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The postpartum period in dromedary camels: Uterine involution, ovarian activity, hormonal changes, and response to GnRH treatment

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ABSTRACT

The aim of the present study was to investigate the time for complete uterine involution and resumption of ovarian activity in postpartum dromedary camels, relative to hormonal changes. A total of six females were examined by ultrasonography twice weekly starting 3 d after parturition. GnRH was administered when the follicles reached ≥0.9 cm diameter. Blood samples were collected for hormonal analysis. Results revealed that the mean intervals for complete involution of the previously gravid horn, non-gravid horn, and cervix were 34.33 ± 3.9, 29.01 ± 0.81, and 28.71 ± 1.51 d, respectively. After GnRH treatment (Days 17–34), five of the six camels had ovulated. The corpus luteum was detected by Day 4.1 ± 1.6 after GnRH treatment and lasted for 6 ± 1.1 d. Serum progesterone (P4) was basal and increased only after GnRH treatment. Serum estradiol 17-β (E2) peaked twice: when a large follicle was detected and 8.5 ± 2.8 d post-GnRH treatment. The serum FSH pattern was biphasic, with two peaks just before the recruitment of small follicles and 4.67 ± 4.1 d after GnRH treatment. The five ovulating females were mated; two conceived after the first service and three after the second service. The interval from calving to conception was 78.16 ± 3.71 d. It was concluded that in dromedary camels, involution of the uterus is completed by the 5th week postpartum, these camels are highly responsive to early GnRH treatment, and they can be mated between the 5th and 6th week after parturition with encouraging conception rates.

1. Introduction

The calving interval is one of the most important fertility indices determining animal productivity. A calving interval of 24–28.4 mo (Iqbal, 2002; Farah et al., 2004; Kaufmann, 2005) has been reported for dromedary camels. Female camels are bred in one season, calve in the subsequent breeding season and then remain sexually quiescent until the following breeding season, leading to long inter-calving periods and significant economic losses (Wilson, 1989). However, improved management and feeding can help in maximizing reproductive performance and shortening the calving interval (Richard, 1985).

Postpartum fertility depends on two main factors: the involution of the uterus and the onset of postpartum ovarian cyclicity. The involuting uterus has thus been considered to be a temporary barrier for delaying fertility

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during the early postpartum period. In dromedary camels, the uterine involution period lasts from 15 to 42 d following parturition (Musa and Makawi, 1985). In Bactrian camels, involution is completed by 5–35 d postpartum (Chen and Yuen, 1984).

It has been reported that late in the gestation period follicles could develop, and this might be the reason for the signs of heat observed early after parturition in camels (Merkt et al., 1990). The postpartum estrus has been reported to occur from 14 to 42 d following parturition (Elias et al., 1984). While other research workers have reported that the first postpartum heat was delayed until the next breeding season (Musa and Makawi, 1985).

Literature on studies dealing with hormonal control of the postpartum period in camels is relatively scarce hence further detailed research is critically needed. In Bactrian camels, luteinizing hormone (LH) and follicle stimulating hormone (FSH) were found to increase rapidly in the blood plasma when a stimulus caused a mature follicle to ovulate (Li et al., 2002). In non-pregnant animals, the level of progesterone (P4) was never seen to exceed 0.55 ng/mL (Elias et al., 1984). In Arabian (dromedary) camels, no changes were observed in either estadiol-17β (E2) or P4 for up to 42 d after parturition (Alfuraiji, 1998).

Thyroid hormones are known as important modulators of general metabolism. They regulate energy metabolism in which carbohydrates and lipids are the major constituents. It is believed that serum cholesterol level and consequently steroidogenesis generally varies inversely with thyroid activity (Kaneko, 2008). The net effect of thyroid hormone on the cholesterol metabolism is to increase the rate of cholesterol catabolism by liver (Mohebbi-Fani et al., 2009). During the postpartum period, the animals are subjected to negative energy balance and their hormonal milieu may be disturbed.

The aim of the present study was to investigate the earliest time for the completion of uterine involution and resumption of ovarian function in postpartum dromedary camels, relative to hormonal changes and in response to early GnRH treatment.

2. Materials and methods

2.1. Animals and management

A group of six pluriparous, lactating female camels (*Camelus dromedarius*) aged 10–14 years and weighing between 380 and 440 kg were selected in the present study, which was carried out during the common breeding season in Saudi Arabian Qassim Region (September–April, 2012/2013). The animals had body condition scores ranging from 2.5 to 4 on a scale of 1 to 5 (Sghiri and Driancourt, 1999). All the animals were clinically healthy and had no history of difficult parturition or postpartum complications. The calves were kept with their mothers until weaning (6–8 months after calving). The animals were housed in the Veterinary Teaching Hospital of Qassim University. The experiment was conducted following the research regulations of the Deanship of Research at Qassim University.

2.2. Ultrasonic examination of the postpartum uterus and ovaries

Transrectal ultrasonographic examinations were performed on all female camels twice weekly starting 3 d after parturition. Real-time, B-mode, diagnostic ultrasounds (Aloka, SSD 500, Tokyo, Japan) equipped with 5 MHz transrectal linear array transducers were used for examination. All the animals were restrained by ropes in the sternal recumbancy during the examination. The transducer was moved medially and laterally to get the best view of the specific organ, and the maximum diameters of the cervix, previously gravid and non-gravid horns were fixed and recorded on the screen of the ultrasound. Cervical and uterine involution was considered to be complete when no further reduction in their diameters was recorded for three successive examinations. In addition, these measurements of the studied organs were compared to measurements from six reproductively healthy, non-pregnant, non-parturient pluriparous. Control female dromedaries lying within the same category of weight, body condition scoring and nutritional conditions within the same region. The ovaries were also examined, for recording of follicle recruitment, response to the GnRH agonist treatment, and luteal development.

2.3. Response to GnRH treatment

When a large follicle (≥0.9 cm in diameter) was detected in one or both ovaries, the camels were treated with 20 μg im of Buserelin acetate (5 ml Argoselina; Zoovet, Ruta 168 – Paraje El Pozo – Lote B1 Parque Tecnológico del Litoral Centro 3000, Ciudad de Santa Fe, Argentina). The dominant follicle (DF) was monitored for its response to the GnRH agonist treatment. Ovulation was considered when the DF was no longer detected, followed by the detection of a newly formed corpus luteum (CL).

2.4. Postpartum fertility

All females in the study, except one which did not ovulate, were naturally mated to a fertile male at the next follicular wave (10–15 days following first induced ovulation, averaged 13.50 ± 1.23 days). Estrus was detected when the female camel approached the male and accepted his trials to mount her and squatting before him. Pregnancy was diagnosed on Day 30 after mating, using ultrasonography. Animals which were not conceived from the first service were mated naturally at the next estrus. Pregnancy was confirmed on Days 90 and 150 after mating.

2.5. Blood sampling and hormonal determination

Concomitant with clinical examination (twice weekly), jugular blood samples were aseptically collected from all female camels. Serum was harvested and kept at −20 °C until analyzed for serum E2, P4, T4, and FSH concentrations. Serum concentrations of E2, P4, and T4 were determined by ELISA using commercial kits (Human Gesellschaft fur Biochemica und Diagnostica, Wiesbaden – Germany). The FSH was determined by ELISA using kits designed for the