ABSTRACTS

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SEASONAL CHANGES IN TESTIS CELL MORPHOLOGY IN MALE DOMESTIC CATS (Felis catus)

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Introduction - Some domestic and wild animals like sheep, goat, deer and fox have seasonal reproduction due to photoperiod [1]. This seasonality is observed in geographic locations where large differences between light hours during the year are present [1, 2]. The queen is described as seasonally, polyestrous, with induced ovulation by coitus [3]. Whereas previous studies concluded that male cats are not seasonal in sperm production [4, 5], more recent studies challenge this findings and suggest seasonality in sperm production in the tom [6].

Objectives - Therefore, the aim of this study was to assess the variation observed in the seminal epithelium morphology in relationship with natural photoperiod in male cats.

Materials and methods - Testes recovered from a program for control of urban feline reproduction at a pet public shelter were used. Toms (n=240) aged between 1 and 5 years, were orchiectomized (ORQ) throughout every other week of the year. Before surgery, all animals were anesthetized with a combination of a ketamine (25 mg/kg i.m.; Vetanarcol, Laboratorios Koning SA, Argentina), xylazine (1mg/kg i.m.; Sedomin, Laboratorios Koning SA, Argentina) and atropine (0.04 mg/kg i.m.; Atropina, Proagro SA, Argentina). All surgical procedures were performed by a licensed veterinarian and followed approved guidelines for ethical treatment of animals. After bilateral orchiectomy [7], each testes with adjacent epididymis was fixed by immersion in Bouin solution [8] and transported to the laboratory. After fixation, testes were trimmed out of epididymis and cut in three sections by transversal cuts with a scalpel blade. To perform light microscopic investigations, 5 µm transversal sections were cut between the second and third section of each testes, and stained with Eosin-Toluidine blue [4]. Twenty cross sections of tubules were examined in each slide at 1000 X magnifications. Percent of round spermatids (PRS), percent of elongated spermatids (PES), percent of tailed spermatids (PTS), percent of mature spermatids (PMS), number of Sertoli (SC) and Leidig cells (LC) were recorded in each sample. The analysis of variance was performed with the GLM procedure and correlations were calculated with the CORR procedure of SAS® [9]. The main effect of season was included as an independent variable in the model. Three orthogonal contrasts were designed to compare differences between means. The first contrast compared seasons of days with long hours (LHD, spring and summer; 11.2-14.3 h) to seasons of days with short hours (SHD, autumn and winter; 10.5-11.2 h), the second contrast compared spring (SP) to summer (SU) and the third contrast compared autumn (AU) to winter (WI).

Results - Testicles from males ORQ during SHD had a higher percentage of tubules with round and elongated spermatids compared to testicles from males ORQ during LHD (31.3 ± 0.6 vs. 2.1 ± 0.6 %, P<0.001; 30.9 ± 0.7 vs. 11.0 ± 0.7 %, P<0.001). Conversely, testicles from males ORQ during SHD had a lower percentage of tubules with tailed and mature spermatids ready for release for Sertoli cells compared to testicles from males ORQ during LHD (24.5 ± 0.8 vs. 29.7 ± 0.8 %, P<0.01; 13.1 ± 1.2 vs. 57.0 ± 1.2 %, P<0.01). Furthermore, testicles from males ORQ during SHD had a higher number of tubules with Sertoli cells and lower number of Leydig cells compared to testicles from males ORQ during LHD (11.4 ± 0.1 vs. 8.0 ± 0.1 %, P<0.01; 19.2 ± 1.0 vs. 38.0 ± 1.0 %, P<0.01). There was a positive and
significant correlation between the percentage of rounded and elongated spermatids ($r^2=0.75$, $P<0.01$); between the percentage of rounded and elongated spermatids and the number of Sertoli cells ($r^2=0.64$, $P<0.01$; $r^2=0.47$, $P<0.01$), and between the percentage of mature spermatids and Leydig cells ($r^2=0.74$, $P<0.01$). On the contrary, there was a negative and significant correlation between the percentage of rounded and elongated spermatids and the percentage of mature spermatids ($r^2=-0.85$, $P<0.01$; $r^2=-0.89$, $P<0.01$), and between the percentage of rounded and elongated spermatids and the number of Leydig cells ($r^2=-0.65$, $P<0.01$; $r^2=-0.67$, $P<0.01$).

**Discussion** - The queen is a seasonal breeder when exposed to natural photoperiod, with ovarian activity ceasing under decreasing photoperiod and resuming with increasing photoperiod. Melatonin secretion is controlled by the prevailing photoperiod, with higher concentrations during the dark phase. In other species, photoperiod and melatonin concentrations are related to circannual sperm production. In our work, the high percentage of mature spermatids observed in males ORQ during LHD could be related with higher sperm production during those months. A higher percentage of mature spermatids could produce a displacement of the SC from the seminiferous epithelium which could explain the lower number of SC found in LHD. Besides, the negative correlation found between rounded and elongated spermatids with mature spermatids, further supports this finding. In addition, the positive correlation between mature spermatids and LC could be related with an increase in testosterone production during LHD, at the time when sperm production is highest. Conversely, during SHD, when sperm production and testosterone concentrations are lowest, we found a negative correlation between rounded and elongated spermatids and LC. Therefore, we conclude that there are seasonal changes in testis cell morphology in the tom which may be related to seasonal sperm production.

**References**


