

Feline Reproductive Physiology:

Estrus follow-up in the queen

MALANDAIN E.M., DVM, MSc, FROMENT, E.M. DVM
Alfort Veterinary College, Paris, France

The follow up of the feline estrous cycle is a new demand of cat breeders, in order to perform AI, or to deal with infertility in the queen.

Vaginal Smears

As in the bitch, exfoliated cells can be easily obtained by introducing a cotton-tipped swab into the vestibular and caudal vagina. Some authors prefer to use instillation of small amount of sterile water to perform vaginal cytology, but according to our experience, queens do not tolerate it better than the cotton swab, which is quickest. The cotton swab must be damped before its horizontal introduction. The introduction must be done carefully, to avoid inducing ovulation.

The difference with the bitch is the use of a smaller cotton swab (for example human urethra cotton swab). The staining methods are rather the same than in bitch, but interpretation differs widely.

Three phases of the queen cycle can be easily identified using vaginal cytology: estrus, anestrus, and interestrus/diestrus.

But, on the opposite of what is seen in the bitch, it is impossible with vaginal cytology to differentiate the beginning, middle, or end of estrus. The majority of the cells are cornified and acidophilic, and no statistical significant variations are seen during the estrus, neither when the maximal diameter is obtained by follicle, as determined by ultrasonography. What can be noted, in some queens (but not all) is cellular clumps around this day, and sparse PN cells at the end of estrus.

In practice, vaginal cytology gives a lot of information, but is not precise enough to follow the heat period. It allows to make sure that the queen is in estrus (sometimes behavior is not characteristic) and to detect vaginitis.

Endocrinology

The follow up of estrus with endocrinology is not really feasible, comparatively to the bitch. Raise of Progesterone begins 24-48 hours after ovulation and therefore, this assay can only confirm it long after the fertile period. Estradiol assays are not routinely available, and difficult to evaluate.

Finally, Feline LH assay is difficult, only performed in research labs and needs several blood samplings. However, these samples lead to stress, which compromises ovulation!

Ultrasonography

Ultrasonography is a powerful tool to examine follicular population in many species. To date, its use in queens has been limited by the small size of follicles. Thanks to the development of high resolution equipment, follicular aspect can now be assessed. (10-12mHz probe)

Ovarian follicles appear as anechoic spherical structures, visible from 1.5 to 4.2 mm in diameter.

In a study on anovulatory cycles (Malandain et al, 2002), between 4 and 9 follicles were detected in each queen. On the first day of behavioral modifications, mean follicular diameter was 2.3 ± 0.5 mm (minimum 1.4 mm; maximum 3.1 mm). Then it progressively increased along the estral period, reaching a maximal diameter of 3.2 ± 0.4 mm (minimum 2.6 mm; maximum 4.1 mm), with at least one follicle per queen being superior to 3.0 mm. The maximal size was reached between the second and the sixth day of estrus (average 4.25 ± 1.5 d). Follicular diameter then decreased, being $2.2 \text{ mm} \pm 4$ (minimum 1.4; maximum 3.4) in diameter at the last day of estrus. Some follicles remained small (around 2 mm) and were not consistently seen during the period of examination.

However, even if the general pattern of follicular growth appears similar between queens, its timing relating to behavioral estrus is highly different between individuals. At the first day of specific estrus behavior, follicles show very different sizes between queens. Moreover, the day at which the maximal diameter is observed after the onset of estral behavior is different between queens.

During ovulatory cycles, the follicles suddenly disappear at the time of ovulation, and, sometimes, hypoechogenic structures (corpus luteum) can be seen in the following days.

Correlation between techniques

It appears that there is not a perfect correlation between follicular size changes and the chronology of estral behavior. Neither behavior, nor vaginal cytology appeared to be accurate methods, despite the observation of cellular clumps in the smears around the day of maximal follicular diameter.

Ultrasonography demonstrated that follicles progressively grew and then became atretic, through out the anovulatory cycles. A maximal follicular diameter could be determined on ultrasound. Ultrasonography was found to be the most reliable method to determine the state of follicular growth and allows diagnosing immediately the moment of ovulation.

As some queens begin to exhibit estrus while their follicles enter in atresia, the decision to inseminate systematically on the third day of estrus should be revised.

With evaluation of follicular maturation using ultrasonography, our preliminary results with vaginal artificial insemination with a low amount of spermatozoa showed better results than others authors, inducing ovulation on a fixed day of the heats.

The optimal follicular diameter for ovulation induction and insemination efficiency is still to be determined. Studies could be done on minimal/maximal diameter of a fertile follicle.

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