficient number of litter trays to allow for this. Or if other litter trays are available but are not being used by the cat, consider their suitability, and make appropriate changes.

Another issue can be individual preferences for different litter tray types and litter substrates. Additional litter trays might therefore be needed in multi-cat households to provide for each cat's individual predilections.

Access to other elimination areas

If a cat has unrestricted outdoor access this will provide at least one extra location (sometimes more); therefore, as long as the outdoor area is suitable, it might not be necessary to provide so many indoor litter trays. However, a sufficient number of litter trays must be provided whenever outdoor access is restricted or if, for whatever reason, the outdoor space becomes less attractive, threatening or difficult for the cat to access.

Positioning of Litter Trays

A cat is in a vulnerable position when it is urinating or defaecating, therefore it is important that litter trays are positioned where the cat feels safe and is unlikely to be disturbed.

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Areas to avoid

Close to, or within sight of, low windows or glass doors

If neighbouring cats, dogs, other animals or unfamiliar people can be seen through glass while the cat is using a litter tray, this can significantly increase the cat's sense of vulnerability and deter the cat from using the litter tray.

A householder can easily be unaware of this issue because they might never, or very rarely, see other animals in the garden or area surrounding the house. This is because neighbouring cats and wildlife are often less likely to venture close to the house during the day when the householder is at home but are more likely to be present at night or during the day when the householder is away.

If there is no other option than to place a litter tray close to, or within sight of, a glass door or window, the cat's sense of security can be improved by covering the lower one-third to one-half of the door or window so that the cat cannot see through the glass. However, this might be less acceptable to the human members of the household if the amount of light entering the home is significantly reduced, but a compromise can be made by using a temporary 'peel on peel off' window frosting film that will block the cat's view without reducing incoming light.

Using 'one-way' glass or film – which allows the house residents, including the cat, to see out while preventing other animals from being able to see in – is not recommended. This is because it is the sight of external rivals or potential predators that causes the cat to feel threatened, and if the resident cat can see out it will have no reason to believe that other animals cannot also see in.

'High-traffic' areas

Examples of 'high-traffic' areas are walkways and corridors, as well as areas close to frequently or moderately used cupboards, etc. If the cat is repeatedly disturbed while using the litter tray it is more likely to opt for a quieter location.

Close to household appliances

Cats have a highly sensitive sense of hearing and noises made by household appliances such as washing machines, dishwashers, etc. can be disturbing or even frightening for them. A cat will be less likely to want to use a litter tray that is close to anything it is not comfortable being close to.

Close to areas used by other household pets or children

Even if the cat gets along well with other pets and children, there is still a high risk that they might intentionally or unintentionally disturb the cat while it is using a litter tray.

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In areas where there is bright or harsh lighting

Because cats' eyes are designed to work most effectively in low light conditions, harsh or bright light can be less comfortable for them.

Close to, or within sight of, the cat flap or other entrances and exits

Where the cat enters or exits the house can also be viewed by a cat as a potential entry point for others from outside. Even if the cat does not use a particular entrance or exit itself, the increased presence of 'outdoor' scent in the area, plus the sight of human residents and visitors using the entrance might cause this area to be viewed by the cat as unsafe.

However, cats will sometimes target areas close to external doors, especially doormats, as an area to urinate and/or defaecate. If this is a doorway through which the cat is regularly let out, this might be a sign that the cat would prefer to eliminate outdoors but is unable to because the door is closed. Other possible reasons might be due to residual scent of feline urine or faeces being brought into the house on shoes and then being wiped on the doormat. This scent could either cause the cat to regard the doormat as a suitable latrine area; or, if the scent is from another cat, this might prompt the resident cat to use urine or faeces as a territorial marker (see Chapter 4, this volume).

Position litter trays away from other activities

Cats will usually prefer to eliminate well away from where they eat, drink and rest (Panaman, 1981; Carney *et al.*, 2014). It is therefore important to ensure a good distance or a barrier between litter trays, resting areas, and food and water dishes (Fig. 3.3).

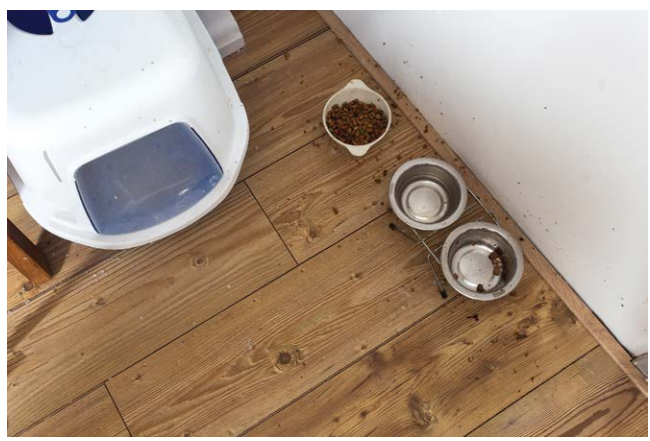

Fig. 3.3. The close proximity of other resources, especially food and water, can deter a cat from using a litter tray. (iStock.)

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Provide separate areas for urination and defaecation

As mentioned previously, it is not unusual for cats to prefer to urinate in one place and defaecate in another. But it is not sufficient to simply provide extra litter trays in the same location. This is because litter trays that are located next to or very close to each other are more likely to be regarded by a cat as a single elimination area. It is therefore best to position litter trays well apart from each other or with a physical barrier between them.

However, care must also be taken that the litter trays are not located too far apart. This is because the act of urinating might also stimulate the need to defaecate (and vice versa). If the cat is one that *does* prefer to use separate areas and the nearest other litter tray is in another room on the other side of the house, or on a different level, this might be too far away for the cat who might not have any other option than to defaecate (or urinate) in a closer location.

Provide quick and easy access

Litter trays should be quick and easy to find and to access. This is especially important for cats in the following circumstances:

- cats or kittens that are new to the home, or in an unfamiliar environment;
- kittens that might not yet have good bladder and bowel control;
- pregnant females that might need to urinate more frequently while also becoming less mobile as their pregnancy progresses; and
- cats with any underlying disease condition that increases urgency or makes finding or accessing a litter tray less easy (see Chapter 2, this volume).

Provide an increased sense of security

Like us, cats have forward-facing eyes, which provides them with binocular vision but poor lateral peripheral vision. In other words, they cannot see behind them and have limited vision to the sides (unlike prey species, which have eyes positioned more to the side giving them a much wider field of vision). Cats are therefore more likely to choose to eliminate in places where they can see what might be approaching them from the front, but where they have their back and preferably also their sides protected. This can be achieved by placing the litter tray against a wall or preferably in a corner (Fig. 3.4).

A cat will also feel more secure if it is fully able to make use of its senses so that it can be aware of any possible approaching threat. These senses can be supported by placing a litter tray in an area of minimal ambient noise and subdued lighting, which will allow the cat to make the best use of its senses of sight and hearing.

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Fig. 3.4. A litter tray in an ideal quiet and sheltered location, away from potential disturbances. (iStock.)

Litter Tray Design

Size

If given the choice, most cats will prefer to use a litter tray that is larger than many that are available commercially (Guy *et al.*, 2014). The standard recommendation regarding litter tray size is that it should be one-and-a-half times the length of the cat from the tip of its nose to the base of its tail (Carney *et al.*, 2014). So, as far as litter trays are concerned, the bigger the better and there are good reasons for this.

Cats needs to feel physically comfortable when using a litter tray. Not only do they need space to comfortably dig into the litter substrate and to cover their waste they also need to be able to achieve and maintain the most physically comfortable positions for urinating and defaecating (Fig. 3.5). Ample space to achieve this is even more essential for cats suffering from any pain or mobility issues (see Chapter 2, this volume). A large surface area is also necessary to allow the litter tray to be reused as much as possible – something that is especially important if it is not possible for the owner/caregiver to keep the litter tray as clean as possible by removing faeces and wet patches as soon as possible after they are deposited.

Shape

Cat litter trays are available in a variety of shapes and designs, including square, circular, oblong, triangular as well as the more usual rectangular. The

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most important factor is that the size, especially the length of the litter tray as described above, and the internal shape do not in any way prevent or impinge on the cat being able to use the litter tray comfortably. Many commercially available non-rectangular litter trays provide a relatively short length and often an overall smaller surface area; therefore, a rectangular shape is more likely to be the preferable shape for most cats (Fig. 3.6).

If the size or shape is not suitable, in order to use the litter tray as comfortably and as effectively as possible, some cats will adopt positions that are different from the normal urination and defaecation postures as

Fig. 3.5. A litter tray that is too small can be very difficult for a cat to use comfortably. (iStock.)

Fig. 3.6. The size and shape of litter tray preferred by most cats is rectangular and approximately one-and-a-half times the length of the cat (excluding its tail). (iStock.)

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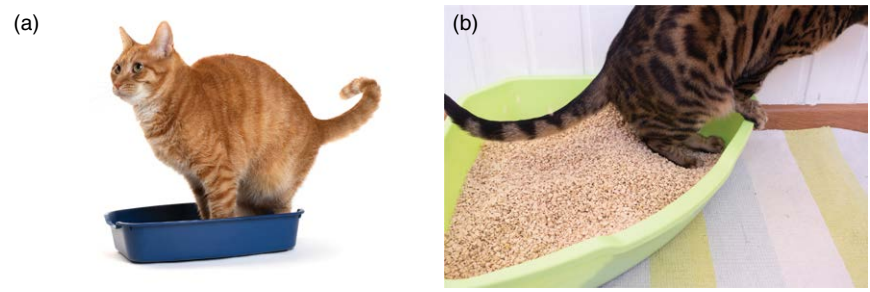

Fig. 3.7. (a, b) The adoption of atypical elimination positions is often seen when litter trays are too small or an unsuitable shape. (iStock.)

described in Chapter 1 (this volume). The most common of these atypical positions include standing or partially standing (usually to pass urine) and standing on the edge of the litter tray, but other 'odd' postures might also be seen (Fig. 3.7a and b).

Type

Automatic self-cleaning litter trays

An automatic self-cleaning litter tray can appear to be a good idea, especially in multi-cat households where it might not be possible to provide a sufficient number of litter trays and/or if it is not always possible to remove faeces and soiled patches as frequently as necessary, and there is no dispute that some cat owners and caregivers have provided these for their cats without any negative issues. However, it is wise to be aware of the potential problems that can be associated with the use of these devices:

- Most automatic self-cleaning litter trays are designed so that they should not activate while the cat is using the litter tray, or for a short time afterwards. But they can still activate when the cat is nearby or approaching. When this occurs, the sound of the motor and the movement can be highly disturbing, even frightening for some cats. This can be sufficient to deter the cat from using reusing the litter tray.
- The waste is usually deposited and stored in a compartment that is either beneath or to one side of the actual litter tray area. If this compartment is not emptied frequently and regularly cleaned, a build-up of odour from stored waste could also be sufficient to deter the cat from reusing the litter tray.
- To allow for the motor and/or the waste storage compartment, many automatic devices are fairly large but the surface area containing the cat litter is usually quite small; often much smaller than is preferred by most cats. For the same reason the entrances to these litter trays are sometimes

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raised off the ground, which can make access difficult for small cats or for those with mobility issues.
- Some of these devices can only be used with a particular type of cat litter. Problems might therefore develop if the type of cat litter is not one that is acceptable to the cat, or if the owner is not able to obtain the necessary cat litter.

Easy-clean litter trays

Easy-clean litter trays are designed to make the removal of faeces and urine easier and quicker for the owner/caregiver. There are a variety of designs, most of which use a grid for separating the waste from the unsoiled litter.

Type 1: A plastic tray with a grid-base sits on top of another tray with a solid base. A fine clumping litter is used. To clean the tray the grid is lifted up and shaken so that the clean litter falls through to the solid tray underneath while faeces and urine clumps remain in the grid section for quick and easy disposal.

Points to consider:

- These can only be used effectively with certain types of cat litter, which might not be preferred by the cat.
- The cat can catch its claws on the grid while digging or scraping (Fig. 3.8). This can be uncomfortable for most cats, and potentially very for painful for those with any form of DJD or injury.

Fig. 3.8. A common design of easy-clean litter tray involves the use of a grid that allows faeces and urine clumps to be easily separated from the clean litter. The main problem with this basic design is that cats can catch their claws on the grid. A better design is where a tray with a solid base is placed on top of the grid. (iStock.)

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- Because there is a gap separating the litter tray section from the solid base, using the litter tray might feel unstable and insecure especially for larger, heavier cats.

An improvement to this basic design is where two solid-based plastic trays are separated by the grid and the cat litter is placed in the top solid-based tray. To remove the waste, the top section is lifted out and the contents are manually poured through the grid with the same result that the clean litter ends up in the lower tray and the waste remains on the grid. This design can be far better for the cat for the following reasons:

- The base of the section used by the cat is smooth, so there is no risk that the cat will catch its claws on the grid when digging.
- It is not essential that the litter tray section is positioned on top of the grid and lower tray. The lower tray and grid can be kept separate until required and the tray in use by the cat can be placed directly on the ground, thereby providing the cat with a more solid and secure base.

Type 2: This design involves a covered litter tray with an integrated waste and clean litter compartment on the side. When the entire litter tray is rolled on to its side, heavier faeces and soiled litter tip into the waste collection section while the clean litter passes through a grid into the clean litter section.

Points to consider:

- This type might be more acceptable for cats that prefer to use a covered tray.
- The base of the area used by the cat is solid, therefore reducing the risk that the cat might catch its claws when digging or scraping. However, there is still a grid on one side. Many cats when using a covered litter tray will also scrape at the sides. Therefore, the risk that the cat might catch its claws still exists.
- To allow for the inclusion of the waste and clean litter collection compartment the whole thing is quite large, but the surface area of the actual litter tray is fairly small.

Covered or uncovered?

Cats can vary in their preference for using either a covered or uncovered litter tray. The cats in a study by Grigg *et al.* (2013) were equally divided regarding their preference, whereas in a later study (Beugnet and Beugnet, 2020) a preference for covered trays was demonstrated. However, in both studies the researchers found that it was actually other factors that appeared to be more influential in shaping the cats' preferences. In the first study it was the cleanliness of the litter substrate: the cats showing a significant preference for clean over soiled litter trays. In the second study it was the size of the litter tray: the

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cats preferring a covered tray with a larger surface area. It therefore seems that other factors might be more important to cats than whether a litter tray is covered or uncovered.

However, some cats do demonstrate a clear choice one way or another, which is likely to be a matter of individual preference, possibly linked to the cat's previous experience and its current circumstances. For example, a cat might feel more secure using a covered tray in situations where it feels exposed or at threat, whereas another cat might feel trapped and more at threat in the enclosed space of a covered tray, and therefore happier using an uncovered tray.

In most households the choice to provide a covered or uncovered litter tray will be that of the owner or caregiver rather than the cat's. As long as the cat does not have an obvious aversion to one or the other, and as long as all other factors mentioned in this chapter are taken into consideration and provided for, this should not increase the risk of house-soiling. However, there can be potential problems with the use of covered trays which are important to be aware of:

- It is less easy to see when a covered tray needs cleaning:
  - a soiled litter tray can be a major factor that can deter a cat from reusing it.
- Smells can become trapped, and their intensity increased, within a covered tray:
  - cats have a highly sensitive olfactory sense, and a strong build-up of odour can also be a deterrent.
- If the space inside a covered tray is not large enough, this can inhibit the cat from being able to achieve the most comfortable position for eliminating (Fig. 3.9).

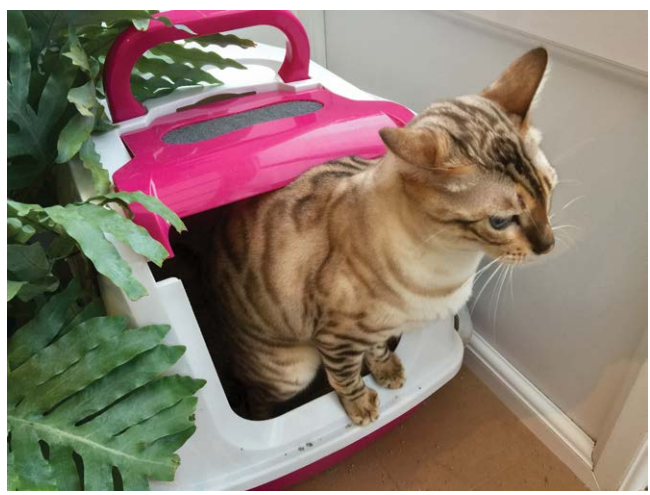

Fig. 3.9. Being happy or not to use a covered litter tray can be a matter of a cat's individual preference. If a cat shows any reluctance to enter a covered tray, or uses the tray as shown here, it might be happier if provided with an uncovered tray. (iStock.)

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- In a multi-cat household where there is tension between the cats, a cat might be at risk of being trapped inside a covered tray by another cat or of being ambushed when exiting the tray.

Top-entry litter trays

Top-entry litter trays are covered trays that have a hole at the top large enough to allow the cat to jump in and out. Some have other entrances/exits as well, but most can only be accessed and exited via the top opening.

Although this design might be accepted by young, healthy cats, if the cat has any degree of reduced mobility, which is not always clearly evident (see Chapter 2, this volume), it is likely to experience difficulty and discomfort when trying to enter or exit a litter tray of this design.

Other potential problems can arise if the litter tray is used or can be accessed by more than one cat. If there is only one entrance/exit this increases the risk that a cat using the litter tray might become trapped inside by another cat sitting on the top. There is also the risk that one cat might jump into the litter tray while another is currently using it. If this happens, as well as very possibly deterring both cats from reusing the litter tray, the event could also disrupt and severely damage the relationship between the cats (Fig. 3.10).

This design can be popular with cat owners and caregivers because it reduces or almost completely prevents the mess of cat litter being kicked out

Fig. 3.10. Top-entry litter trays are an increasingly popular design. However, they might not be easy to use for cats with reduced mobility and could also increase the risk of conflict between cats in multi-cat households. (iStock.)

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of the litter tray by the cat. But this issue can also be reduced or completely resolved by the use of a litter mat (see 'Accessories' section below).

Home-made litter trays

Adapting a large plastic storage box can be an easy, inexpensive and effective way to provide a cat litter tray. Home-made litter trays can also be tailored to an individual cat's needs (or to the needs of a multi-cat household).

- Use a rectangular storage box made of rigid, preferably opaque plastic. Choose a size that is most suitable for the cat (or cats) that will be using it. (Ideally one-and-a-half times the length of the largest cat excluding its tail.)
- If the cat, or cats, appear to prefer using an uncovered tray, a shallow storage box approximately 15–20 cm (6–8 inches) deep can be used. If all the cats that are likely to use the box are young and healthy without any mobility issues, no alteration should be necessary. But if a cat is elderly or has mobility problems, then cutting down one of the shorter sides of the box to allow easier access might be necessary (Fig. 3.11a).
  - Any part of the plastic that has been cut should be covered with strong plastic tape, or similar, to cover any sharp or potentially sharp edges.
- If it appears that a cat might benefit from an increased sense of security, a deep-sided storage box (at least 40 cm (16 inches) deep) can be adapted by cutting down one of the shorter sides to allow access. For most cats the high sides alone can provide a sufficient sense of security. Also, the open top allows an alternative escape route, if necessary, which can be very important in a multi-cat household (Fig. 3.11b).
- If a completely covered box is preferred, then the lid can be replaced. However, it is essential to first check that the box is deep

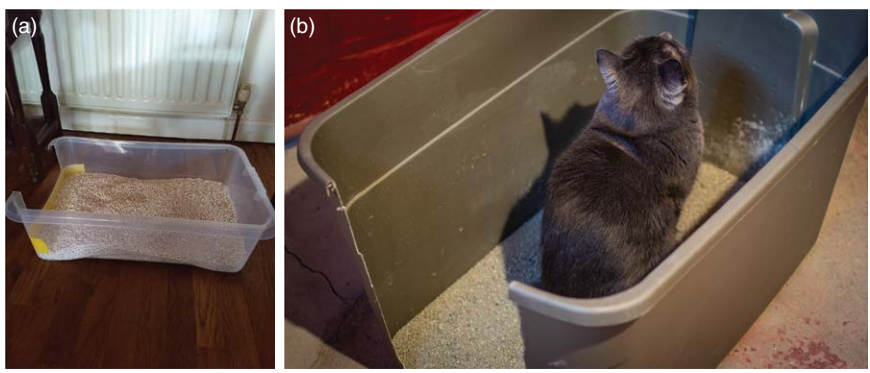

Fig. 3.11. (a, b) Examples of home-made litter trays. The high sides of a deep storage box can often be sufficient if a cat requires an increased sense of security. (Photo (a) courtesy of Lynne Taylor; photo (b) courtesy of Heather Alvey.)

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enough to provide the cat with sufficient head room when the lid is fitted, to allow the cat to use the litter tray comfortably.

Cat Litter

Cats need a suitable substrate into which they can dig and bury their waste. Sand or loose dry earth are the natural choices for most cats, but these can be messy and impractical to use in an indoor litter tray. Therefore, most cat owners and caregivers will prefer to provide their pets with a commercially available cat litter.

There is a wide range of different cat litters on the market, the majority are targeted towards the requirements of the cat owner or caregiver. But to reduce the risk of house-soiling it is best to provide the type that is preferred by the cat.

Factors that can influence litter preference

Early experience

The action of digging into a loose substrate and burying urine and/or faeces appears to be an innate behaviour (Borchelt, 1991). But where to do this and into what type of substrate, is something that is possibly learnt at an early age from observation of the mother cat or other adult cats within the social group. Early preferences for litter substrate might also develop due to what is available to a kitten during the sensitive period of its behavioural development (between 2 and 7–9 weeks of age). These preferences might then remain with the cat throughout its life.

Negative or positive experiences

All animals will tend to prefer something that has become associated with positive (good) experiences and avoid anything associated with negative (bad) experiences. This aspect of learning can apply to litter trays and litter preference as much as with anything else. In other words, a cat is more likely to prefer a type of tray or cat litter that it has frequently used comfortably and successfully over one that has become associated with negative experiences such as pain, discomfort or fear.

Cleanliness

The cleanliness of the cat litter within a litter tray can have a tremendous influence on a cat's choice to reuse the litter tray or eliminate elsewhere. Increased odour might be one deterrent (Carney *et al.*, 2014); however, in a study by Ellis *et al.* (2017) it was found that it was not so much the odour but 'objects' (e.g. faeces and/or urine clumps) within the litter that prevented reuse. This effect

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seems to be variable: some cats are deterred by the presence of very few or very small amounts of urine and/or faeces in the litter tray, while others are notably less 'fussy'. But without doubt the more 'objects' within a litter tray, the more a cat is likely to be deterred from reusing it, even if the surrounding litter substrate is clean (Fig. 3.12). Frequent and regular removal of faeces and soiled litter is therefore essential.

Depth

Cats also require a sufficient depth of cat litter to allow them to dig a hole prior to eliminating and then cover their waste. In a study by Mills and Munster (2003), 56 cats were each provided with two identical litter trays, one containing 1 cm of granular (fuller's earth) cat litter and one containing 3 cm of the same product. Although urinations were evenly distributed between the two trays, 96% of the defaecations were in the trays containing the deeper level of cat litter. Where the cats urinated and defaecated in the same litter tray, 23 did so in the deeper cat litter and only three in the shallower. The cats in the study were provided with 3 cm depth of cat litter, but an approximate depth of at least 4 cm (1.5 inches) is preferable. This also might need to be further increased for very large cats, or in multi-cat households where litter trays are shared.

Scent

Cats have a highly sensitive sense of smell that is far superior to our own olfactory abilities. Therefore, the scent of a cat litter is another factor likely

Fig. 3.12. It is very important to keep a litter tray clean. Some cats will refuse to reuse a litter tray if it contains any amount of urine and/or faeces, even if the quantity is very small and the surrounding litter substrate is clean. (iStock.)

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to influence a cat's willingness to use it. Scented litters – that is, those containing a scent that aims to mask the odour rather than reducing or containing it – are usually best avoided. This is because scents enjoyed by us might not be perceived in the same way by other species. For example, most people regard lemon or orange scent as clean, fresh and pleasant, whereas the majority of cats demonstrate a strong aversion to all citrus odours. Also, because of the cat's highly sensitive sense of smell, a level of scent that is pleasing for us might easily be overpowering and repellent for a cat.

Scent can also be a factor linked to previous or early experiences. If a cat has learned to associate the scent of a particular cat litter with comfort, safety and ease of elimination, it might prefer that cat litter over others – even those that might appear in other ways to be more suitable for the cat. Likewise, if a scent has become associated with unpleasant experiences, a cat might choose to avoid a cat litter which has that particular odour.

Texture and type

Granular Cat Litter: In a study by Villeneuve-Beugnet and Beugnet (2018), 17 out of 18 cats showed a clear preference for granular rather than pelleted cat litter. One reason for this increased preference might be because cat litter with a fine granular texture most closely resembles the natural substrates that cats encounter when they eliminate outside.

Pelleted Cat Litter: A major problem with cat litter made of compressed pellets is that it can be uncomfortable for a cat to walk on and dig into, especially for elderly cats or those with any form of joint disease or injury. However, some cats might still prefer this type of cat litter due to early or previous experiences.

Clumping Cat Litter: These litters form a 'clump' when wet, enabling urine patches to be more easily 'scooped' and removed. However, these clumps can stick to the base of the litter tray, with the result that some soiled litter might remain after scooping.

Odour Control: Odour control is a major selling point for some cat litters and litter additives, but it is debatable as to how important this is for the cat (Neilson, 2010; Ellis *et al.*, 2017). If the odour of urine or faeces is a factor deterring a cat from reusing a litter tray, then a cat litter or additive that limits odour can be a good idea. But we also need to bear in mind that cats have a sense of smell that is far superior to that of humans. Therefore, even if the odour is sufficiently reduced for us, it might not be so well reduced for the cat.

A potential issue with odour-control litters or additives, which might lead to a possible increased risk of house-soiling, is if the litter tray is cleaned less frequently due to the perception that reduced odour equates to less need for cleaning or regular removal of waste. Recent research, as mentioned previously, has found that odour might not be so important for cats than the amount

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of waste matter in the litter tray. Therefore, regular scooping and cleaning are still essential, even if odour cannot be detected or considered to be unpleasant.

'Cat-Attract' Litter: Cat litter and litter additives are available that are claimed to 'attract' cats and increase the cats' use of the product. Frayne *et al.* (2019) found that when offered the choice, cats urinated more in this type of litter compared with a similar plant-based litter not containing the attractant but found no difference regarding defaecation. However, only one other alternative type of litter substrate was provided for the cats in this study, so more research may be needed to assess the efficacy of these products.

Plant-based Cat Litters: Over recent years a number of plant-based cat litters have become available. The main selling points for these are factors that make them attractive to the cat owner or caregiver, such as sustainability and ease of disposal (some are advertised as being 'flushable'). But so far there appears to be no published scientific evidence regarding feline preference for these litters. Therefore, the possibility that the use of these cat litters could increase or decrease the likelihood of house-soiling is, as yet, unknown.

Accessories

Litter mats (aka cat litter trapping mats)

These are textured, usually rubberized, mats made to go underneath and cover the floor area around the litter tray (Fig. 3.13). The textured surface traps any litter that is kicked out of the tray by the cat while it is using it, plus any that is on the cat's feet as it leaves the litter tray – thereby effectively reducing cat

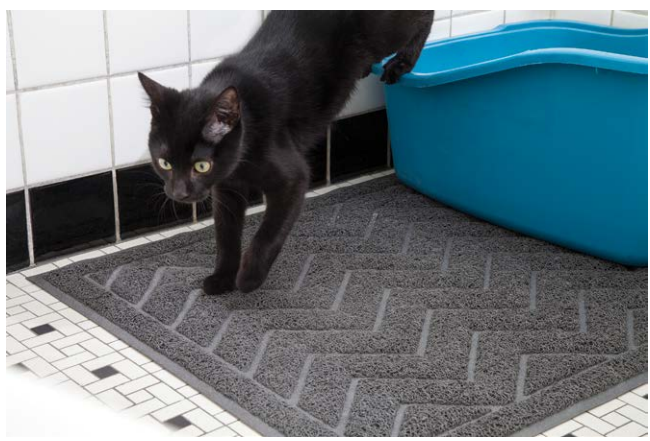

Fig. 3.13. The use of a 'litter mat' can be effective in reducing mess from the area close to and surrounding a litter tray.

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litter being deposited around the house by the cat after using the litter tray. However, the texture might be unusual for some cats, causing them to avoid walking on the mat and so, in turn, approaching and using the litter tray. It is important, therefore, to ensure that the cat has no concerns about walking on the mat. If the cat is wary, time should be spent gently encouraging the cat to approach and walk across the mat using favourite food treats and toys as lures, ensuring that the cat is accustomed and comfortable with the mat before it is put in place.

Litter tray liners

Liners placed in the base of a litter tray, especially plastic ones, are best avoided. A cat can catch its claws on a liner, which can cause sufficient discomfort to deter the cat from reusing the tray. Odour can also build up in absorbent liners unless they are removed and replaced frequently.

Litter additives

A variety of additives are available intended to either reduce or mask odours or to increase the cat's use of the litter (see sections on 'Cat-attract litter' and 'Scent' above).

External odour eliminators and air fresheners

Care should be taken to avoid any scents that could be unpleasant or overpowering for the cat, not only within the litter tray, but also in the surrounding area (see 'Scent' section above). Automatic, time- or motion-activated air fresheners should definitely be avoided. These can be particularly aversive for cats, because of the 'hiss'-like sound they usually produce along with the spray of perfume.

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3b Providing the Ideal Elimination Area: Part 2 – Outdoor Elimination Areas

There can be certain advantages in allowing or encouraging a cat to eliminate outside. For example:

- fewer indoor litter trays may be required, or might only be needed when the cat is unable or unwilling to venture outside;
- if indoor litter trays are used less frequently, they might not need scooping or cleaning so often;
- depending on the nature and the extent of the outdoor space available, the cat could have a far wider range of elimination areas to choose from; and
- outdoor access can also provide a cat with increased opportunity to engage in natural behaviours necessary for a good quality of life.

But there are also possible disadvantages that require serious consideration:

- if a cat eliminates outside, and especially if it is not provided with a suitable indoor option, the cat must have easy and unrestricted access to its outdoor elimination area(s) *at all times*;
- a cat might be, or it might perceive itself to be, at greater risk from rivals and/or predators when eliminating away from the security of the house, especially if the cat is elderly or has mobility issues;
- it can be very difficult, often impossible, to keep a check on the frequency, quantity and nature of the cat's urine and faeces, increasing the risk that disease symptoms might go unnoticed;
- parasites and other pathogens could be picked up from and spread to other cats via urine or faeces, as well as being a potential health risk to humans (Hill *et al.*, 2000); and
- the presence of cat urine and faeces in outdoor spaces used by people can be very unpleasant.

However, there are ways that these issues can be addressed.

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Fit a Cat Flap

A cat flap is the most effective and secure way to allow a cat the freedom to come and go whenever it needs to. To prevent the risk that other neighbouring cats might enter the house via the cat flap, it is advisable to fit one that can only be activated by the resident cat(s).

If the cat is microchipped, a microchip-activated cat flap can be the best choice for the following reasons:

- The locking device is usually strong enough to prevent most other cats from breaking in.
- The more advanced versions can be set to restrict a cat to one-way access for a set period of time, as well as allowing individual settings for each cat in a multi-cat household. This can be particularly useful if one cat needs to be kept indoors without restricting the movement of others. Some can also be controlled remotely via an app which also tracks how often, and in which direction (in or out), each cat is using the cat flap. If a cat urinates and/or defaecates solely or predominantly outdoors, this can be useful to highlight possible health issues if a cat is making more trips outside to eliminate than usual.
- The cat does not need to wear a collar:
    - Collars can be potentially dangerous for free-ranging cats due to the risk of the collar becoming caught up or entangled. Collars with safety release or 'break-away' buckles are therefore advisable if a cat is not microchipped and a collar is necessary to operate the cat flap. However, if the cat loses the collar, it also loses its ability to open the cat flap.

Where to fit a cat flap

- A cat flap can be an important escape route from real or perceived threats. Therefore, access must be easy from both indoors and outdoors. Elderly cats or those with mobility issues can also experience difficulty in using a cat flap that requires any degree of climbing or leaping up to reach it. This is something that should be considered, even when fitting a cat flap for a currently young and agile cat.
- The cat flap should be located well away from the cat's food dish, water, resting places and litter trays. Not only can the positioning of a litter tray close to a cat flap increase the risk of house-soiling as explained earlier in this chapter, but the placing of important resources such as food in sight of the cat flap can attract neighbouring cats that might attempt to enter the home via the cat flap.
- When venturing outside a cat is leaving the safety and security of home and going out into a world where there can be potential 'dangers' such as

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other cats or neighbourhood dogs, causing the cat to initially feel wary and vulnerable. Providing somewhere for the cat to hide for a short period of time before venturing further can help to make the cat feel more secure. A good way to do this is to position bushy, cat-safe plants (see 'Provide Safe and Secluded Outdoor Latrine Areas' below) close to the outside of the cat flap (Fig. 3.14). But be wary of placing large solid objects such as wheelie bins or other large containers nearby, as these can provide a potential ambush point for other cats.

Training a cat to use a cat flap

If a cat has never used a cat flap before, it will need to learn what it is and how to use it. If the cat flap comes with instructions on how to train the cat, it is often best to follow the manufacturer's instructions. But if no instructions are available:

- Start by allowing the cat to become accustomed to the cat flap before fitting it. Place the cat flap on the ground and place small, tasty food treats around it, to encourage the cat to approach and investigate. Always allow the cat to approach, don't move the cat flap towards the cat.
- Once the cat flap has been installed 'prop' it open or remove the flap, if possible.

Fig. 3.14. Fitting a cat flap can be the best way to allow a cat 24/7 outdoor access. Bushy (cat-safe) plants, etc. placed near the cat flap can help the cat to feel more secure when it leaves the house. (iStock.)

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- Encourage the cat through the gap in both directions using food treats, toys or fuss (whatever the cat enjoys most).
- *Never* push, pull or in any other way force the cat through the gap, as this is likely to frighten the cat and deter it from using the cat flap.
- Leave the cat flap propped open, or with the flap removed, and give the cat time to get accustomed to it.
- Once the cat is confident going through the open gap, drop down/replace the flap, and once again encourage the cat back and forth with treats, toys or fuss.

Provide Safe and Secluded Outdoor Latrine Areas

As mentioned previously, a cat is in a vulnerable position when it is urinating or defaecating and therefore it needs to do so in an area where it feels safe. Areas chosen by most cats to eliminate are usually partially hidden and in a position where the cat has a solid or not easily penetrable barrier behind it to prevent potential attack from behind, while still being able to see what might be approaching from the front. Such areas can be provided by planting bushy shrubs or large grasses around the periphery of the garden (Fig. 3.15a), although:

- *be very careful to only use plants that are safe for cats* (see https://icatcare.org/advice/cats-and-poisonous-plants, accessed 12 May 2022).

However, a cat might still feel at threat if it has no other option than to travel across an unprotected open space to reach the 'safe' area. This can be prevented by providing the cat with at least one route towards the safe area(s) where it will also be at least partially hidden or where it can access a number of elevated positions along the way (Fig. 3.15b).

Provide a purpose-built outdoor latrine

Having access to at least one purpose-built latrine can help to reduce the likelihood that the cat will eliminate elsewhere in the garden or in neighbouring gardens. It can also be easier to keep clean and allows regular checks to be made on the cat's health.

To construct a permanent latrine:

- Choose a safe location as described above, preferably in an area where the cat already eliminates.
- Dig a hole approximately 50–60 cm deep that is the same size or larger than advised for an indoor litter tray (see Chapter 3a, this volume).
- Line with plastic sheeting and fill one-third with pea gravel.

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Fig. 3.15. (a, b) Cats with outdoor access should be provided with places to hide among bushes, etc. and access to elevated areas. They are also likely to feel more secure eliminating in areas where they are partially hidden. (iStock.)

- Top up with playground sand or fine clay-free topsoil (avoiding any that might contain pesticides or any other chemicals):
  - Sand can become very dense and heavy when wet, which can make it difficult for some cats to dig into. Therefore, fine topsoil can sometimes be a better choice if the latrine site is not sheltered from rain.

Another alternative is to provide an outdoor 'litter tray' which can be easily relocated if necessary:

- Use a litter tray or larger-sized container that has holes or slats in the base for drainage. A low-sided wooden planter can be a good choice as these usually allow sufficient drainage and do not look unsightly or out of place in the garden.
- Fill to a depth of at least 13–15 cm with sand or fine topsoil.

For both options, remove soiled patches and faeces once a day and top up with fresh sand/topsoil as necessary.

If suitable and sufficient latrine sites are provided, the cat can be discouraged from using other areas by covering exposed soil with a layer of decorative slate, gravel or chipped bark.

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Regular Parasite Control and Veterinary Visits

If the cat has access to other people's land, or if other cats visit land where the cat is resident, then regular worming and treatment for external parasites (ticks and fleas) is important, along with regular veterinary examinations and vaccinations.

Feline infectious peritonitis (FIP)

Feline infectious peritonitis (FIP) is a typically fatal disease that can develop in some, but by no means all, cats infected with feline coronavirus (FCoV). Most cats infected with FCoV develop nothing more than mild to moderate diarrhoea, but in some the virus mutates and causes FIP.

FCoV is transmitted from one cat to another via infected faeces (it is not transmissible to humans) and is most commonly spread from one cat to another in multi-cat households or catteries where litter trays are shared (Hartmann, 2005). However, it is possible that an infected cat might pass the virus to neighbouring cats if it defaecates in an outdoor area frequented by other cats.

'Cat-proof' the Garden or Build an Enclosure

The only way that a cat can be guaranteed not to urinate or defaecate on other people's land is to physically prevent the cat from accessing other areas by effectively 'cat-proofing' the garden using specialist fencing or by building an outdoor enclosure (Fig. 3.16a and b).

Despite the fact that doing so is likely to restrict a cat's home range, in a study by de Assis and Mills (2021) a wide number of welfare benefits significantly improving a cat's quality of life were found to be associated with the installation of cat-proof fencing or enclosures. One of the most important is that this can significantly increase a cat's sense of security by reducing, or even, in most cases, completely preventing, aggressive or frightening encounters with neighbouring cats and other animals. This general increased sense of security should also make a cat feel less vulnerable when eliminating outside.

However, it should also be noted that such benefits are only associated with the use of an effective physical barrier and not with 'invisible' electric containment systems. These systems work by way of a buried wire at the boundary that sends a signal to a collar worn by the cat. When the cat approaches the wire a warning sound is emitted by the collar followed by an electric shock if the cat moves closer to the wire. The electric shock is designed to be deactivated after a time because the cat will learn to avoid the areas where it has previously received the unpleasant stimulus. Also, the sound alone becomes sufficient to prevent the cat from crossing the area where the wire is buried. But, unlike physical barriers, these systems provide no deterrent or barrier to rival

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Fig. 3.16. (a, b) A 'cat-proofed' garden and outdoor enclosure using specialist fencing. (Courtesy of ProtectaPet.)

cats or predators. Plus, the frightening and unpleasant (very possibly painful) experience of the electric shock, and later the fear produced by the sound that causes the cat to anticipate the shock, is far more likely to have the effect of increasing rather than decreasing the cat's sense of insecurity and vulnerability.

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4 Marking Behaviour

So far, this book has concentrated mostly on house-soiling as a part of eliminatory behaviour, but relief of pressure on the bladder and bowels is not the only reason why cats might deposit urine or faeces in the home in areas considered inappropriate or undesirable by owners or caregivers. Urine and faeces are also used by cats as a means of communication.

Communication is the transfer of information from one individual to another, or to a group of individuals. This can be conveyed via a variety of methods including visual signalling, sound and scent.

The form of communication that we humans are most familiar with is sound signalling in the form of verbal language – a highly complex form of communication that enables us to exchange a wide range of information about ourselves and knowledge that we have gathered from experience or received from others. But for many other species, including cats, the information transferred is far less complex and is generally limited to expressing emotions, warnings, greetings, care or food soliciting, and basic information about the individual such as sexual status and fitness.

Olfactory (Scent) Communication

There are advantages and disadvantages for each of the different methods of communication (see Table 4.1). Also, the method used can depend on a number of other factors including:

- the nature of the information that needs to be conveyed;
- the intended recipient; and
- environmental factors and potential risks to the signaller.

Another reason for using a particular signalling method can be the physical ability, or not, of the signaller to send, and of the recipient to 'read', the communication. Cats are well equipped to use scent communication as they have a variety of secretory glands that enable them to deposit biochemical

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Table 4.1. Methods of communication: advantages and disadvantages. (From Atkinson, 2018.)

Method of communication	Advantages	Disadvantages
Visual signalling (body language)	• Clear and explicit	• The intended recipient needs to be in close enough range to see the signaller clearly
	• Can be started, stopped or altered quickly	• The intended recipient needs to be in close enough range to see the signaller clearly
Auditory signalling (vocalizations and other sounds)	• The signaller does not have to be seen by the intended recipient	• The signal may be heard and exploited by an unintended recipient such as a rival or predator
	• Sounds can be more effective than visual signals over a longer distance	• Signals may become distorted by distance or overpowered by other sounds
	• Can be started, stopped or altered quickly	
Olfactory (scent) signalling	• Long-lasting	• Information cannot be altered or retracted
	• Information can be deposited by the signaller and read by the recipient when the signaller is no longer in the area. Ideal for solitary species, or animals at risk of predation	• Contamination may alter the intended information

'messages' and the olfactory ability to detect and distinguish between a highly extensive range of individual odours (Bradshaw *et al.*, 2012; Ley, 2016). They also possess, along with many other species (not including humans or the other higher primates), a secondary olfactory organ known as the vomeronasal or Jacobson's organ.

The vomeronasal organ (VNO)

The vomeronasal organ (VNO) is a secondary scent organ located within the hard palate just behind the internasal septum. It consists of two blind-ended, fluid-filled sacs containing a variety of chemical receptors. Scent is taken in

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Fig. 4.1. A cat performing a 'flehmen' response which actively directs scent towards the vomeronasal organ. (iStock.)

through the mouth and directed towards the VNO via two small slits, the nasopalatine ducts, which are situated in the hard palate just behind the upper incisors.

Odours have to be actively directed towards the VNO which is achieved by performing what is known as a 'flehmen response', whereby the upper lip is raised and the mouth is held slightly open in a 'gape expression' (Fig. 4.1). This is a voluntary behaviour that is possibly triggered by the presence of other visual or olfactory signals, such as the sight or smell of urine, especially that which has been deposited via 'spraying' (Mills *et al.*, 2013).

The main purpose of the VNO is the detection and interpretation of pheromones (Tirindelli *et al.*, 2009).

Pheromones

Pheromones are a subset of biochemicals known as semiochemicals: chemical compounds, including odours, which are used to communicate with, or influence the physiology or behaviour of others. What makes pheromones different from other semiochemicals is that they can only be used as a means of communication between members of the same species. Therefore, feline pheromones can only be deposited by and 'read' by cats.

The messages contained within feline pheromones are not fully understood but appear to be variously involved with sexual and territorial marking, and social cohesion (Pageat and Gaultier, 2003; Mills *et al.*, 2013).

Cats produce and deposit pheromones from a number of secretory glands found in the following areas (Fig. 4.2):

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- Around the head and face:
  - Deposited by rubbing (a behaviour also known as 'bunting') on inanimate objects. Also, by allorubbing on other individuals considered to be a part of the same social group.
- The tail and tail base:
  - Deposited during close contact (tail wrapping) with other individuals of the same social group.
- The foot pads:
  - Deposited when scratching inanimate objects.
- The area around the mammary glands in nursing females:
  - Detected by kittens while suckling.
- The perianal area (anal glands):
  - Deposited on to faeces when defaecating.
- The urogenital area:
  - Deposited into the urine when urinating. Possibly more so when passing urine by 'spraying'.

Fig. 4.2. Some of the ways that feline pheromones are deposited: (a) rubbing; (b) tail wrapping; (c) scratching; and (d) detected by kittens when nursing. (iStock.)

Urine Marking

Spraying

Spraying describes the passing of urine from a standing position, which is the most common position that cats adopt when urine marking. When spraying,

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a cat remains in a standing position with the tail raised vertically. Urine is then 'sprayed' backwards, usually on to a vertical surface. Quivering of the tail and alternate treading of the back legs are also commonly seen while urine is being voided (Fig. 4.3).

The most likely reason why cats adopt this position is because it allows the urine to be deposited on a vertical surface at 'cat nose height', thereby making it a more noticeable and easily read signal than urine deposited on the ground. It is also possible that this position might improve the collection of pheromones secreted by the glands in the urogenital region while the urine is being expelled.

Although urine marking is the most common reason why cats stand to pass urine, a standing or semi-standing position might also be adopted for other reasons, such as physiological conditions that cause pain or otherwise make it difficult for the cat to adopt or maintain a squatting position. Attempting to use a litter tray that is too small or one that is positioned in a constricted location can be another reason why a cat might have difficulty squatting.

If a standing or semi-standing position is adopted for reasons other than scent marking, it is less likely that the cat will tread with the hind legs or quiver the tail. However, a lack of these behaviours does not preclude the possibility that the cat is urine marking.

The amount of urine voided when urine marking can be less than is passed during urination for the sole reason of relieving pressure on the bladder. But it can still be a considerable amount, which is possibly dependent on how much urine is in the bladder at the time (Neilson, 2009).

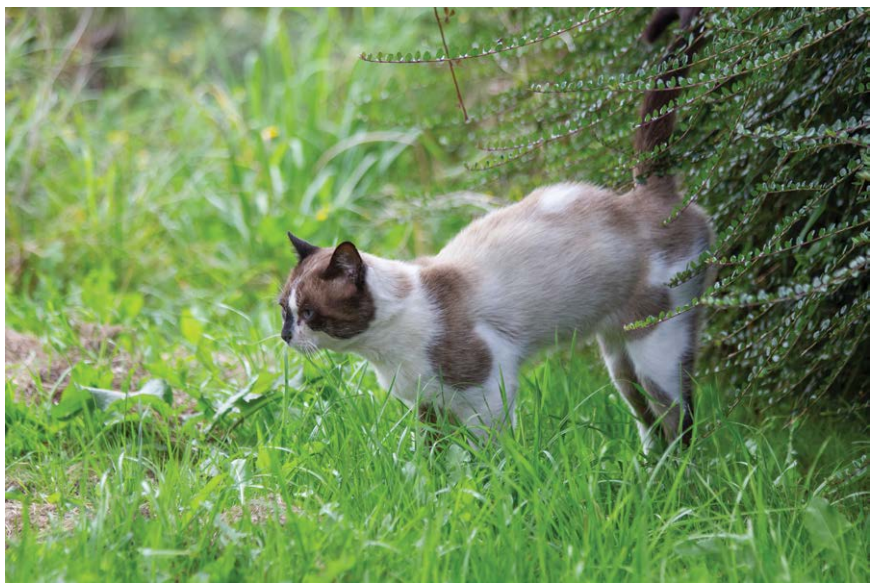

Fig. 4.3. Urine marking ('spraying'). (iStock.)

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Why Do Cats Urine Mark?

Entire (unneutered) males, especially when in the presence of receptive females and/or rival males, urine mark far more frequently than neutered males or females (Feldman, 1994). But it is a common misconception that it is only tomcats that can urine mark. All adult cats are capable of urine marking and do so for a variety of reasons.

Territorial marking

Domestic cats are descended from a wildcat species (*Felis sylvestris lybica*) that is known to live a predominantly solitary lifestyle. Although they have evolved to be a lot more flexible in sociality than their ancestor, most modern-day domestic cats (pets and ferals) can still be highly territorial regarding other cats not considered to be members of the same social group (Fig. 4.4).

Although fights do occur, the risks involved can be costly, therefore avoidance is often the preferred tactic. And this is where scent marking, including urine marking, is likely to play an important role. But the exact role that it plays and the nature of message(s) sent are not fully understood. A number of hypotheses exist, some of which are more probable than others. However, it is most likely that territorial scent marking does not leave one single message but a combination of signals – including some, or all, of the following.

Fig. 4.4. Cats are naturally territorial animals. Scent marking is one way that costly fighting might be avoided. (iStock.)

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- A direct warning to tell other cats to leave the territory:
  - The problem with this hypothesis is that once a scent mark has been detected, rather than immediately leaving the area, it is usual for a cat to spend a considerable time investigating the scent mark (Bradshaw and Cameron-Beaumont, 2000).
- Identification of the depositor by comparison of the scent deposited and the scent of the depositor:
  - This might allow the recipient to consider the potential risks of encountering the depositor. However, the problem with this hypothesis is that the recipient would only be able to identify the depositor by its scent if the two had previously met.
- Provision of information regarding the location of the depositor (Bradshaw *et al.*, 2012):
  - Scent marks degrade over time, therefore the stronger the scent the more likely it is that the depositor might still be in the vicinity or has only recently left. This information might possibly help cats to 'time share' territories by learning when scent marks left by others are usually stronger and then avoiding the territory at these times. Once a scent mark has been detected and investigated, it is not uncommon for the recipient to 'over mark' by leaving their own scent in the same area, thereby providing information for other cats that share the same territory.
- Provision of information regarding the depositor's health and fitness:
  - This would allow the recipient to consider their chances of winning a confrontation and the potential risks involved if a close encounter should occur. This is also likely to be an important part of sexual marking, especially by sexually mature entire males.

Sexual marking

Entire males

Entire, sexually mature males use scent marking to advertise sexual status and fitness to receptive females and rivals. Some of this information is conveyed via pheromones secreted by facial skin glands and deposited by rubbing (Pageat and Gaultier, 2003). Pheromones 'picked up' from glands in the urogenital and perianal region when urine marking might also play a part in sexual marking. Exactly what signals or information they convey is not clear (Wolski, 1982). However, it does appear that specific and relevant information about the depositor is conveyed via the concentration in the urine of a specific chemical compound known as felinine.

The excretion of felinine is regulated by testosterone. The more circulating testosterone there is in the bloodstream, the more felinine is excreted (Miyazaki *et al.*, 2006), thereby providing a good indication of the depositor's sexual

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status. The higher the concentration the more likely it is that the depositor is a sexually mature male.

But sexual status is not the only information conveyed. Felinine is produced by the breakdown of amino acids, specifically cysteine and methionine, both of which are present in fresh meat. Therefore, the amount of felinine in the urine is also related to the depositor's diet and so, in turn, can provide information about the individual's physical fitness and success as a hunter (Hendriks *et al.*, 1995).

Felinine is also responsible for the distinctive 'sour' odour of cat urine: the stronger the concentration the stronger the odour. This explains why, even to us with our relatively poor sense of smell, the scent of tomcat urine can be particularly pungent.

As well as the distinct scent, there are other characteristics particular to sexual marking by entire adult males – most notably, the frequency of marking and the quantity of urine deposited.

Tomcats, especially when they are aware of receptive females and/or rival males, will usually urine mark fairly frequently (Feldman, 1994). Also, most probably because of this high frequency of urine marking, the quantity of urine deposited is usually quite small.

Entire females

Sexual marking by unneutered females is also known to occur, although not as frequently as it is with males. However, urine marking by entire females is known to increase when a queen is in the receptive stage of her reproductive cycle (Bradshaw *et al.*, 2012).

Urine marking related to stress

Although sexual marking is common in entire, sexually active cats, most incidents of indoor urine marking by neutered pet cats appear to be reactional, usually in response to a stressor within the home environment (Borchelt, 1991; Dehasse, 1997).

The most common stressors associated with indoor urine marking are conflict or resource competition between cats in multi-cat households (Fig. 4.5a) and where there is a real or perceived feline intruder to the home (Fig. 4.5b). This type of marking might therefore be a form of territorial behaviour (see above). But it has also been hypothesized that it could be a strategy that can help the depositor cope with a stressful situation by:

- increasing the depositor's own scent profile; or
- increasing predictability and control by leaving a mark indicating where threats had been encountered previously and therefore where extra vigilance might be required (Bowen and Heath, 2005; Casey, 2007; Bradshaw *et al.*, 2012).

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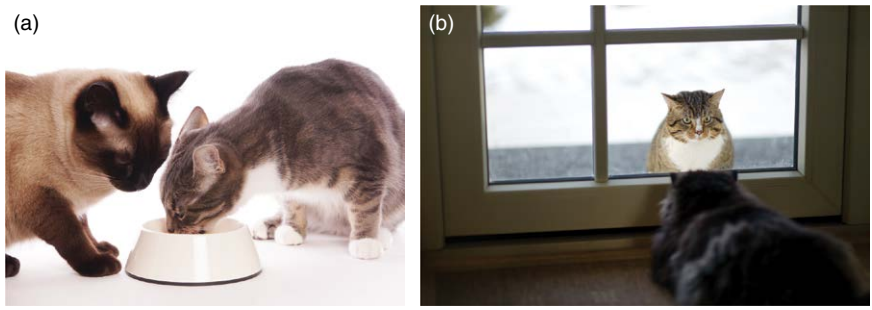

Fig. 4.5. (a, b) Competition for important resources in a multi-cat household and feline intruders to the home are common stressors related indoor urine marking. (iStock.)

Stress-related urine marking and organic disease

As mentioned previously, cats might pass urine from a standing or semi-standing position due to physiological conditions that make it difficult for the cat to squat or maintain a squatting position. But physiological disease can also be related to marking behaviour.

Cystitis is a common condition affecting domestic cats. It has a number of possible causes, including bacterial infection, trauma, and excess urinary crystals or uroliths. But in many cases no physical cause can be found. In such cases the disease is usually referred to as idiopathic. However, links have been found between stress and feline cystitis.

There are two ways in which stress appears be a possible contributory cause:

- predisposition following exposure to stressors in early life and/or excessive prenatal stress hormones while *in utero*; and
- periods of stress throughout life acting as trigger factors leading to recurrent bouts of the condition (Buffington, 2004; Cameron *et al.*, 2004; Westropp *et al.*, 2006; Buffington *et al.*, 2014).

It is not uncommon for cats suffering from idiopathic cystitis to spray urine in the home, and it has been hypothesized that this might be because it is more comfortable for a cat with cystitis to pass urine from a standing position. However, most of these cats will also pass, or attempt to pass, urine in a squatting position. Therefore, it is possible that the spraying might not be as a result of the disease but is marking behaviour related to stress being experienced by the cat which is also triggering the condition. (For more information on feline cystitis, see Chapter 2, this volume.)

Middening

Middening is the term used to describe the use of faeces to leave a visual and olfactory signal. This is a behaviour performed by many mammals, especially carnivores, and certain factors indicate that some olfactory information is also

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likely to be conveyed via feline faeces. Like urine, faecal matter might itself contain information about the individual. But information is also likely to be contained within the odorous secretion deposited by the anal glands on to the faeces during defaecation.

It is known that many mammals use faeces as territorial markers, and it is possible that cats do likewise. Observations by Nakabayashi *et al.* (2012) found that domestic cats spend more time sniffing the faeces of unfamiliar cats compared with the time spent sniffing their own faeces or those of familiar cats, indicating a possible role in group recognition and the identification of strangers.

Burying faeces is normal behaviour for cats but observations of farm and feral cats reveal that this behaviour occurs less away from the core territory and that faeces deposited in hunting areas or at the boundary of the territory are more likely to be left exposed, also indicating a role in territorial marking (Feldman, 1994). However, this is not conclusive evidence, because it might simply be the case that there is greater incentive for a cat to bury its faeces within or close to the core territory for hygienic purposes and/or to avoid attracting predators (Bradshaw and Cameron-Beaumont, 2000).

It is debatable as to how much middening contributes to house-soiling by pet cats, as there are so many other reasons why a cat might defaecate in the home away from the litter tray (see Chapters 2, 3a and 3b, this volume). Also, unlike urine marking, there is no difference regarding the position adopted by the cat to pass faeces or the quantity produced which can give us any indication of the cat's intention.

One difference, however, can be location. Cats are more likely to choose an exposed area for middening and a less exposed area for normal defaecation (Bowen and Heath, 2005). But even this is not decisive when it occurs within the home, as there are other reasons such as physiological disease or difficulties in accessing a suitable secluded area that might cause a cat to defaecate in a location it might not normally choose.

Cats will also not attempt to bury their faeces if the intention is marking. But simply the discovery of exposed faeces is not sufficient to assume that the cat's intent was marking behaviour. It is possible that the cat defaecated for no other reason than to empty its bowels, but without the presence of any suitable substrate it was unable to cover its waste. The only way to tell if there was any intention to cover or not would be to observe the cat immediately after defaecation – even without a suitable substrate many cats will still attempt to cover by scraping the surrounding area.

Middening is also not the only reason why a cat might not attempt to cover or bury faeces deposited away from the litter tray. For example, no attempt to cover will be made if the cat is unaware that faecal pellets have been dropped, as can happen in cases of faecal incontinence or more commonly where pellets have become stuck to the hair and fall away later.

So, although middening may be considered a possible reason for house-soiling with faeces, it is essential that all other possible reasons for the behaviour are also explored and investigated.

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5 Treatment and Management Strategies

The aim of this chapter is to provide guidelines as to how to approach, treat and/or and manage house-soiling problems in domestic cats.

Successful long-term treatment and management rely greatly on understanding and correctly addressing underlying or contributory causes. Therefore, it is important that this chapter is read in conjunction with previous chapters. It must also be kept in mind that all cases of feline house-soiling are different; therefore the following guideline points should be read as such and not as hard-and-fast rules or as a strict order of approach that applies to all.

1. Could the House-soiling be a Sign of a Medical Emergency?

The possibility that an underlying physical condition (see Chapter 2, this volume) might be causing or contributing to the house-soiling behaviour must be considered in every case. In many cases this is something that will need to be ruled out (or treated) by a veterinary surgeon at some point, maybe not immediately but preferably before any in-depth behavioural investigation or advice, other than initial 'first aid' advice, is offered or undertaken. However, some conditions associated with house-soiling can be serious, even potentially life-threatening, if not diagnosed and treated as a matter of urgency. ***Therefore, if the cat is demonstrating any of the following signs, veterinary advice must be sought as soon as possible*:**

- Blood in the urine or faeces.
- Black or abnormally very dark faeces.
- Unproductive straining to pass urine or faeces. Or production of only very small quantities, especially if these are found in more than one location.

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- Vocalizing (indicative of pain) when passing or attempting to pass urine or faeces.
- Lethargy.
- Inappetence.
- Swollen abdomen.
- Any other recent changes in behaviour, for example:
  - seizures;
  - notably increased aggression and/or fearfulness; or
  - ataxia (lack of, or significantly reduced, muscle coordination).

2. Do Not Attempt Punishment

House-soiling is a behaviour that can be highly unpleasant and frustrating for the cat owner/caregiver. Even so, it is extremely important not to attempt direct physical or verbal punishment. Although this can initially and instinctively feel like the right thing to do, attempts at punishment, or simply being 'angry' with the cat, are usually ineffective and are more likely to be counterproductive for the following reasons:

- If attempted punishment is applied 'after the act' when urine or faeces are discovered, it will be impossible for the cat to associate the 'correction' with the act of eliminating. The only association likely to be made will be a negative association with the person 'applying' the punishment.
- If 'caught in the act' the cat might associate the attempted 'correction' with the act, but a negative association (fear) will also be made with the person applying the 'correction', which is likely to be the stronger association. This can result in the cat learning to avoid eliminating in areas, which can include the litter tray, whenever the same person is nearby.
- Even if an attempt at punishment teaches the cat not to eliminate in a particular spot, it will not teach the cat to avoid all other inappropriate areas or teach the cat where it should be eliminating.
- If the house-soiling is due to marking behaviour, by increasing the stress experienced by the cat (see Chapter 4, this volume), any attempt at punishment is far more likely to increase rather than decrease the frequency of the behaviour.

It is also very important that if the cat has soiled elsewhere and is then taken to the litter tray, this is be done gently and without any demonstration of anger or frustration. If the cat is handled roughly or in any way that it could be hurt or frightened, this could result in the cat developing a long-term fear and avoidance of the litter tray (Fig. 5.1).

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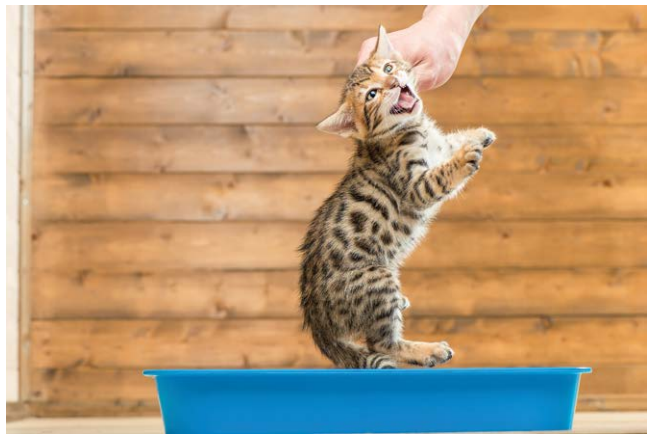

Fig. 5.1. It is very important not to attempt punishment for house-soiling, or to do anything that might cause the cat to make a negative association with the litter tray. (iStock.)

3. Cleaning, Replacing and Preventing Access to Soiled Areas

Cats will often return to areas where they have previously urinated, defaecated or scent marked with urine or faeces. Scent is one of the major factors that attracts cats back to the same location, as this can help to confirm for them that the area is a safe or otherwise suitable place to eliminate, or that it is a location where further scent marking might be required.

Effective cleaning of soiled areas is therefore an important part of management to help reduce incidents of house-soiling, no matter what the underlying cause (Fig. 5.2).

How to clean

Cleaning soiled areas in the house is obviously important for hygiene reasons and to remove any unpleasant scent that we are aware of. However, cats have an olfactory sense that is far more sensitive and efficient than our own, so 'normal cleaning' might not be sufficient to effectively remove the residual scent that might still be detectable by the cat.

To reduce the scent as much as possible, the following cleaning method is advised:

1. Remove faeces and/or use absorbent paper to soak up urine.
2. Wash the area with a 10–20% solution of a biological washing detergent or use a proprietary enzymatic 'odour elimination' product. If using a proprietary product, follow the instructions as provided by the manufacturer. Include a margin of at least 5–7.5 cm (2–3 inches) outside of where the urine or faeces

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Fig. 5.2. The correct cleaning method is a very important part of management. (iStock.)

was deposited. It is also advisable test a small area first, especially on carpet or any other surface that might not be colour-fast or could be easily damaged.
3. Rinse, if necessary (most proprietary products do not require rinsing), then pat or wipe dry as much as possible with a clean towel or absorbent paper.
4. Wipe or spray over lightly with surgical spirit. (Again, it advisable to test a small area first.)
5. Leave to dry for at least 30 min.
6. If the item is relatively small and will not be damaged by either machine or hand washing, it is best to do so using a biological detergent.
7. Do not use household disinfectants. Bleach, phenolic (aka carbolic) disinfectants, and any that contain benzalkonium chloride are all toxic to cats (iCatCare, 2020a,b). Also, the use of any ammonia-based products will add to rather than remove the scent of degraded urine.

The above method is effective in many cases, but the ease and efficacy of cleaning to sufficiently remove odours can depend on the surface that requires cleaning and how heavily soiled the area is. For example, it can be very difficult, if not impossible, to completely remove the scent of urine that has soaked into soft furnishings, carpets, rugs, or other porous surfaces such as wood or concrete, especially if the house-soiling has been a long-standing problem. In such cases removal of the soiled item or floor covering might be necessary.

Removal and replacement

If a carpet or other flooring surface needs to be replaced, the underlay or any other loose material beneath the top surface should also be removed. The base

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floor should then be thoroughly cleaned, at least two or three times as advised above, and then left uncovered for as long as possible (at least a few days) to allow it to 'air' and dry thoroughly before any new flooring is installed.

During this period and until installation of the new flooring is complete, it is essential that the cat is denied access to the area. This is to prevent the cat from soiling the base floor, and to avoid any potential harm to the cat from any chemicals or other substances that might be present on or within the base floor or used during fitting of the new flooring.

When deciding on a replacement it is advisable to choose something that has a different texture (feel) to the flooring or item of furniture that the cat previously eliminated on. This is because cats often develop a preference for toileting on materials of a particular texture. Therefore, if the replacement is of the same or a similar texture to the previous item there could be an increased chance that the house-soiling will continue. However, cats have poor colour vision and also appear to be 'behaviourally colour-blind' – in other words, they are less able to make associations based on colour differences (Bradshaw *et al.*, 2012). Therefore, any new item or flooring can be the same colour as was in place before.

It is also advisable, where possible, to choose impermeable and easily cleaned surfaces. Porous surfaces, such as grouting in between tiles, wooden skirting boards, etc., should also be treated with an effective sealant to prevent any future absorption of urine.

A decision might be made to leave a soiled item of furniture or flooring *in situ* and not remove it until the house-soiling has been treated and resolved. But unless the residual scent can be sufficiently eradicated, the cat is likely to continue soiling in the same location, thereby increasing the odour and the 'attraction' for the cat to soil in that location, even after the soiled item has eventually been removed. Therefore, it can be better to remove repeatedly soiled items or flooring, or otherwise deny the cat access to the area.

If it is possible to do without the particular item of furniture for a while, it might be best to delay replacement until there is significant improvement. But if a delay to replace an item is not possible, all new items must be well protected with an impermeable covering, or the cat denied access until the house-soiling issue is effectively resolved or managed.

Preventing access

The more often a cat soils an area, the more likely it is that the cat will soil there again. Therefore, it is advisable to keep doors shut or otherwise physically prevent the cat from accessing any area where it has soiled repeatedly (Fig. 5.3), unless:

- The area is one that can be more easily and more effectively cleaned than other areas where the cat might choose to eliminate.

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- Denying access might increase stress for the cat. This is especially important if it appears likely that underlying stress is a contributory cause.
- Denying the cat access to the area will also prevent it from accessing important resources such as food, water, resting places and, very importantly, litter trays and/or outdoor access.

If it is not possible or expedient to keep doors shut or otherwise completely block the cat's access to the area, strategically placed items of furniture, or covering the specific area with a tough, impermeable and easily cleaned material, are other options to consider.

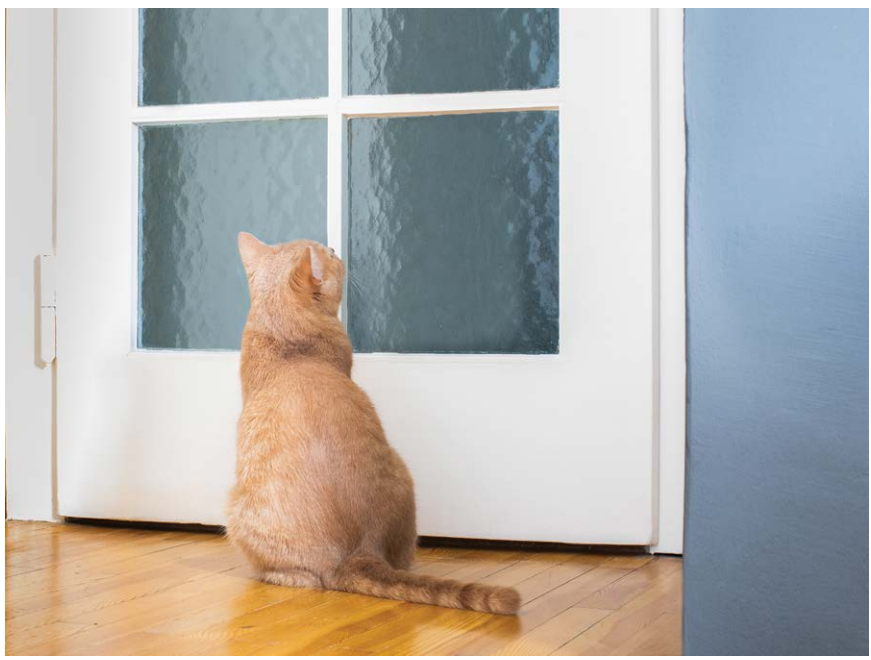

Fig. 5.3. If a cat repeatedly soils in the same area, it is advisable to prevent the cat from entering that room or area of the house until the house-soiling is resolved or managed. (iStock.)

4. Periuria, Perichezia or Marking Behaviour?

Periuria (eliminatory indoor urination away from the litter tray), perichezia (eliminatory defaecation away from the litter tray) and marking behaviour all come under the heading of house-soiling. But knowing which of these behaviours the cat is performing is important to aid further investigation and management and might also alter the order in which specific considerations and investigations are made.

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The most common and most notable difference between periuria and urine marking can be the position adopted by the cat. Squatting is the most common position for eliminatory urination (Fig. 5.4a) and standing (spraying) for marking (Fig. 5.4b). Perichezia and marking using faeces might be differentiated by the location where the faeces is deposited. (See more detailed information on marking behaviour in Chapter 4, and on non-marking elimination in Chapter 1, this volume.)

It is important to look further than any initial assumptions made regarding the nature of the behaviour resulting in house-soiling, or the assumption that this is the only type of house-soiling occurring. A cursory examination of the 'evidence' can very easily lead to an incorrect conclusion. For example, a pool of urine on the floor might be identified as periuria, however closer examination of an adjacent vertical surface (a wall, chair or table leg, etc.) might reveal streaks of dried urine, indicating that the urine was more probably deposited via spraying.

It is also very important to investigate further to find out if the cat is performing more than one behaviour. Disease conditions, such as lower urinary tract disease, especially idiopathic (aka stress-related) cystitis, can often be a cause of both periuria and urine marking (see Chapters 2 and 4, this volume).

Marking behaviour – initial considerations

If it is concluded that urine marking (spraying) is the only or predominant cause of house-soiling, a number of considerations will need to be made regarding the cat's sexual status and its current social and physical environment.

Domestic cats use urine marking as a way of communicating sexual status and suitability as a mate. It is, therefore, a behaviour that is far more common in entire (unneutered) cats, especially adult males. Entire adult females do also urine mark for similar reasons, although this is usually limited to the receptive periods of her reproductive cycle. Neutering has been shown to markedly reduce the incidence of marking behaviour (Hart and Barrett, 1973; Hart and

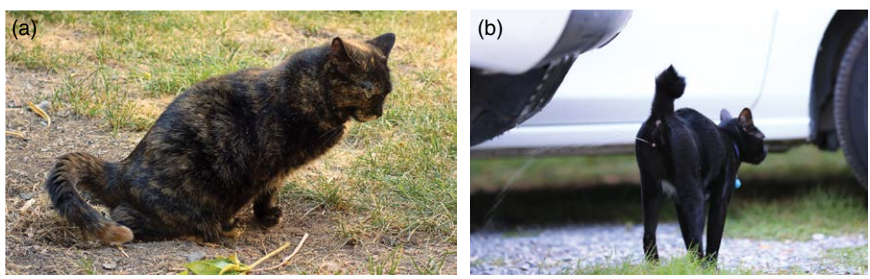

Fig. 5.4. The position adopted by the cat is the most notable difference between eliminatory urination (a) (known as periuria when this occurs in an inappropriate location) and urine marking (b). (iStock.)

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Cooper, 1984). Therefore, if a cat is urine marking and is not neutered this should be arranged, unless the cat is required for breeding or if there are valid medical reasons why the cat cannot be operated upon.

Some neutered cats might still urine mark to demonstrate sexual status due to incomplete neutering or an underlying disease condition, such as an adrenal gland tumour, as reported by Millard *et al.* (2009), but such conditions are rare. However, if the cat is demonstrating other sexually dimorphic behaviour (see Table 5.1) and there appears to be no other reason for the urine marking, veterinary investigation is advisable.

Indoor urine marking by neutered pet cats is far more likely to be reactional, in response to a social or environmental stressor (Borchelt, 1991; Dehasse, 1997). The same might also apply to indoor marking using faeces, although it is questionable as to how much this contributes to house-soiling cases (see Chapter 4, this volume). Even so, the identification and removal or management of potential stressors (see point 8 below) are essential parts of dealing with any indoor marking behaviour involving urine and/or faeces.

Table 5.1. Behaviour influenced by sex hormones in domestic cats.

Males	Urine marking – distinctive strong urine odour
	Fighting
	Roaming
	Mounting
Females (signs of oestrus)	Calling (distinctive, loud and persistent vocalizations)
	Increased facial marking (rubbing)
	Rolling and purring
	Lateral deviation of the tail
	Lordosis (downward arching of the back with the hind quarters raised)
	Urine marking

5. Have There Been Any Recent Changes or Events?

Any recent changes to the cat's physical and/or social environment must be considered. Such changes can be a cause of reactional marking behaviour or alter a cat's ability or motivation to use an indoor litter tray or an outdoor elimination area.

Even minor changes can result in house-soiling issues. Relevant changes can include:

- Changes to the litter tray provision:
  - Changing to a different litter substrate.
  - Changing to a different size, shape or type of litter tray.
  - Changing the location of litter trays.

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- Changes to the outdoor space that might deter the cat from eliminating outdoors (Fig. 5.5):
  - Changes to how, how often or at what times the cat is able to access the outdoor space.
  - Physical changes to the outdoor space:
    - additional planting or removal of garden plants, especially bushes that might have previously helped to shield the cat; and
    - additional fencing that might now block the cat's access to a preferred elimination area.
  - A new cat or dog, either in the same household or within the neighbourhood.
  - Unfamiliar or possibly frightening sounds:
    - fireworks;
    - thunder;
    - local building works; and
    - children playing.
  - Changes in the weather:
    - storms;
    - snow; and
    - heavy rain.

If any of the above changes, or others, can be identified and appear to be associated with the emergence of the house-soiling problem, going back to

Fig. 5.5. (a, b, c) For a cat that usually eliminates outside, certain events or changes to the outdoor environment might deter the cat and result in indoor house-soiling.

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how things were can sometimes easily resolve the problem. However, not all relevant changes can be easily identified, and certainly not all can be prevented or rectified. In such cases alternative provision, in the form of a new or extra indoor litter tray, should be made.

6. Review the Current Litter Tray and/or Other Eliminatory Area Provisions for the Cat

Chapters 3a and 3b (this volume) cover feline needs and preferences regarding litter tray provision, and how to provide the ideal indoor and/or outdoor elimination area. Not meeting these requirements is a very common cause of feline house-soiling. It is therefore important to review what is provided for the cat, and what changes might be required.

7. Veterinary Involvement

As previously stated, the possibility that an underlying physical condition might be causing or contributing to the house-soiling behaviour must always be considered. Not all associated conditions are medical emergencies (as outlined in point 1 above), but many can be painful and distressing, and if not diagnosed the cat's welfare can be severely compromised and the chances of a long-term resolution or successful management of the behaviour are likely to be greatly reduced.

Chapter 2 (this volume) covers the links between physical health and house-soiling, and the various medical conditions that can be associated with the behaviour. Cats do not always show clearly evident signs of pain or discomfort and many of these conditions can be chronic or develop gradually, which can make them difficult to detect. Therefore, veterinary examination, even if the cat appears healthy, is an essential part of treatment (Fig. 5.6).

Reviewing the cat's medical history can also help to identify possible underlying causes. Conditions previously diagnosed or suspected, even if not previously connected to house-soiling, could now be a contributory cause of the behaviour. Also, cats learn from previous experiences, and behaviours such as litter tray avoidance and stress-related marking behaviour might be related to previous negative experiences, which might also include visits to the veterinary clinic.

Veterinary involvement is also necessary if medication is required, either to treat an underlying physical condition or to help address emotions such as fear, anxiety or social tension, all of which can be contributing factors to house-soiling behaviour. However, if psychotropic medication is indicated it should only be used as an adjunct to behaviour therapy. Long-term prognosis is less likely to be successful if underlying stressors contributing to the behaviour remain undetected or are not correctly addressed.

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Fig 5.6. Veterinary examination is important in cases of house-soiling – even if the cat appears healthy. (iStock.)

8. Review the Cat's Past and Current Social and Environmental Situation

Consider the cat's history

Although the past cannot be changed, it is important to have an idea of how a cat's previous experiences might be influencing its current behaviour. For example, cats with limited positive social experience, especially with other cats, people or other household pets, are more likely to be fearful of these individuals. Such cats might therefore be less willing to use an indoor litter tray or eliminate in an outdoor space where individuals whom they are nervous of might be present.

Previous experience can also cause negative associations to be made with locations, inanimate objects and even the general context that a cat may find itself in – all of which can be contributory causes of house-soiling.

If a cat is clearly fearful or anxious it must be provided with safe and secure elimination areas (see Chapters 3a and 3b, this volume) and professional veterinary and behavioural help sought to help increase the cat's confidence and reduce anxiety. However, feline expressions of fear and anxiety are not always clearly evident, but a review of the cat's history might reveal a reason why the cat is avoiding the litter tray or outdoor elimination area.

Consider the social relationships between household cats

Conflict or competition between cats living in the same household is a common cause of house-soiling issues for the following reasons:

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- Cats may be unwilling to share litter trays. If an insufficient number of trays is provided, other locations are more likely to be used (see Chapter 3a, this volume).
- One cat might block the others' access to important resources, including litter trays and/or access to an outdoor space (Fig. 5.7).
- Urine marking is more likely to occur in households where there is conflict or resource competition between cats (see Chapter 4, this volume).

It is important in multi-cat households that sufficient resources, especially litter trays, are provided. These should be spaced well apart, and the 'rule' of providing at least one per cat plus one more should be followed as best as possible. If blocking is occurring, or if a cat is feeling threatened by another, litter trays should be positioned in different areas of the house so that if access is blocked, at least one other is available in another location.

It is also important that any conflict between household cats is investigated and addressed. There are many factors that can influence the relationship between cats. Therefore, if conflict is a concern, it is advisable to seek advice from a qualified and experienced feline behaviourist.

Fig. 5.7. In a multi-cat household one cat might position itself in order to 'block' the other cats' access to important resources, including litter trays. (iStock.)

Consider the influence of neighbouring cats and other animals

Neighbouring cats and other animals can be a cause of house-soiling, especially if they enter the home and/or are considered a threat by the resident cat(s):

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- if a litter tray is positioned close to an entrance through which other cats or other animals might come into the house, the resident cat might choose a different area in which to urinate or defaecate;
- a cat might also be deterred from using a litter tray that is positioned close to, or within sight of, a window or glass door through which rival cats or other animals might be seen;
- conflict with other cats outdoors or feeling threatened by the sight or sound of a neighbour's dog can also effectively deter a cat from using an outdoor elimination area; and
- urine marking is a common reaction by cats that feel insecure and threatened by real or perceived intruders to their territory.

As well as being a cause of house-soiling, other animals in the neighbourhood can be a source of stress for cats that is more common than many people realize. It is also not uncommon for householders to be unaware of the presence of other animals entering their cat's territory. This is often because wildlife and neighbouring cats might only visit the garden or the area close to the home or attempt to enter the house at night or when the human residents are out.

If the presence of other animals is suspected as a cause of house-soiling, litter trays should be repositioned away from doors and windows. The lower part of windows or glass doors through which other cats might be seen should be covered, for example by using a temporary window frosting film, and entrance points should be made secure to prevent access by neighbouring cats or other animals. If the entrance point is a cat flap, an exclusive, preferably a microchip-activated cat flap that can only be used by the resident cat(s) should be installed.

Specialist fencing that contains the resident cat(s) within the garden and makes it difficult for feline or other animal intruders to enter the garden, can be another effective solution. (For more detail on all of the above, see Chapters 3a and 3b, this volume.)

Consider other influences

As mentioned at the start of this chapter, all cases of feline house-soiling are different. The most common social and environmental influences that can lead to house-soiling have been included, but it is impossible to include all influences that might be relevant in every case. For this reason, especially if the cause of the house-soiling is not clear after considering all of the above, or if treatment proves ineffective or short-lived, more in-depth investigation should be carried out, preferably by a suitably qualified and experienced feline behaviourist.

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DOMESTIC CAT BEHAVIOUR PROBLEMS

House-soiling Problems in Domestic Cats

Trudi Atkinson

Highly practical, this book is the first in a series entitled Domestic Cat Behaviour Problems designed to help veterinary professionals and behaviourists understand the background behind common domestic cat behaviour problems and provide various treatment strategies. The text in this volume covers feline problem elimination and marking behaviour inside the home, outlining:

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