ABSTRACTS

ISCFR 2012

July 26-29, Whistler, Canada

7th International Symposium on Canine and Feline Reproduction

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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Embryo retrieval after hormonal treatment to control ovarian function and non-surgical artificial insemination in African lions (Panthera leo)

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OBJECTIVES AND METHODS: African lions (Panthera leo) normally breed well in captivity leading to application of contraception methods as a management tool in zoos. However, the wild population is highly fragmented and suffers progressively from geographic isolation and inbreeding. Within Africa, the West African population is particularly endangered. The Asiatic lion (Panthera leo persica) is actually critically endangered in the wild and breeding success in zoos is very limited. Assisted reproduction technologies became essential for propagating endangered wild felids in captivity (1). Artificial insemination (AI) has been reported successfully in only a few feline species (2, 3) to date. Before AI estrus and ovulation have to be induced. Although there are a variety of studies on ovarian control for assisted reproduction in domestic and wild cats (4) no protocol is described to induce estrus and ovulation to time and apply AI in lions.

Developing successful assisted reproductive techniques requires knowledge of the female reproductive cycle and precise control of ovarian activity. Therefore, the aim of the present study was to develop reliable methods to monitor ovarian activity and an effective hormonal protocol to induce estrus and ovulation to perform AI in African lions. Four 6 years old female lions were anaesthetized via dart gun using a combination of medetomidine (35µg/kg), ketamine (2 mg/kg), butorphanol (0.1 mg/kg), and midazolam (0.1 mg/kg). Transabdominal ultrasound was performed (Voluson i, GE equipped with a 4-8 MHz volume transducer and 12 MHz linear transducer) to visualize the female reproductive tract. Size of the ovaries, number and size of follicles and/or corpora lutea (CL’s) were measured. Blood was collected and estradiol (E2) and progesterone (P4) was measured in blood serum as described before (5). All animals received an etonogestrel-implant (68mg; Implanon™) subcutaneously to down regulate ovarian activity. 64 days later the animals were immobilized again and the implants were removed. The ovarian status was monitored ultrasonographically and endocrinologically. Two different hormonal protocols were initiated (day 0). Two animals (group I) received single dosage of 750 IU eCG and 100 IU hCG 4 days later. The other two animals (group II) received pFSH on 4 consecutive days (50/100/100/50 IU) followed by two times 50 IU pLH. All hormones were applied intramuscularly via dart without sedation. All animals were housed individually and separated from males. On day 6 all animals were anesthetized and ovarian status evaluated again. Non-surgical AI was performed with fresh semen obtained by electroejaculation from a breeding male housed nearby. Another 7 days later (day 13) the final evaluation of ovarian activity and embryo collection was performed. The oviducts and uteri were flushed retrograde and the flushing medium retrieved was scanned for embryos microscopically.

RESULTS: High resolution ultrasonography was an essential tool to monitor ovarian and uterine activity. Ovaries were identified in dorsal recumbency caudal of the kidneys. Follicles and CL’s could be clearly distinguished. Etonogestrel implants caused designated down regulation of ovarian activity in all four animals. Ovaries were small and no CL’s and only few follicles (diameter <1 mm) could be visualized by ultrasound. The serum concentrations of E2 and P4 were also measured in blood serum. E2 measured in blood serum was 28.76 (+6.19) and 54.38 (+36.24) pg/ml in group I and group II, respectively. No CL’s could be detected sonographically during AI was 11.5% (group I) and 14.0% (group II). Concentration of E2 measured in blood serum was 28.76 (+6.19) and 54.38 (+36.24) pg/ml in group I and group II, respectively. Embryos were evaluated microscopically and cryopreserved by vitrification.

CONCLUSION: Non-surgical AI was proven successful for the first time in lions. Viable embryos could be collected and cryopreserved. Application of pFSH and pLH after down regulation of ovarian activity is recommended to induce follicular development; estrus and ovulation in this species. Further studies are needed to show whether this protocol is qualified to produce live offspring. African lion may serve as a valuable model for the critically endangered Asian lion.


(3) Göritz et al. Successful transcervical artificial insemination in cheetah and Amur leopard, unpublished data
