# Feline relinquishment: how can the veterinary profession help reduce this?

Vanessa Bourne MVB CertAVP(SAM-F) PGCertVetEd FHEA MRCVS, Beaumont Sainsbury Animal Hospital, Department of Clinical Science and Services, Royal Veterinary College, writes about how veterinary practices can reduce feline overpopulation, relinquishment and welfare in Ireland

#### ABSTRACT

Cats may not be as popular a choice for pets in Ireland as dogs are. However, rehoming centres are consistently full to bursting. The veterinary profession can help reduce the rate of feline relinquishment through education and early intervention before the pet-human bond is broken. There are a number of common causes of feline relinquishment, with overpopulation being a significant problem. Other reported reasons for relinquishment include behavioural issues (for example inappropriate elimination and aggression), owner expectations, and changes in owner circumstances, old age and illness. This article discusses reasons for overpopulation and how veterinarians can help reduce this. Recent years have brought record numbers for the Irish Society for the Prevention of Cruelty to Animals (ISPCA) in terms of inspectors dealing with indiscriminate breeding of cats. There is a relative lack of research on neutering owned or feral cats in Ireland, but it is generally considered low and overpopulation is a recognised problem. Most feline pregnancies are regarded as unplanned. The ISPCA launched the SpayAware campaign with the support of Veterinary Ireland in 2002 (http://www.spayaware.ie/index.php). As

## SMALL ANIMAL I CONTINUING EDUCATION

part of a grassroots effort by animal-welfare groups and individuals across Ireland, SpayAware has been highlighting the importance of spaying and neutering to address the pet overpopulation crisis. Member vets have access to posters and fact sheets that they can display in clinics across Ireland, providing information and education for owners.

There is no reliable data on the number of feral cat colonies in Ireland; numbers are estimated to be in excess of 200,000 but may vastly exceed this. Uncontrolled feral colonies have the potential to grow quickly, which can lead to increased spread of disease and decrease of available food and environment, affecting the colonies' overall health. The increasing number may also be regarded as a nuisance. The ISPCA oversaw the re-launch of Feral Cat Awareness Week in August 2019 to promote utilisation of trap, neuter and return (TNR) initiatives in order to control the feral feline population.

Effective neutering is widely regarded as the principal way to control the cat population and there have been a number of charity-driven subsidised neutering schemes. Given that both male and female cats can reach sexual maturity at four months of age, it makes sense to consider the advantages and disadvantages of neutering cats earlier than the traditionally recommended age of six months. A study in the UK reported that 51% of respondents did not recommend neutering cats before six months of age (Murray et al, 2008). The appropriateness of neutering at this traditional age has been challenged by various studies (Howe et al 2000; Spain et al 2004; Joyce and Yates, 2011).

Recommending early neutering can have financial benefits for the practice. Once the kitten vaccination course has been completed, neutering can be booked in a timely fashion, allowing for increased revenue. Allowing for a more traditional approach of neutering at six months can mean clients are lost to follow up or females may become pregnant.

# WHY ARE MORE PEOPLE NOT NEUTERING THEIR CATS?

There are several myths regarding neutering and cats. In addition, owners may simply be unaware of the reasons why they should get their cat neutered and financial barriers may exist for some other owners. It is important to understand the contributing factors beyond financial constraints in order to implement change. The Royal Society for the Prevention of Cruelty to Animals (RSPCA) in the UK undertook a widespread survey of cat owners, which was published in 2014 and is likely to be representative of similar views held by Irish owners.

This study showed 92% of cats aged six months, or more, were neutered, but only 66% of cats between six and 12 months were neutered. This discrepancy allows for many unintentional litters. Interestingly, neutering of females was identified as the key factor required in order to control the feline population and the level of male cat castration was irrelevant. There are, of course, many other positive reasons to have males neutered. Neutered male cats are less likely to roam and become involved in traumatic accidents. They are less likely to fight or interact with other cats, reducing their risk of contracting infectious diseases or developing abscesses as a result of bite injuries. Neutered animals are considered to have a longer lifespan than entire ones (Root Kustritz 2002). While cat ownership was consistent across all socioeconomical groups, those in lower groups were twice as likely not to neuter as owners in the upper groups. Getting a cat or kitten from friends or family whose cat had had a litter was strongly correlated with not neutering and those who did not neuter their cat were likely to have friends and family who also did not neuter their pet.

While the majority of society was comfortable with the concept of neutering, the myth of allowing one litter continued to be widespread, with many people applying human emotions onto their pets. Many would neuter after the first litter, although this resulted in a significant number of 15% of females having one litter and unfortunately a significant number of these would then go on to have further litters. Unfortunately, a lot of the issues raised by having entire male and female cats and the associated problems with litters or anti-social behaviour may in turn increase the possibility of these animals being abandoned or turned over to rescue. Considerable confusion continues to exist for owners regarding when to neuter, which increases the chances of females getting pregnant. Once they have had a litter, confusion may then result over when the cat becomes fertile and these cats may subsequently become pregnant again. There are also some owners who don't realise they need to get their cat neutered or regard it as low priority. The cost of neutering may be a genuine factor for some owners, while others may overestimate the cost. Cats Protection currently offers a Northern Ireland-wide scheme allowing cats owned by people on State benefits, on a low income or who are pensioners, to be neutered for £5. Research in the UK (RSPCA 2014) had shown that although awareness of subsidised neutering was high, understanding of how to progress through the scheme was low. Veterinary practices' charges need to be taken into consideration in terms of the efficacy of neutering vouchers, as some practices will neuter at cost price and others will attempt to maximise profit. When issuing vouchers, responsibility is then passed to the owner to follow the scheme through. Therefore, consideration needs to be given as to why owners do not go through with the neutering, which may be related to inconvenience, transport, additional costs or veterinary practice factors. Following up to ensure the voucher has been used is beneficial, but addressing why people do not go through with the subsidised neutering and resolving this would be better.

# HOW CAN THE POPULATION PROBLEM BE ADDRESSED?

#### Education

Education is key on many levels, to the general public, vets, councils and government, in order to reduce population

through neutering and to avoid other population control methods through euthanasia of healthy animals. People frequently don't realise that they are contributing to the problem. Sometimes they don't understand the issues that may occur from having entire cats, for example injuries, disease spread and roaming. Because they cannot perceive a problem, there is no incentive for them to change their behaviour.

Improving the public's understanding of cats and their care is vital, whether this is through educational talks, social and broadcast media, helplines and event attendance. Neutering needs to be seen as the act of a responsible owner and the 'one litter' myth must be tackled. Confusion over time of neutering needs to be resolved through education and promotion by rescues and veterinary practices. Education of children regarding animal welfare can help to influence future adults and pet owners. Promotion of the benefits of cat ownership and promoting cats available in rescue can help to find good homes.

#### EARLY NEUTERING = NORMAL NEUTERING

Another way to address the problem is the continued promotion of the concept of neutering cats at four months of age (or before). Although this 'early' neutering concept has been adopted widely by the US and a number of charities in the UK, it remains a less favourable solution for many vets due to perceived health concerns. However numerous studies, up to 11 years post procedure, have successfully refuted these concerns (Howe et al, 2000; Spain et al, 2004; Joyce and Yates, 2011).

Several organisations such as Veterinary Ireland, the International Society of Feline Medicine (ISFM), the American Association of Feline Practitioners (AAFP), the RSPCA and the Cat Group (UK) support the concept of early neutering. The Cat Group is a collection of professional organisations in the UK dedicated to feline welfare through the development and promotion of policies and recommendations on the care and keeping of all cats.

# COMMON CONCERNS REPORTED ON THE PRACTICE OF EARLY NEUTERING

Research has shown no negative impact of subsequent behaviour, growth or development (Joyce and Yates 2011, RSPCA 2014). In fact, positive effects were recorded in various studies. These included reduced occurrence of abscesses, urine spraying and aggression in early castrated males and a 91% reduction in the risk of mammary carcinomas in females neutered before six months of age compared to intact females (Overley et al, 2005). The common concern of a link between prepubertal castration and feline lower urinary tract disease (FLUTD) has been researched in several studies, which demonstrate a lack of correlation (Howe et al, 2000; Spain et al, 2004). Urethral diameter and dynamic function were not found to be significantly different in animals neutered 'early' and at more traditional ages.

Neutering has long been associated with a greater risk of the development of obesity, although this is multifactorial. Long-term studies have shown no link between age of neutering and the development of obesity (Spain et al, 2004). Prepubertal neutering has been associated with delayed physeal closure of long bones, however this has not been found to affect adult size or be of clinical relevance (Joyce and Yates, 2011).

No increase in surgical or anaesthetic risks has been reported with prepubertal neutering. There is generally a lack of abdominal or ovarian fat, improving visualisation of tissue and placement of ligatures. Smaller blood vessel size allows for easier haemostasis. Smaller incisions are generally required compared to older animals. Postoperative wound infections may be lower compared to later age neutering (Joyce and Yates, 2011). Early neutering can be regarded as more 'fiddly' at first, however practice quickly improves tissue handling.

Parameter	Kitten reference range	Adult reference range
Heart rate	210-300 beats/ minute	140-220 beats/ minute
Respiratory rate	20-36 breaths/ minute	24-42 breaths/ minute
Temperature	37.7°C	38.1-39.2°C
Blood pressure	56-66mmHg	100-150mmHg
Packed cell volume	25-35%	29-45%

Table 1: Normal physiological measurements in kittens and adult cats (Holden 2007).

## CONSIDERATIONS WHEN NEUTERING KITTENS

Paediatric physiology and its implications for kitten anaesthesia include limited cardiovascular compensation, higher relative tissue oxygen consumption and a higher bodysurface-area-to-mass ratio.

Cardiac output is predominantly dependent on heart rate in paediatrics owing to a higher proportion of non-contractile tissue and, hence, a predetermined stroke volume. Paediatric animals also have an immature sympathetic nervous system. This restricts the ability to increase heart rate and cardiac contractility in response to drug-related bradycardia. Therefore, there is an increased risk of hypotension. Comparatively small blood volume losses can also cause hypotension (Joyce and Yates 2011). These factors affect the choice of anaesthetic protocol for paediatric animals that have a limited capacity to compensate for drug-induced bradycardia, particularly with  $\alpha$ 2-adrenoceptor agonists and opioids.

Tissue oxygen consumption is increased in paediatrics and ventilation may be less efficient due to compliant lung tissue and chest walls. It is, therefore, recommended that oxygen is

## SMALL ANIMAL I CONTINUING EDUCATION

provided throughout surgery for patients, even if anaesthetic depth is adequate without inhalational gases. Placement of an endotracheal tube is recommended in females undergoing ovariohysterectomy to maintain a patent airway. Increased airway resistance and an increased risk of airway obstruction is possible due to a relatively narrow upper airway and larger tongue in a paediatric patient. Anaesthetic circuits chosen should have minimal dead spaces and resistance to airflow. High flow rates are required to avoid rebreathing (Joyce and Yates, 2011). Paediatric animals are at a higher risk of developing hypothermia once anaesthesia has been induced and during the recovery period. This is due to a high body-surface-areato-mass ratio, a reduced ability to thermoregulate and the amount of subcutaneous fat reserves present in younger animals (Joyce and Yates, 2011).

Heat loss should be minimised by being careful with hair clipping and wetting of skin during preparation for surgery. Bubble wrap and insulating materials can be used, along with warming devices. The room temperature should be maintained above 20oC. Duration of anaesthesia and surgery should be minimised as much as possible. Where animals from the same litter are present, reuniting these patients in recovery, when able, allows for a return to feeding and reduction in stress (Joyce and Yates, 2011).

Other pharmacological considerations for paediatric anaesthesia include hypoalbuminaemia, which exists in kittens up until around eight weeks of age and may enhance the effects of highly protein-bound drugs such as propofol. Immature hepatic enzyme systems can persist to around 12 weeks of age and may reduce the rate of drug metabolism, prolonging their effects. Reduced renal blood flow and immature glomerular filtration rate can affect drugs that are cleared via renal excretion. As younger animals have a reduced ability to concentrate urine, they may be more vulnerable to dehydration. Water should, therefore, not be restricted for more than an hour prior to surgery (Joyce and Yates, 2011). Benzodiazepines stimulate appetite and their use during anaesthesia may promote feeding on recovery. This is particularly valuable in kittens in helping to prevent hypoglycaemia and hypothermia.

Despite the apparent physiological disadvantage, there is recent evidence that kittens demonstrated fewer behavioural signs of pain and a faster return to normal behaviour post neutering than adult cats, supporting the move towards programmes for kitten neutering (Bruniges at al, 2015).

- Summary of practical considerations when performing prepubertal neutering
- Do not restrict water for more than an hour before surgery.
- Food should be withheld for no more than three to five hours (two to three hours if <8 weeks of age) before surgery to reduce the risk of hypoglycaemia and food offered as soon as possible after recovery.
- Consider anaesthetic agents carefully due to changes in metabolism and excretion of drugs. Intramuscular protocols

require less restraint than intravenous administration of drugs.

- Keep kittens with littermates before procedure to reduce stress or excitement.
- Perform a full physical examination and accurate weighing of each patient. Delay surgery in male cats identified to be cryptorchid.
- Provide oxygen throughout procedure and intubate females.
- Monitor blood pressure during the procedure due to increased risk of hypotension.
- Minimise development of hypothermia by:
  - Implementing care with hair clipping;
  - Avoiding over-wetting of fur;
  - Usage of insulating materials and warming devices;
  - Maintaining environmental temperature >20oC;
  - Monitor temperature during procedure;
  - · Minimising the duration of procedure; and
  - Returning kitten to littermates where possible.

Veterinary surgeons at the RSPCA Greater Manchester Animal Hospital identified that the current licensed intramuscular protocols did not achieve reliable anaesthetic depth in prepubertal kittens being neutered at the centre. They subsequently developed the 'quad' protocol. This protocol is comprised of medetomidine (1mg/ml solution), ketamine (100mg/ml solution), midazolam (5mg/ml solution) and buprenorphine (0.3mg/ml solution) in equal volume, based on body-surface-area dosing. There is also a 'Kitten Quad' free iPhone App to allow for easy drug calculations. Usage of the protocol is off licence. Methadone (10mg/ml) can be used instead of buprenorphine as an alternative opioid. This changes the volume of each anaesthetic drug used, however. Butorphanol is not considered a suitable opioid due to lack of analgesic properties.

While meloxicam (2mg/ml) is licensed for use in cats larger than 2kg and older than six weeks, usage in early neutering may also be off license. Although the 'quad' can be reversed, it is not recommended to use atipamazole (5mg/ml) until at least 20 minutes after ketamine administration in order to avoid excitement.

Food should be withheld for no more than three to five hours before surgery to reduce the risk of hypoglycaemia and food should be offered as soon as possible after recovery. Kittens could potentially become hypoglycaemic due to reduced glycogen storage in an immature liver. If the patient is not recovering as expected post procedure, a blood-glucose measurement should be taken and supplementation given (oral or intravenous) where required (Welsh, 2016). While either a flank or midline approach can be utilised for ovariohysterectomy, a midline approach may be preferable as it may allow for improved exposure of soft tissue and reduce the risk of accidental damage to structures (Joyce and Yates, 2011). Anna Gales RVN, who worked at an RSPCA

Bodyweight (kg)	Body surface area (m2)	Volume of each anaesthetic drug (ml)	Volume of atipamazole (ml)	Volume of meloxicam cat (ml)
0.5	0.07	0.04	0.02	0.05
0.6	0.07	0.04	0.02	0.06
0.7	0.08	0.05	0.025	0.07
0.8	0.09	0.05	0.025	0.08
0.9	0.10	0.05	0.025	0.09
1.0	0.10	0.06	0.03	0.10
1.1	0.11	0.06	0.03	0.11
1.2	0.12	0.06	0.03	0.12
1.3	0.12	0.07	0.035	0.13
1.4	0.13	0.07	0.035	0.14
1.5	0.14	0.08	0.04	0.15
1.6	0.14	0.08	0.04	0.16
1.7	0.15	0.08	0.04	0.17
1.8	0.15	0.09	0.045	0.18
1.9	0.16	0.09	0.045	0.19
2.0	0.17	0.10	0.05	0.20
2.5	0.19	0.12	0.06	0.25

Table 2: Quad protocol using buprenorphine as selected opioid.

Body Volume Volume of Volume of Bodyweight surface of each atipamazole meloxicam (kg) area anaesthetic (ml) cat (ml) (m2) drug (ml) 0.5 0.07 0.03 0.015 0.05 0.6 0.07 0.04 0.02 0.06 07 0.08 0.04 0.02 0.07 0.02 0.8 0.9 0.04 0.08 0.025 0.9 0.10 0.05 0.09 0.10 1.0 0.05 0.025 0.10 1.1 0.11 0.06 0.03 0.11 1.2 0.12 0.06 0.03 0.12 0.12 0.03 1.3 0.06 0.13 1.4 0.13 0.07 0.035 0.14 0.14 0.07 0.035 0.15 1.5 1.6 0.14 0.07 0.035 0.16 0.15 0.07 0.035 0.17 1.7 1.8 0.15 0.08 0.04 0.18 0.04 0.16 0.08 1.9 0.19 2.0 0.17 0.08 0.04 0.20 0.19 0.10 0.05 0.25 2.5

Table 2: Quad protocol using methadone as selected opioid.

#### **CONTINUING EDUCATION I SMALL ANIMAL**

unit routinely practicing early neutering reported: "At first I was nervous monitoring the anaesthetics of young kittens. Now I feel confident and have found that, in general, they are effective and stable anaesthetics. Mostly though, I've been won over at how guickly they bounce back after their procedure - they are awake and eating very quickly and are generally playing again a few hours after their surgery. Anecdotally, I have found that the females are generally in less pain than adult cats having the same surgery. I also love the fact that we can rehome these cats already neutered, eliminating the risk of unwanted pregnancies and helping reduce the cat population problems we are currently facing." Increasing practice awareness of this concept is vital for it to become accepted and promoted routinely by veterinary surgeons as standard good practice timing rather than early neutering. Continued education in the subject for vets through awareness of online CPD or visiting practices could increase compliance, help change the mindset of many surgeons and help convert the concept to a conventional approach. All rehoming centres should ensure that cats are neutered prior to rehoming where at all possible. Early neutering before 16 weeks may be necessary in these situations. For feral cats, considering neutering at eight to 12 weeks may be necessary. No data is available but there is agreement that neutering, vaccinations and homing should be separated if possible, to minimise potential problems caused by stress (RSPCA, 2014). There will be situations where this is not possible, for example in shelters, charity medicine or non-compliant clients. Some rescue organisations suggest an arbitrary minimum weight of 400g, whereas others use an eightweek minimum age. However, there is no significant data to make firm recommendations of definitive minimums, besides that data that suggests neutering at eight weeks is safe for the patient.

#### SUMMARY

By working with other charities, councils and social housing, increased awareness can be achieved, and changes implemented. Using social and local media to promote neutering schemes would certainly increase uptake. Veterinary practices have an important role to play in education. Poor owner knowledge of feline reproduction is a major contributory factor in the rate of unplanned litters (Welsh et al, 2013). Greater emphasis on education and pre-booking of neutering could help to decrease this. Promotion of spay days, pro bono work and mobile clinics can further feline welfare. For charities, considering a policy where animals must be neutered in order to utilise their services may increase compliance.

Collaboration between animal organisations and housing associations through community outreach programmes can help target people less likely to neuter, areas of urban deprivation in big cities where people cannot afford neutering or where neutering is a low priority. Unneutered cats can be regarded as a nuisance; damaging homes or creating environmental health issues.

Therefore there is benefit for the housing association and councils to help tackle neutering at a local level. The attitude of veterinary surgeons towards the concept of early neutering will have a large impact on its use and therefore effectiveness at controlling the cat population. This article is designed to help general practitioners become more familiar with commonly used protocols and assuage any fears veterinarians may have over possible negative aspects of pre-pubertal neutering.

## **REFERENCES**:

- Bruniges N, et al. 2015. Injectable anaesthesia for adult cat and kitten castration: effects of medetomidine, dexmedetomidine and atipamazole on recovery. Journal of Feline Medicine and Surgery, 18, pp. 860-867.
- Joyce A, Yates, D. 2011. Help stop teenage pregnancy! Early-age neutering in cats. Journal of Feline Medicine and Surgery, 13, pp. 3-10.
- Holden D. 2007 Paediatric patients. In: Seymour C, Duke-Novakovski T, eds. BSAVA manual of canine and feline anaesthesia and analgesia. 2nd ed. Gloucester: British Small Animal Veterinary Association, pp. 296-302.
- Howe LM et al. 2000 Long-term outcome of gonadectomy performed at an early age or traditional

age in cats. Journal of the American Veterinary Medical Association, 217, pp. 1661-65.

- Spain CV et al. 2004. Long term risks and benefits of early age neutering in cats. Journal of the American Veterinary Medical Association, 224, pp. 372-80.
- Overley B et al. 2005. Association between ovariohysterectomy and feline mammary carcinoma. Journal of Veterinary Internal Medicine, 19, pp. 560-63.
- Murray, J.K. et al (2008) Opinions of veterinarians about the age at which kittens should be neutered. Veterinary Record, 163, pp. 381-385.
- Root Kustritz, MV. 2002. Early spay-neuter: clinical considerations. Clinical Techniques in Small Animal Practice, 17, pp.124-128.
- RSPCA. 2014. Tackling the cat crisis: a collaborative approach to neutering [online] available at https:// www.rspca.org.uk/adviceandwelfare/pets/cats/health/ neutering [accessed 23 April 2020]
- Welsh, C.P. et al (2013) Poor owner knowledge of feline reproduction contributes to the high proportion of accidental litters born to UK pet cats. Veterinary Record, 174, p.118.
- Welsh P. 2016. Neutering pet cats at four months of age (or less) [online] available at https://www.langfordvets. co.uk/media/1248/neutering-cats-at-4-months-of-ageor-less.pdf [accessed 23 April 2020]

# **READER QUESTIONS AND ANSWERS**

## 1. WHAT IS THE NORMAL RANGE FOR HEART RATE IN PAEDIATRIC CATS?

- A. 100-150 beats/minute
- B. 150-210 beats/minute
- c. 210-300 beats/minute
- D. 300-350 beats/minute

# 2. IMMATURE LIVER ENZYME SYSTEMS PERSIST UNTIL WHAT AGE?

- A. 6 weeks
- B. 8 weeks
- C. 12 weeks
- D. 16 weeks

## 3. COMPARED TO ADULTS, KITTENS ARE MORE SUSCEPTIBLE TO:

- A. Hypothermia, hypotension, hypoglycaemia
- B. Hyperthermia, hypertension, hyperglycaemia
- C. Hypothermia, hypotension, hyperglycaemia
- D. Hypothermia, hypertension, hypoglycaemia

#### 4. WHEN NEUTERING CATS BETWEEN 8-16 WEEKS OF AGE, FOOD SHOULD BE WITHHELD FOR NO MORE THAN:

- **A.** 2-3 hours
- **B.** 3-5 hours
- **C.** 6-8 hours
- D. 12 hours

#### 5. WHICH INTRAMUSCULAR SEDATIVE AGENT WOULD NOT BE SUITABLE IF PROVISION OF ANALGESIA WAS DESIRABLE?

- A. Butorphanol
- B. Buprenorphine
- C. Methadone
- D. Ketamine