

## VARIATION OF LH CONCENTRATIONS AROUND MATING TIME AT DIFFERENT AGES OF DROMEDARY SHE-CAMEL

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### ABSTRACT

The concentrations of luteinizing hormone (LH) in the blood plasma of the Maghrebi she-camel (*Camelus dromedarius*) were measured in many times around mating. The experiment started in November, 2018 and the blood samples collecting were done during January until March. Thirty Maghrebi she-camels according to ages were divided into 3 groups, (G1) 3 - 5 years, (G2) 5 - 10 years and (G3) 10 - 20 years old. From the Jugular vein the blood samples were collected once in the previous day of mating day and in its following day and four times during a mating day. They were timed in the first, second, fourth and eighth hours after mating respectively throughout one estrous cycle for each she-camel. On the day before the mating day (Db = -1d) the concentration of LH for all groups was at the lowest concentration levels ranging from (0.18-0.53 ng/ml) (Overall mean =  $0.37 \pm 0.02$  ng/ml). In the mating day (Dm = 0d) Concentrations of (LH) began to rise after mating significantly from first to fourth hours, then reduced in eighth hour. The Overall mean of (LH) plasma concentrations were  $2.00 \pm 0.11$ ;  $5.05 \pm 0.14$ ;  $13.08 \pm 0.15$  and  $9.69 \pm 0.13$  ng/ml respectively. In a day after mating (Da = +1d) The (LH) plasma concentrations decreased to the basal concentration. The Overall mean was  $0.41 \pm 0.02$  ng/ml. In the similar times around mating were no observed significant variations plasma hormone concentrations among the three groups.

### **Keywords:**

Breeding season, She-camel-ages, luteinizing hormone (LH).

### INTRODUCTION

Still the camel (*Camelus dromedarius*) reproductive endocrinology is known a little. The camel has great economic importance in the desert and harsh environments Compared to other productive and domestic animals. Camels are regarded seasonal breeders (**Shalash and Nawito, 1964; Novoa, 1970**). Therewith, the breeding season informations about the dromedary are rather conflicting. Thence, the breeding season has been recorded from December to May in Egypt (**Shalash, 1965.**), March to August in Sudan (**Musa and Abusineina, 1978.**) and

October to April in Saudi Arabia (**Abdel-Rahim and El-Nazier, 1990**). Impaired fertility and failure of conception return to the lack of precise information about the estrous cycle and the optimum time for the ovarian follicle to mature (**Novoa, 1970; Musa and Abusineina, 1978**). Now well documents relatively refer to all camelids are induced ovulators, viz their hormonal profiles and ovulation after mating (**Novoa, 1970; Zhao et al., 1996**). They with other researches confirm that (*Camelus dromedarius*) are induced ovulators (**Musa and Abusineina, 1978; Elias et al, 1985; Marie and Anouassi, 1987**), that means ovulation in camel actually occurs mechanically by natural mating or induces by hormonal treatments (**Al-Sobayil,2003**). Therefore, stimulates luteinizing hormone (LH) secretion by copulation occurrence, as other induced animals including the rabbit (**Scaramuzzi et al., 1972; Dufy-Barbe et al., 1973**), cat (**Johnson and Gay, 1978, 1981; Concannon et al.,1980; Wildt et al., 1980**), vole (**Charlton et al., 1975**). Induced ovulation of the dromedary seems to be by copulation due to the estrous cycle is restricted only to a follicular development with absence of luteinization (**Noseir et al., 1980,cited by Ismail,1998**). The purpose of this study is to quantify LH concentration around mating at different ages in Maghrebi she-camel to add more information about the mechanism of ovulation and effect of longevity on LH secretion rate in this species.

## **MATERIAL AND METHODS**

The present study was conducted in the Department of Animal Biotechnology, Animal Production Research Institute, and Egypt. The present work was carried out in the Private Camels Farm, Marsa Matrouh Governorate, located in the North of Egypt, far west from a Nile Delta. The study started in November, 2018 and persisted until June, 2020.

### **Animals and Feeding:**

Thirty healthy varying ages Maghrebi (*Camelus dromedarius*) she-camels were used in the present study. The total number of 30 Maghrebi she-camels were divided into 3 groups, a first (G1), second (G2) and third (G3) groups. According to ages, those groups were classified to (G1) from 3 - 5 years, (G2) from 5 - 10 years and (G3) from 10 - 20 years old respectively. They were housed in 3 sand bedded pens (temporary pen for each group) apart from male's refuges, and wide paddock for exercising throughout the breeding period. The Overall average of the Thirty Maghrebi she-camels body weight in all groups and body weight averages for each group were presented in the (Table 1).

**Table (1):** Maghrebi she-camels body weight Minimum, Maximum and average for each group and Overall average for all Thirty Maghrebi she-camels.

Groups	Minimum (kg)	Maximum (kg)	Average (kg)
G1	395.0	465.0	430.50 ± 6.78
G2	460.0	515.0	486.90 ± 6.23
G3	517.0	563.0	537.90 ± 5.42
Overall average	395.0	563.0	485.10 ± 8.84

**n = 10 / Group**

Ration per animal was given twice daily at 8 a.m. and 6 p.m. The ration consisted of 7 kg of a forage mixture barley straw (*Hordeum vulgare*) and 3-4 kg of a commercial feed concentrate mixture (12% CP).

**Experimental design:**

The present study included one estrous cycle, it long ranged from 25-30 days and the duration of estrous was around 5 days (Alfuriji,1999), which is characterized by three phases lasting 24-28 days (Shalash, 1987) with absence of the luteal phase (Al-Sobayil, 2003) for each she camel, which were fulfilled From January to March.

The she-camels estrous were known by their behaviors and some symptoms as chasing and mounting females by estroused females, frequent salivation, restlessness, vaginal mucous discharge, frequent urination and swollen vulva. For locating suitable time to introduce the females to the potent male, a male was moved between female's pens and observed females responses for hour daily. The females were appearing courts with the male (A court by whoop, approach the male and taking a sitting position), were separated to take blood samples from them. Next day courted females were pollinated. After mating performed female was restrained and blood samples were collected as the present Experimental method.

**Blood samples and hormonal analysis:**

From the Jugular vein the blood samples were collected once in a day before (Db = -1d) and a day after (Da = +1d) a mating day and four times during a day of mating (Dm = 0d). Those four blood samples were obtained in a first (H<sub>1</sub>), second (H<sub>2</sub>), fourth (H<sub>4</sub>) and eighth (H<sub>8</sub>) hours after mating respectively. Blood samples were collected in tubes containing EDTA, stored in ice for a short period and centrifuged at 2000 rpm. for 10 min. Clear plasma were

carefully drawn into micro tubes and stored at -20 °C until the time of chemical analysis. Blood samples for all she-camels were completed collecting them during January until March. The plasma luteinizing hormone (LH) concentrations were measured by specific radioimmunoassay Technique (RIA) Kits (DIAsource ImmunoAssays S.A.) according to **(Thomas and Segers, 1988)**.

#### **Statistical analysis:**

Data obtained were tabulated and statistically computed by SAS (SAS version 9.0, SAS Inst. Inc., Cary, NC). To have the analysis of variance procedure and Duncan's Multiple Range test to detect significant differences among means.

### **RESULTS AND DISCUSSION**

Data are summarized in the (Table 2), Mating was achieved by the she-camel's acceptance of the male and sitting for it, which was coming after the estrus symptoms appearance on the females. Estrus symptoms were represented in restlessness, frequent salivation, and vaginal mucous discharge chasing, mounting of other females, and swelling of the vulva, those signals according to previously described **(Homeida et al., 1988; Novoa, 1970; Musa and Abusineina, 1978; Yagil and Etzion, 1980; Elias et al, 1985)**. Matings continued from 5 to 15 minute and complete successfully in all cases. The most clear was luteinizing hormone (LH) concentrations were influenced by duration around the copulation. Vast change in LH concentration during a short period of time after sexual intercourse.

On the day before the mating day ( $Db = -1d$ ) the concentration of LH for all groups was at the lowest concentration levels ranging from 0.18 - 0.53 ng/ml (Overall mean =  $0.37 \pm 0.02$  ng/ml). The concentration of the hormone began to rise after the mating during the next day ( $Dm = 0d$ ), whither it increased significantly since the first hour ( $H_1$ ) after the mating 0.86-3.15 ng/ml (Overall mean =  $2.00 \pm 0.11$  ng/ml) and continued at the significant height in the second hour ( $H_2$ ) of the mating from the previous one, its concentration ranged in the blood plasma from 3.80 - 6.41 ng/ml (Overall mean =  $5.05 \pm 0.14$  ng/ml). In the fourth hour ( $H_4$ ) of the mating, the concentration of LH increased significantly, attaining its highest concentration during the study, ranging from 11.69-14.39 ng/ml (Overall mean =  $13.08 \pm 0.15$  ng/ml) where it initiated a clear decrease registration during the following measurements, the concentration of the hormone decreased significantly in the eighth hour ( $H_8$ ) of the mating lower than the

previous (4 o'clock post-mating), but remained significantly higher than all periods prior to the fourth hour from the mating as well as the subsequent blood hormone concentration too (in the following day of mating (Da = +1d), which ranged between 8.71 - 11.03 ng/ml (Overall mean =  $9.69 \pm 0.13$  ng/ml). On the day after mating (Da = +1d), the concentration of LH decreased by a significant difference from the previous time, also by a significant differences from all the recorded concentrations in all the hours after mating, then it regressed to low concentrations consistent with the hormone concentrations on the day before the mating (Db=-1d) and similar in significance with slight augmentation 0.19 - 0.60 ng/ml (Overall mean =  $0.41e \pm 0.02$  ng/ml). This path in the change in the concentration of the hormone in the periods around the mating was similar in the three groups, where there were no significant differences among the groups or among them and their overall mean. Virtually were no significant differences among the three groups averages, barring for very narrow differences among the hormone concentrations averages of those groups, in which the second group was observed to be increased from the first and the third increased in a trivial amount more others.

**Table (2):** The variation (mean  $\pm$  S.E) in plasma luteinizing hormone (LH) concentrations (ng/ml) of Maghrebi she-camels in one estrous cycle during breeding season.

Groups	Times					
	(Db = -1d)	(Dm = 0d)				(Da = +1d)
		H <sub>1</sub>	H <sub>2</sub>	H <sub>4</sub>	H <sub>8</sub>	
G1	$0.36^e \pm 0.03$	$1.99^d \pm 0.20$	$4.96^c \pm 0.24$	$12.98^a \pm 0.26$	$9.63^b \pm 0.22$	$0.40^e \pm 0.04$
G2	$0.38^e \pm 0.03$	$2.00^d \pm 0.22$	$5.08^c \pm 0.25$	$13.12^a \pm 0.26$	$9.65^b \pm 0.26$	$0.42^e \pm 0.04$
G3	$0.38^e \pm 0.03$	$2.03^d \pm 0.20$	$5.10^c \pm 0.25$	$13.15^a \pm 0.95$	$9.80^b \pm 0.24$	$0.41^e \pm 0.04$
Overall mean	$0.37^e \pm 0.02$	$2.00^d \pm 0.11$	$5.05^c \pm 0.14$	$13.08^a \pm 0.15$	$9.69^b \pm 0.13$	$0.41^e \pm 0.02$

\*: Significantly differed, P<0.05: n = 10 / Group.

The present study is timed on establish fact based on Chronicle that, the breeding season of camels is associated with mild and rainy seasons abundant pastures and food. Generally the breeding activity of the one humped camel increase during the rain periods, low temperature and better grazing conditions (Tibary and Anouassi 1997). Generally its breeding season is related to the period of low humidity, low temperature and increased rainfall (Skidmore,

2005). In Egypt, the camels breeding season extends from November to May (**Shalash, 1965**), during which the highest ovarian activity is accomplished so the experiment was conducted and measurements were taken on an estrus for each she-camel during this period, this was attained in the months of January to March. In pre - mating quantifications, low concentration of LH was observed in the she-camels blood plasma samples, the overall average of the three groups was less than 0.50 ng/ml, with the appearance of multiple and evident symptoms of estrus on females and its courtship to male during the days before the mating occurs. LH concentrations remained very low (< 1ng/ml) and no peaks were observed throughout the estrous cycle (**Homeida et al., 1988**). The rise in the concentration of the hormone in the blood plasma samples of all females began during the first hour after mating, in significant increases from the pre-mating time samples, and continued to rise at significant levels during the second hour of post-mating until it reached its highest elevation in the fourth hour samples, later on record decreasing values during the eighth hour of post-mating. These results are partly in sympathy with what was recorded by **Marie and Anouassi, (1986)** the change in the concentration of the hormone from the base level to the increase significantly within 60 -100 minutes after mating, and reached the highest level within 180-240 minutes of post-mating, and began to decrease within 300 - 410 minutes of post-mating. Their results may harmonize with the results of the present study after taking into consideration the small numbers of females in their study, as it was based on only four of the mated females, with an observed variation in the time range of hormone concentration change, although the samples were taken every ten minutes during the twelve hours after mating. The comparison of the results of the two studies indicates that the concentration of LH may attain a greater increase in the blood of the she-camels during the confined minutes surrounding (previously and later) at the fourth hour after mating, and that, the decrease in its concentration following that time (4 o'clock post-mating) by a period of one to three hours (300-410 minutes post-mating) Later and that, the significant decrease in the hormone concentration recorded during the eighth hour post-mating in the study present, was a subsequent decrease in the series of decreases during the previous 60-180 minutes. The change in the ration of the hormone from the base concentration less than (< 1 ng/ml) in the estrused she-camels to the significant height in one hour post-mating, and then reach the maximum concentration within 4 hours of pollination, after that falling to the base level during the 24 hours confirms that, the Maghrebi she- camels

induced ovulation and agree with the results of researchs (**Musa and Abusineina, 1978; Elias et al, 1985; Marie and Anouassi, 1987; Al-Sobayil, 2003**) also corresponds to previous research that LH is secreted in surge (pulsation) for short periods of time during breeding seasons in response to Hormone (GnRH). During the breeding season the pituitary is more sensitive to Gonadotrophin Releasing Hormone (GnRH) and releases more LH after challenge (**Bono et al.,1985**). The absence of significant differences between the three groups of she-camels in the concentration of the hormone during the different timings surrounding the mating although the variation between them in ages, may be due to the unique nature of the camels and the length of its productive and reproductive life compared to most of the productive and domesticated animals. The females Puberty of *Camelus dromedarius* is reached at 3 - 4 year of age (**Maria et al., 2009**). Full reproductive capacity of the female camel is reached at 6 years, but it can be bred at 3-5 years of age (**Khetami, 1970**) in cited by age (**Maria et al., 2009**). The females of *Camelus dromedarius* continue to be fertile and capable of reproduction in varying proportions of fertility up to 20 years of age. (**Hussein et al., 2008**) reported that, she-camel reaches its maturity later and has a higher longevity than cattle. The best reproductive capacity of she-camel is expected to be 8-15 years of age. (**Yagil 2006**) noted that Females become mature at 4 years and remain fertile for over 20 years. This age is reduced as the husbandry practices improve and if the animals are kept in a convenient food.

### CONCLUSION

The mating season in Maghrebi she-camels extends from December until May, and the concentration of LH in the blood of the estrused she- camels remains at the base level in a day before and after the mating day. The concentration of LH hormone in the she- camels blood increases during one hour after the mating and reaches its highest levels within four hours, then shows a clear decrease in concentration within eight hours of post-mating. There is no significant changes occur in the concentration of the hormone with longevity during the reproductive age of the Maghrebi she-camels.

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## تباين تركيزات الـ LH حول وقت التزاوج في أعمار مختلفة للنوق العربية

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### المخلص

تم قياس تركيزات هرمون اللوتين (LH) في بلازما الدم في النوق المغربي (*Camelus dromedarius*) خلال عدة أوقات حول التزاوج. بدأت التجربة في نوفمبر 2018 و جُمعت عينات الدم خلال يناير و حتى مارس. حيث قُسمت ثلاثين من النوق المغربي وفقا للأعمار إلى 3 مجموعات، المجموعة الأولى (G1) من 3-5 سنوات، المجموعة الثانية (G2) من 5-10 سنوات و المجموعة الثالثة (G3) من 10-20 سنة. من الوريد الوداجي تم جمع عينات الدم مرة واحدة خلال اليوم السابق ليوم التزاوج و أخرى في اليوم التالي ليوم التزاوج، وأربع مرات خلال يوم التزاوج، في الساعة الأولى و الثانية و الرابعة و الثامنة بعد التزاوج على التوالي خلال دورة شيق واحدة لكل ناقة. خلال اليوم السابق ليوم التزاوج ( $Db = -1d$ ) كان تركيز الـ LH لجميع المجموعات عند أدنى مستويات تركيز الهرمون التي تتراوح بين (0.18-0.53 نانوغرام/مل) (المتوسط الإجمالي =  $0.02 \pm 0.37$  نانوغرام/مل). في يوم التزاوج ( $Dm = 0d$ ) بدأت تركيزات (LH) بعد التزاوج في الإرتفاع معنوياً من الساعات الأولى إلى الرابعة ، ثم انخفضت في الساعة الثامنة. وبلغ المتوسط العام لتركيزات الهرمون في البلازما  $0.11 \pm 2.00$  و  $0.14 \pm 5.05$  و  $0.15 \pm 13.08$  و  $0.13 \pm 9.69$  نانوغرام/مل على التوالي. في اليوم التالي ( $Da = +1d$ ) ليوم التزاوج انخفضت تركيزات البلازما (LH) إلى التركيز القاعدي . وكان المتوسط الكلي  $0.02 \pm 0.41$  نانوغرام / مل. في الأوقات المتماثلة حول التزاوج لم يلاحظ وجود اختلافات معنوية في تركيزات هرمون البلازما بين المجموعات الثلاث.