ABSTRACTS

ISCFR 2012

July 26-29, Whistler, Canada

In a joint meeting with

EVSSAR 2012

15th Congress of the
European Veterinary Society for Small Animal Reproduction

Editors: Gary England, Michelle Kutzler, Pierre Comizzoli, Wojciech Nizanski, Tom Rijsselaere and Patrick Concannon

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Felid luteal function, hormone profiles and reproductive assessment strategies in felid species

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OBJECTIVES AND METHODS: The life cycle of the corpus luteum (CL) in domestic cat and many other felid species is characterised by marked changes in morphology and endocrine regulation patterns. In the domestic cat, the CL formation starts immediately after ovulation, when ovarian follicular cells become compactly grouped and begin to hypertrophy reaching the typical polyhedral for active luteal cells by day 7 (1). Both, luteal cells and whole CL, reach maximum size at day 12 to 16. The progesterone (P4) excretion follow similar pattern. Serum P4 level rises for 10-12 days, afterwards stay elevated till regressive luteal changes are evident by histology and decreasing serum P4. In pseudopregnant animals, luteal regression starts from day 21 onwards, and lasts approximately 40 days (2). The structure of CL seems not to be fully resolved in lactating queens (1).

In other pregnant and pseudopregnant felid species the luteal hormone profile doesn’t differ markedly from that of the domestic cat. Only cycle (pregnancy) lengths and hormone elevation levels are species specific. Usually data on non-domestic cats are available from non-invasive hormone monitoring based on hormone metabolite determination in feces or urine (3-5). In almost all felid species, fecal progesterone reflects luteal function during pregnancy and pseudopregnancy, whereas fecal PGFM (a metabolite of prostaglandinF2α) can be used for differentiation between pregnancy and pseudopregnancy and for pregnancy check in captive felid species (4). Both, P4 and PGFM drop down to basal levels at parturition.

One exception within the felid family are lynxes. The fecal hormone profiles described for all lynx species indicate no P4 elevation during pregnancy and pseudopregnancy (5). Serum P4 level, however, significantly increase during pregnancy, but never reach baseline levels after parturition and weaning. Based on repeated ultrasonography and endocrine examinations, a postpartum luteal activity was suggested for lynxes (6). Also in pseudopregnant lynxes, persistent CL and elevated P4 values indicate luteal activity throughout the year.

RESULTS: To obtain more information on annual life cycle of lynx CL, and especially on pre-estrus luteolysis, serum and fecal prostaglandin metabolite levels were analyzed by EIA and LCMS as described before (4). In addition, histological structure and intraluteal hormone levels were determined in CL obtained from hunted or road-killed Eurasian lynxes (Carneby et al., in preparation). The intraluteal steroid hormones follow the same pattern as described for serum, with 25fold higher P4 (2.6 µg/g vs. 72.3 µg/g) and 50fold higher E2 (10 ng/g vs. 450 ng/g) levels measured in CL from pregnant animals. Interestingly, intraluteal prostaglandins were not elevated in CL during pregnancy, but just prior to breeding season in ovaries obtained in January and February. PGE was the predominant intraluteal prostaglandin with highest content in January (3060 ± 480 ng/g, n = 8) which gradually decreased towards the end of the year (November/December = 1210 ± 126 ng/g, n = 16). Significant higher amounts of PGF2α (611 ± 113 ng/g) and PGFM (915 ± 108 ng/g) were found in CL from January/February (n = 22) in comparison to the rest of the year (193 ± 113 and 498 ± 38 ng/g, respectively; n = 67). The seasonal elevation of prostaglandins within CL was not related to significant changes in serum or fecal samples, with exception of PGFM indicating for placental function during late pregnancy.

CONCLUSION Feline luteal function is only partly reflected by serum hormone levels. Especially the unique structure of the vascular utero-ovarian plexus allows transport of luteolytic PGF2α directly from the uterus to ovaries bypassing the systemic circulation. Thus, the intraluteal levels of steroids and prostaglandins provide more information about hormonal driven processes during luteogenesis and luteolysis (BMBF 033L046).

(5) Dehnhard M, Fanson K, Frank A, Naidenko SV, Vargas A, Jewgenow K. Comparative metabolism of gestagens and estrogens in the four lynx species, the Eurasian (Lynx lynx), the Iberian (L. pardinus), the Canada lynx (L. canadensis) and the bobcat (L. rufus). Gen Comp Endocrinol;167: 287-296.