

# **A summary of evidence**

## **Neutering kittens at four months**



**Cat-Kind**  
Kitten neutering database

Neutering is widely recognised as an effective way to reduce the number of accidental litters and unwanted cats being born in the UK, alongside other recognised benefits to cat health and behaviour. It is also the only certain way to prevent breeding, with alternatives such as containment and cat separation within the household often problematic and stressful for both owner and cat. Despite the efforts of cat welfare charities who neuter thousands of cats every year, the unowned cat population remains of concern with too few suitable homes available. Shelters are often at capacity<sup>1,2</sup> with many cats on rescue centre waiting lists<sup>2</sup>, and stray and feral cats are commonly found in large numbers across localised areas<sup>3</sup>. Research shows that 78 to 80% of owners of female cats who have had one or more litters say that the litter was unplanned<sup>4,5</sup> and that cat owners are largely unaware of the reproductive capacity of their pets<sup>4</sup>.

Historically, neutering has been completed at six months of age for owned cats. However, pregnancy can be seen in queens as young as four months<sup>6</sup>. Since 2006, neutering cats at four months, also known as prepubertal neutering, has been recommended by The Cat Group and subsequently supported by other animal welfare and veterinary organisations. A 2023 modelling study demonstrated the positive impact of prepubertal neutering on cat populations, with a decline in unowned cat numbers observed when owned cats were neutered at four months rather than six, even when neutering prevalence remained the same<sup>7</sup>. As of 2020, approximately half of UK-based veterinarians would recommend neutering client-owned cats at four months of age<sup>8</sup>. Cat-Kind is calling for all veterinary practices to promote and practice neutering at four months old to reduce the number of unplanned litters.

### **Perceived risks of four-month neutering**

There remain some concerns within the veterinary profession about the perceived negative consequences of four-month neutering in cats relative to the historic recommendation of six months.

This document provides a simple review of current available evidence on key areas of concern for neutering cats earlier than six months. While the recommendation is four months for owned cats, we note that some of the studies summarised explore the effects of neutering at earlier ages.

This summary is designed to be a quick, informative tool to incorporate evidence into clinical practice. This is not a fully comprehensive overview of all literature, and only published, peer-reviewed work is included.

### **Surgical risks?**

Short-term studies have identified no increased surgical risks associated with prepubertal neutering (during, immediately after and up to a week after neutering)<sup>9,11</sup>. Furthermore, neutering earlier (eight to 12 weeks of age) has the benefit of being more expedient, relative to neutering at six to eight months<sup>10</sup>. This is likely due to the physiological differences between kittens and adult cats. For example, gonadal vessels are elastic and small, there is less abdominal and bursal fat which can help enable good visualisation and accurate haemostasis of small blood vessels and prepubertal ovaries have been found to be easily identified because of their relatively large size in comparison to the small size of the kitten<sup>10</sup>. It has also been reported that a smaller incision is required and use of intradermal absorbable skin sutures can reduce the need for Elizabethan/buster collars and/or postoperative checks<sup>6</sup>. A lower rate of postoperative

wound complications and less effective pain has also been documented following prepubertal neutering (less than four months of age) compared with neutering cats older than four months<sup>12</sup>.

### **Anaesthetising younger kittens**

Potential risks of anaesthetising young kittens, including hypothermia and hypoglycaemia, are now recognised and considerably reduced by published information on improved techniques and agents. Numerous studies have demonstrated that there is no increased risk of anaesthetic complications associated with desexing cats before puberty. One study found no significant anaesthetic complications in 96 kittens neutered between six and 16 weeks of age<sup>13</sup>. Further studies found no difference in risk between early neutering compared to later neutering (around six months) provided appropriate measures are in place<sup>10,11</sup>. Examples of these measures include withholding food for no more than three to five hours before surgery, offering food early in recovery, prevention of heat loss and 'the quad' anaesthetic combination of medetomidine, ketamine, buprenorphine and midazolam (unlicensed in combination; the Kitten Quad app which is available for free from [kind.cats.org.uk](http://kind.cats.org.uk) helps calculation of doses). Research has shown that recovery from anaesthesia is faster in kittens (less than six months of age) compared to adults<sup>14</sup>.

### **Implications for the cat's behaviour?**

Neutering is known to correlate with a decrease in sexually dimorphic behaviours, some of which may be considered undesirable by owners, for example urine spraying, fighting. Studies that have followed up with owners between one to seven years post-adoption have found no significant differences in the behaviour of prepubertal neutered kittens compared with later age neutered kittens<sup>15-19</sup>. Where a difference has been found, it has indicated that there may be behavioural benefits to earlier neutering including reduced aggression towards vets<sup>20</sup>.

### **Growth and development?**

Neutering at any age prior to physeal closure delays that closure and has been associated with significant lengthening of associated long bones found in some<sup>21</sup>, but not all studies<sup>22</sup>. An additional study found a significant delay in closure for neutered male cats compared with entire males but no difference between entire and neutered females<sup>23</sup>. However, this lengthening has not been associated with prepubertal neutering specifically, with no difference in radial length between cats neutered at seven weeks and seven months<sup>21,24</sup>.

Additionally, no clinical relevance of delayed physeal closure has been demonstrated in cats neutered prepubertally, for example this does not affect radius length<sup>22</sup>, has not been associated with long-bone fractures<sup>20</sup> or increased osteoporotic risks<sup>22</sup>. A recent longitudinal study using prospective data reported cats that were entire at six months of age were twice as likely to have owner-reported early signs of degenerative joint disease when six years of age than cats that were neutered prior to six months<sup>25</sup>. While we are unable to infer the mechanism behind this result, it does indicate no adverse effects of neutering cats prior to six months on their mobility at six years of age. With regards to growth (as measured by bodyweight), a 2023 study found an upwards trend in growth for all cats after neutering. However, growth trajectories were similar for all male cats neutered up to 28 weeks, and all female cats neutered up until 29 weeks, suggesting prepubertal neutering impacts growth at the same level as cats neutered up until the historically recommended six months<sup>26</sup>.

### Urinary problems?

In prepubertal neutered cats, the external genitalia remain the size of their infantile appearance<sup>6</sup>. If prepubertal neutering can cause an underdevelopment of the genitals, and therefore of the urethral diameter, it is understandable that there have been concerns about potential risks of higher incidents of feline lower urinary tract disease (FLUTD) in prepubertal neutered cats. However, numerous studies have failed to evidence a correlation between prepubertal neutering and increased risk of urinary problems. Specifically, cats neutered at seven weeks were not found at increased risk of a decrease in the diameter of the urethra at 22 months of age when compared to cats neutered at seven months<sup>27</sup>. One study actually found a decrease in occurrence of FLUTD in earlier neutered cats (less than 24 weeks old)<sup>16</sup>. Additionally, there has been no difference found between cats neutered at eight to 12 weeks compared to those neutered between six to eight months in the increase in incidence of FLUTD or urethral obstruction in male cats two years post-neutering<sup>28</sup>. Similar results were found when comparing cats neutered before and after 5.5 months, with no difference in incidence of FLUTD or urethral obstruction up to 11 years (median 3.9 years) post-neutering<sup>20</sup>. Owner-reported incidences of FLUTD, urinary tract disease, urinary incontinence and urinary obstruction were not found to be significantly different between cats neutered before four months or at six months or older<sup>19</sup>. In male cats that did develop urethral obstruction, a significantly earlier age of onset was found for intact cats when compared to cats neutered at any age, and a slight, but not significant, later age of onset was found for cats neutered prepubertally<sup>29</sup>.

### Increased risk of obesity

Neutering is a commonly associated risk factor for obesity. Metabolic rate has been shown to decrease in cats after neutering and neutered cats are more predisposed to obesity than entire cats<sup>24</sup>. However, longer-term studies that track cats in the years following surgery have not identified earlier neutering (less than 5.5 months of age) as a risk factor for obesity relative to later neutering (more than 5.5 months of age) when the cats were three years of age<sup>16</sup> and up to 11 years (median 3.9 years) post-surgery<sup>20</sup>.

Further studies compared cats neutered at seven weeks and seven months and found no difference between heat production (an indirect measure of calorimetry) at two years of age<sup>30</sup> and no difference in bodyweight or body condition score (BCS) at one year of age<sup>24</sup>. Additionally, cats neutered at 31 weeks showed a rapid post-neuter increase in food intake compared to cats neutered earlier at 19 weeks, therefore from a weight management perspective the authors suggest neutering earlier may be beneficial<sup>31</sup>. Owner-reported levels of obesity did not differ significantly in cats neutered before four months or at six months or above (no cats in the study population were neutered between four to six months)<sup>19</sup>. A 2024 longitudinal study following cats from kittenhood up to 13 years old found no differences in clinical measurements of BCS and bodyweight between cats neutered at four months or younger, five months, or six months as cats aged<sup>32</sup>. There is no evidence to suggest that cats neutered at four months are of increased risk of obesity relative to cats neutered at six months. Instead, proactive dietary management of neutered cats is important irrespective of age when neutered.

### Summary

Although all studies have limitations and further longitudinal data on owned cats would be valuable, overall, the body of evidence suggests that neutering cats prepubertally has similar effects on physical and behavioural development and carry no greater risk of surgical or anaesthetic complications, compared with neutering at the age of six months or older. The perceived increased risks of surgery or anaesthesia are now considerably reduced by published information on improved techniques and agents. These data lend support to the practise of four-month neutering of owned cats, already performed by many veterinary surgeons.

Many charities are working together under the umbrella of Cat-Kind to maximise the effectiveness of cat neutering through collaboration on research, joint projects and co-ordination of activities.

We cannot achieve this without the help of vets.

- Over 575 veterinary practices are signed up to the Kitten Neutering Database at [kind.org/cats](https://www.kind.org/cats) with a pledge to practice four-month neutering
- Both the British Small Animal Veterinary Association (BSAVA) and British Veterinary Association (BVA) support prepubertal neutering of owned cats at four months of age

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Cat-Kind is an initiative from Cats Protection and respective members of the Cat Population Control Group (CPCG) as detailed below:



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