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OESTRUS BEHAVIOUR IN DOMESTIC CATS
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Introduction
The domestic queen is classified as being seasonally polyestrous and a long day breeder. Queens cycle repeatedly during breeding season, unless interrupted by pregnancy or pseudopregnancy. The seasonality is related to the light duration, because the cat is positive photoperiodic (Leyva et al., 1989ab; Michel, 1993). The manipulation of the hour’s light has routinely been used to induce estrus (Leyva et al., 1989ab; Michel, 1993) or an estrous in the queen (Mattos et al., 2001; Silva et al., 2001). However, environment factors, such as social stimulus and audiovisual and olfactory communication seem to change the queen’s behavior (Michel, 1993). Furthermore, the sexual behavior of domestic cats is described through classical signs, but, differences have been observed between queens kept under temperate and equatorial conditions. Under 12 hours of natural light without seasonal variations, queens seem to cycle continually. Concerning sexual behavioral signs in an equatorial photoperiod, some experiments were done with cats in natural conditions only under hormonal treatments (Silva et al., 2001; Aguiar et al., 2002).

Thus a better understanding of the estrous cycle characteristics of domestic queens maintained in natural photoperiod is needed.

General characteristics of estrous cycle
Queens normally have their first estrous cycle between 4 and 12 months, with the average age around 6 months. They have 2 to 4 estrous period every year, lasting 15 to 22 days. If the cat is bred, estrus seldom lasts more than 4 days. If successful mating does not occur, a heat cycle may last for 7 to 10 days and recur at 15 to 21 day intervals. An unmated female can cycle every 3-4 weeks indefinitely. Cats also have an estrous period 1-6 weeks after giving birth, so a female may be nursing one litter while pregnant with another (Silva et al., 2006a).

The time of the first estrus is influenced by breed (many shorthair breeds reach puberty earlier than longhair breeds), the time of year (which determines the length of daylight), and the body condition of the queen. The average body weight at puberty is 2.3 to 3.2 kg (or 80% of adult body weight). Queens cycle repeatedly during a breeding season unless interrupted by pregnancy, pseudopregnancy, or illness. Estrous cycles will occur at intervals ranging from four to 30 days but are typically 14 to 21 days apart. Over 50% of all shorthair cats will have estrous cycles year-round (Silva et al., 2006a).

Occasionally, queens with prolonged estrus are seen. In some cases, it is thought that this is due to the maturation of overlapping waves of ovarian follicles and therefore, prolonged high levels of the hormone estradiol. Other such cats, however, are having normal distinct patterns of follicular growth. Another normal variation is the queen that appears to be in estrus while pregnant (Silva et al., 2006a).

Traditionally, queens are described as induced ovulators. Ovulation should not occur unless mating or a similar stimulus induces it. However, spontaneous ovulation in response to visual, auditory or tactile stimulation is well documented. The length of estrus is not affected whether ovulation does or does not occur. The period between one estrus and the next in queens that have not ovulated is called the interestrus. During this time the blood estradiol level is low and no sexual behaviors are seen. The time of interestrus can range from two to 19 days but on average is seven days (Verstegen, 1998).

Queen sexual behavior and estrous characteristics under equatorial photoperiod
Estrous signs can be observed by manual stimulation of hindquarters performed by a trained observer and by presenting queens to a tomcat, in the presence of the observer. Both procedures
should be performed twice daily. Sexual signs observed are: tail deflection, spinal flexion, rubbing or rolling, vaginal discharge, vocalization, treading of the hind legs, body or tail tremor and rigidity, blows or scratches and discomfort on manipulation (grunting and escape attempt). For evaluation of the queen placed with a tomcat, a gloved hand of the observer is needed to prevent mating (Silva et al., 2006b).

Our team had observed a group of domestic queens during 6 months. The study was conducted in the city of Fortaleza, Ceará State, Brazil. In that study, 45 domestic queens were kept in individual cages allotted in intercommunicating boxes for 135 days. During this period, 34 (75.5%) queens did not show anoestrus. We suggested that the social stimulus had developed a negative effect in the anoestrus induction by light manipulation in queens.

A total of 362 observations were accomplished for each female during the six months of the experiment. For all the females, no periods of absence of sexual behavior of over 24 hours were observed, just an interchange of phases with acceptance or refusal of mating was observed. Through only of the analysis of behavior it was not possible to identify the interestrus, nor to distinguish it from proestrus.

During the period of observation, 187 complete cycles were accompanied, with an average of 7.48 ± 0.68 cycles per queen. The mean duration of the cycle was of 18.06 ± 0.92 days with mean estrus duration of 7.87 ± 0.49 days and mean phase of no acceptance of mating of 10.25 ± 0.85 days.

Estrus of 5.8 ± 3.3 days were found. Short estrus, with duration of 0.5 up to 5 days, happened in 28.3% (53/187) of the total of observed estrus, presenting a mean duration of 2.99 ± 0.24 days. The mean estrus, between 5 and 20 days, were observed in 68.5% (128/187) of the cases. Phases of sexual intercourse acceptance with duration superior to 20 days, or long estrus, were observed in 3.2% (6/187) of the total of cycles, with minimum duration 24, and maxim of 63 days and mean duration of 36.5 ± 6.61 days.

In 10.16% (19/25) of the observed cycles, the phase of no mating acceptance had duration superior to 22 days with mean duration of 40.82 ± 2.76 days, suggesting the occurrence of the diestrous phase. These cycles were classified as ovulatories. At least one ovulatory cycle was observed in 48% (12/25) of the queens studied, with mean duration of 46.63 ± 3.03 days. Among the 12 females that seemed to have presented spontaneous ovulation, the percentage of ovulatory cycles among the total of observed cycles per queen varied from 7.69% to 100%.

Intervals of no sexual intercourse acceptance (no superior to 24h), but with the maintenance of other signs of sexual behavior inside the estrous phase, were observed in 41% of the total of cycles, where only 3 queens (12% of the cats) did not present discontinuity in any of the estrus.

The duration of the phases of non acceptance of sexual intercourse in all the animals varied from 1.5 to 64.5 days. In 89.84% (168/187) of the observed cycles, the duration of this phase was of up to 22 days, with mean duration of 6.79 ± 0.31 days, suggesting the absence of ovulation, and these cycles were classified as no-ovulatory. The total of no-ovulatories cycles found was distributed in 13 of the observed females and presented a mean duration of 14.89 ± 0.57 days, with minimum of 2 and maximum of 68 days.

While some cats presented from 9 to 13 cycles in 6 months (1.5 to 2.17 cycles/month), in others the prolongation of one of the two phases led to a considerable reduction in the number of cycles/month (0.33 and 0.5 cycles a month, for instance).

The absolute number of observations for each acceptance sign or rejection differed among the periods with and without sexual intercourse acceptance for all of the signs (P <0.05). The percentages of observations of the signs in those periods are expressed in Table 1.

It was noticed that 85.3% of the observations of body or tail tremor and rigidity were accomplished in estrus, being, therefore, a characteristic parameter of sexual receptivity, together with rolling and vocalization. The discomfort on manipulation and the blows or scratches were more characteristic in the moments of no sexual receptivity.
The effects of smelling, visualization and hearing presented by the females in estrus might have been the most relevant within the social effect. Graph 1 displays the distribution in the form of waves of estrus occurrence over the months, where on every day of observation females in estrus were found, but never concentrating more than 18 cats simultaneously. The number of cats in estrus daily differed among the months, concentrating more cats in estrus in March, followed by April, June and February. In January and May there was a smaller number of queens in estrus (P<0.05).

**Final considerations**

Domestic queens maintained in a natural equatorial photoperiod in the semi-humid equatorial weather continuously exhibited signs of sexual behavior and that signs of body and tail tremor and rigidity are an important estrus indicative. Further investigation is needed to define the factors that determine an unresponsive behavior to darkness in the domestic cat. It is possible that temperature, humidity and pluviosity associated to the social effect exercise effect on the concentration of cats in estrus. That knowledge of the reproductive physiology of domestic cats in equatorial climatic conditions will allow the best reproductive handling and biotechniques in domestic and wild cats.

**References:**


