



Assessment of neutered status – female cats

This guidance may be helpful for vets being asked to appraise the neutered status of female cats in the care of Cats Protection (CP) where previous medical records are unavailable. It also details our recommendations for cases of suspected 'ovarian remnant syndrome'.

While exploratory laparotomy is the only definitive test to confirm neuter status, the below recommendations aim to reduce the number of cats undergoing exploratory surgery. It is important that new owners are made fully aware of the diagnostic process if methods other than exploratory laparotomy are used. The '**Handout for adopters of female cats not neutered in Cats Protection's care**' explains this in more detail.

Options	Comments	CP Preferred options for CP Cats
Evidence of lactation	Lactation is suggestive of entire status, but absence of lactation is obviously not confirmative of neutered status.	✓
Palpation for pregnancy	Pregnancy is confirmative of entire status, but absence of pregnancy is obviously not confirmative of neutered status.	✓
Shave for spay scar	The left flank, the midline and then the right flank should be shaved to look for a scar suggestive of neutering - such scars are often more apparent if a small quantity of surgical spirit is applied to the skin. On occasion, queens which have scars suggestive of neutered status go on to show signs of oestrus or develop pregnancy. A midline scar may indicate laparotomy for reason other than neutering. However, if a strongly suggestive scar is found, new owners should be advised that the cat is presumed neutered. If no such obvious scar is found and the neuter status remains unknown, an LH test may be performed.	✓

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LH assay	<p>LH (luteinising hormone) is released from the pituitary gland. In female cats, mating stimulates the release of LH into the bloodstream, leading to ovulation. In unneutered female cats, LH is normally maintained at low serum levels through negative feedback from the ovaries (unless mating has just occurred). Removal of the ovaries through neutering removes that negative feedback and subsequently the serum levels of LH in neutered females are higher. A Cats Protection study published in 2018* looked at female cats of unknown neuter status and found that the LH test was 100% specific in identifying neutered females. A single positive LH test with a single sample will correctly identify a cat as being neutered. New owners can be advised that the LH test has indicated the cat is neutered. An exploratory laparotomy should follow a single negative LH test. Some cats that test negative on the LH test will be neutered on exploratory laparotomy, but this should significantly reduce the number of neutered cats undergoing surgery.</p> <p>More detail on the LH testing procedure can be found in Cats Protection’s LH testing protocol and LH testing flowchart.</p>	✓
Exploratory laparotomy	Usually confirms neutered status.	✓ mid-line exploratory laparotomy is preferred for female CP cats of unknown neutered status if no spay scar is found and that have tested negative on the LH test.

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Options	Comments	CP Preferred options for CP Cats
Monitor behaviour	Oestrus activity recurs every two to three weeks in non-gravid entire sexually mature females generally through spring, summer and autumn. However, this is reliant on good observational skills and/or flexibility to examine the cat during this time for response to manual stimulation of the hindquarters (appraising for signs of oestrus, including tail deflection, spinal flexion, rubbing/rolling, vocalisation, treading of the hind legs, body or tail tremor and rigidity).	
Vaginal cytology	Cornified epithelial cells are present in entire queens during oestrus – multiple samples may be needed and/or good observational skills and flexibility to examine the cat during this time.	
Ultrasonography	A high level of skill is required to confirm or discount entire status in a non-gravid queen.	
Oestradiol assay	Oestradiol is at its peak when an entire queen is showing oestrus behaviour, however a low level may be present in an entire queen during anoestrus (winter) or during the inter-oestrus interval – not a useful test alone.	
Stimulation tests (hCG, GnRH)	<p>hCG injection must be given one to three days after the onset of oestrus behaviour and the cat resampled seven days later to assess progesterone levels, so not a useful test alone.</p> <p>GnRH injection leads to an oestradiol surge three hours later, but data from controlled, published studies on cats are lacking.</p> <p>Neither hCG nor GnRH are licensed for use in cats.</p>	
Anti-Mullerian hormone testing	Anti-Mullerian hormone (AMH) is produced by the granulosa cells, with serum concentrations present throughout the oestrus cycle. Although studies are based on limited sample sizes in cats, it is thought to be highly efficient, with serum concentration of AMH differing significantly between entire and spayed female cats. However, currently there is no validated patient-side assay available.	



*Cats Protection study published online first in the Journal of Feline Medicine and Surgery:

Morrow LD, Gruffydd-Jones TJ, Skillings E, Welsh CP, Murray JK (2018) Field study assessing the performance of a patient-side blood test to determine neuter status in female cats based on detection of luteinising hormone

Oestrus behaviour in neutered queens, including ovarian remnant syndrome

Unneutered female cats, and those with ovarian remnants following neutering, continue to show seasonal oestrus behaviour, with 'heat cycles' every two to three weeks in spring, summer and autumn, but typically not in winter. Some of the options for assessment of neutered status detailed above may be useful for identifying female cats with ovarian remnants following neutering.

Surgery is the most common approach to the confirmation and management of cats with ovarian remnants. If surgery is performed to explore for ovarian remnants (often found at the ovarian pedicles), timing this to be during the dioestrus period of the cat's oestrus cycle, just after (induced) ovulation can make the remnants easier to see as the ovarian tissue may have corpora lutea nodules grossly evident at this time.

Some cases of 'ovarian remnant syndrome' are proposed to be due to additional ovarian tissue found away from the normal surgical sites, although evidence of this is unclear.

Other possible causes of 'heat-like' behaviour has been reported in neutered cats following contact with human skin to which Hormone Replacement Therapy (HRT) cream or spray has been applied.