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USE OF MILK PROGESTERONE ASSAYS FOR DETERMINING REPRODUCTIVE PERFORMANCE IN CAMEL UNDER FARMING SYSTEM

Environmental

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ABSTRACT

Eight lactating she-camels, eight calves plus one mature male were divided into two groups: (G1 and G2). In (G1) calves were completely restricted from suckling after 60th days. Calves of (G2) were freely suckling. Another eight lactating she-camels, eight calves and one mature male were divided into two groups: (GY) which included she-camels in first and second parity, and (GA) included camels in third, fourth and fifth parity. Milk samples were collected from the second week up to the 4th month postpartum. Progesterone level in milk was measured by radioimmunoassay (RIA) apparatus. The higher concentration of progesterone (7.84 ng/ml) was recorded in the 8th week postpartum in G1 compared to (6.23 ng/ml) in the 2nd week in G2. Only two she-camel of G1 became pregnant during the first four months postpartum. Progesterone concentration reached higher level of (8.83ng/ml) in the 6th week postpartum of GA compared to (4.7867 ng/ml) in 16th week of GY. Only one she-camel of GY was suspected to be pregnant. The results revealed that the level of progesterone in milk of she-camel is a good indicator of ovarian activity within the first four months postpartum.

KEYWORDS

Camel, milk, ovarian-activity, postpartum, progesterone, suckling.

1. Introduction

Reproductive performance of the herd can be measured using fertility indices, pregnancy-loss as well as prenatal losses indices. In camels, fertility indices may be determined by the annual reproductive rate (number of births in one year/number of mated females), reduplication rate, and fecundity or conception rate [1]. Ovarian activity in the female camel is seasonal but much of this seasonality is due to nutritional status [2]. Females can maintain ovarian activity throughout the year in herds with good nutrition (body condition score >5) [3]. However, the interval between parturitions can be reduced by early weaning and artificial feeding of the young. The interval between parturitions can be improved if nutrition is adequate and lactation length is not affected by early re-breeding [4]. According to reduction of the interval between parturitions was achieved by early weaning and hormonal treatment (progesterone + eCG 2000 IU) [5]. This treatment induces follicular activity in 58% of the treated females and resulted in a pregnancy rate of 40% [6].

Progesterone is produced and released into the blood by the corpus luteum on the ovary. The hormone is low during heat, and begins to rise after ovulation as the corpus luteum develops. When the cow becomes pregnant, progesterone in blood and milk remains high until just prior to calving. But when the cow does not conceive, the corpus luteum begins to degenerate on approximately day 17 of the cycle, and progesterone declines to minimal concentrations on days 20 through 23 as the animal returns to heat. Therefore, progesterone concentration in milk is an accurate indicator to monitor ovarian activity and, hence, reproductive status. When a cow has a high concentration of progesterone in milk, she probably has a CL and is not in estrus. The aim of this study is to use milk progesterone analysis as a new technique to detect the estrus and ovarian activity within four months postpartum in she-camel under farming system.

2. Materials and Methods

Experiment I: Restricted suckling from lactating she-camel under semi-intensive system

Eight lactating she-camels, eight calves plus one mature male have been selected after calving and divided into two groups without male. In group one (G1) all calves were allowed to suckle freely during the first 30 days postpartum then completely restricted from suckling after 60 days and all four quarters of the udder were milked. In group two (G2), calves were freely suckling up to 75th – 80th day postpartum, then restricted from suckling at midnight until end of experiment in day 120 postpartum. All experimental animals are allowed to graze from the natural range around the farm and provided with supplementation and water.

Experiment II: Lactating she-camel in different parity under intensive system

Another eight lactating she-camels, eight calves and one mature male were selected and divided into two groups. Early lactation group (GY) included she-camels in first and second parity, and mid lactation group (GA) included she-camels in third, fourth and fifth parity. Both groups were managed together under intensive system and supplement with concentrated feed and water.

Milk samples collection

In the first experiment, 25 ml of milk were collected in sterile glass bottle starting in second week postpartum and continued biweekly interval up to the 4th month postpartum. In the second experiment, 25 ml of milk were also collected in sterile glass bottles starting in the second week postpartum and continued biweekly interval up to the 4th month postpartum. All milk samples were freezed immediately until laboratory analysis later.

Laboratory analysis

Progesterone level was measured by radioimmunoassay (RIA) apparatus, where kits for measurement of progesterone in animal milk has been utilized. All collected raw data was subjected to General Liner Model (GLM) using Statistix version-8 software to detect the variance between treatments and weeks. Least Significant Differences (LSD) Test was used to compare between averages of treatments and weeks.

3. Results and Discussion

Table 1 and Fig. 1 showed that, the progesterone concentration in milk of G1 was fluctuated during the experiment period and attained higher value (7.84 ng/ml) at the 8th week postpartum compared with (6.23 ng/ml) in milk of G2 at the 2nd week postpartum. In G1 the level was 5.23 ng/ml at 2nd week postpartum then decreased gradually at 4th and increased to attained its peak concentration of 7.84 ng/ml at the 8th week postpartum then decline at the 10th week afterward, continued increased in 12$^{th.}$ 14th and 16th postpartum. In G2, progesterone concentration reached its peak of 6.23 ng/ml at the 2nd week postpartum then decline at the 4th and 6th weeks and increased again at the 8th week, decline to the lower value at the 10th week, then increased gradually at 12th, 14th and 16th postpartum. The ratio of G1:G2 of she-camel which became pregnant during first four month postpartum was 2:0. The effect of restricted suckling on progesterone concentration was not significantly ($p > 0.05$)

Table 2 and Fig 2 revealed that, progesterone concentration of GA reached its higher level of 8.83ng/ml at the 6th week postpartum, compared to GY, whereas, GY recorded the maximum level of 4.7867 ng/ml at the 16th week. Progesterone level in milk non-pregnant camel had a range of (2.63 - 8.05 ng/ml) during 2 weeks after calving.

For GY, progesterone concentration was (2.63 ng/ml) at the 2nd week postpartum then increased insignificantly ($P>0.05$) at the 4th week,

afterward declined to at the 6th week then increased at the 8th week, declined at the 10th week then gradually increased at 12th, 14th and 16th postpartum. on other hand, progesterone concentration of GA recorded high level of 8.05 ng/ml at the 2nd week then decline at the 4th week, increased significantly (P<0.05) at the 6th week then decline to its lower level at the 10th week after that began to increase gradually at 12th, 14th and 16th week postpartum. In this experiment only one she-camel of GY was suspected to be pregnant due to the increase of progesterone level from the 12th week up to the end of the experiment.

The effect of parity and age on progesterone concentration of camel milk through experiment period was insignificantly (P>0.05) but the interaction between weeks postpartum and treatment were significantly (P<0.05).

Differences in progesterone concentration in camel milk is an important index, it resulted from different physiological reaction in the body, and therefore it is varying due with age, physiological status of the animal and the ecological factors. The level of progesterone from 2nd up to 16th week postpartum could be due to different management practices. It was observed that, the first rise of progesterone took place at the 4th week postpartum for two animals (G1=1, G2=1) indicating the first luteal phase after calving. High level of progesterone on the 8th week postpartum have been detected for many animals, which indicated the first activity of ovaries after calving. In the same time she-camel was ready to for breeding due to the obvious signs of estrus cycle. It was observed that, the concentration of progesterone reached its peak level, in addition to higher ovarian activity during the 2nd to the 4th month postpartum, and restricted suckling was practiced well rather on G1. The results obtained in this study were high than the finding by [7] who recorded a range of 0.0 ng/ml to 4.7 ng/ml, with mean value 1.1 ng/ml of progesterone level in non-pregnant female camel.

The result also revealed that, in camel under semi- semi-intensive farming system, progesterone concentration was fluctuated during the breeding season, and was affected by restricted suckling and early weaning (G1) rather than free suckling (G2), where the concentration stay at low level during the last two month of the experiment. The present findings were in line with [6], [5] who reported that reduction of the interval between parturitions was achieved by early weaning and hormonal treatment, when treatment induced follicular activity in 58% of the females and resulted in pregnancy rate of 40%. Moreover, progesterone affected the reproductive activity in G1 rather than G2 which agreed with the results obtained by [8] who stated that, early separation of calves allowed the insemination of 97.7 % of dams after 3 to 4 weeks postpartum. Consequently, the interval between calving was reduced to 14 months.

The results of management strategies of early separation of calves from their dam on one side, and free calves on another side in semi-intensive system were in line with [9] who stated that, the delayed commencement of luteal activity and ovulation were associated with indicators of nutritional stress and poorer production performance in early lactation in cow, whereas, the prevention of associated diseases and the implementation of good management practices are likely to be more rewarding.

Progesterone concentration was measured for sixteen weeks after parturition on young (GY) and adult (GA) she-camel under intensive system. The result indicated that, progesterone profile was fluctuating during the experimental period, while progesterone concentration is higher within two weeks after calving in adult compared to young she-camel. The finding in this study was higher than that obtained by [10] who reported a range of 4 to 6.5 ng/ml of progesterone in the blood of camel during the last two weeks before parturition, which then dropped to 2.5 ng/ml on the day of parturition and ranged between 1.19 and 2.28 ng/ml after parturition. The fluctuation of progesterone level in this study, could be attributed to the ovarian activity during the breeding season. This was in agreement with [11], [12], [13]. There are no previous investigations of how to use progesterone assays to evaluate reproductive performance and fertility level regarding age and parity of dromedary camel. Once result of current study illustrated that, higher level of progesterone coincided with regular ovarian activity of young rather than adult during last two months of experiment. No results about the conception rate of animal was observed in this experiment except that one she-camel of GY became pregnant at the 3rd month postpartum. Progesterone also increased to 5.1 ng/ml at 14th week then reached peak value 10.5 ng/ml at 16th postpartum of pregnant camel. This was in line with the results recorded by [14], [15], [16], who stated that, the progesterone profile of female camel during the first month after mating, showed considerable individuals variation and range from 3.0 ng/ml to 9.0 ng/ml.

4. Conclusion

It can be concluded that level of milk progesterone is a good indicator of ovarian activity within first four months postpartum. Management practices focusing on restricted suckling and separating calves from their dam after one month postpartum can reduce calving interval, early ovarian activity and high reproductive performance. This is practice has a good benefit to both humans and animal as an excellent reproductive technique in raising camel in intensive or semi-intensive system. Early estrus cycle and regular fluctuation of milk progesterone of young rather than adult she-camel can be observed. More studies need to be conducted using hormonal treatment and new reproductive techniques in camel pastoral system.

Table 1. Progesterone concentration of camel milk under semi-intensive system during the experiment period (2nd -16th week postpartum).

Treatment	2nd week (ng/ml)	4th week (ng/ml)	6th week (ng/ml)	8th week (ng/ml)	10th week (ng/ml)	12th week (ng/ml)	14th week (ng/ml)	16th week (ng/ml)	Overall (ng/ml)
G1	5.23ab	2.38ab	0.26b	7.84a	0.43b	3.76ab	4.29ab	7.83a	4.03A
G2	6.23ab	4.33ab	0.167b	4.087ab	0.07b	0.14b	0.63b	2.73ab	2.29A
Overall	5.732A	3.36AB	0.212B	5.96A	0.25B	1.95AB	2.47AB	5.28A	3.15

[a b] Letters on the same column bearing differ superscripts differ significantly (P<0.05)

Table 2. Progesterone concentration of camel milk during experiment period (2nd -16th week postpartum) under intensive system.

Treatment	2nd week (ng/ml)	4th week (ng/ml)	6th week (ng/ml)	8th week (ng/ml)	10th week (ng/ml)	12th week (ng/ml)	14th week (ng/ml)	16th week (ng/ml)	Overall (ng/ml)
GY	2.63b	4.72ab	0.31b	3.03b	0.21b	1.98b	2.60b	4.79ab	2.53A
GA	8.05a	1.46b	8.84a	2.37b	0.09b	0.98b	1.0b	1.47b	3.03A
Overall	5.34A	3.09ABC	4.57AB	2.70ABC	0.14C	1.48BC	1.8BC	3.13ABC	2.78±1.0

[a b] Letters on the same column bearing differ superscripts differ significantly (P<0.05)

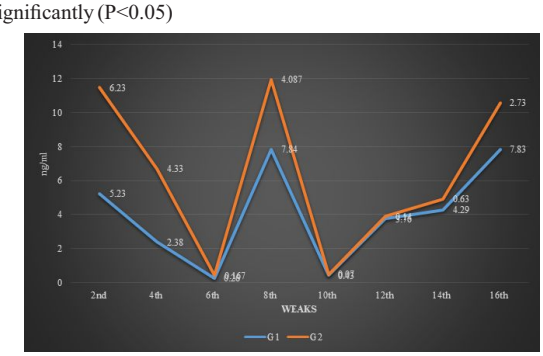

Fig 1.

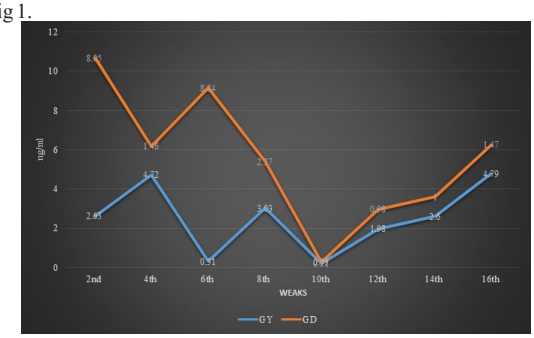

Fig 2.

Legends

Fig 1. Progesterone concentration of camel milk during experiment period (2^{nd}-16^{th} weeks) postpartum under semi-intensive system. (G1), calves allowed to suckle freely during the first 30 days postpartum; (G2), calves freely suckling up to 75^{th} – 80^{th} day postpartum.

Fig 2. Progesterone concentration of camel milk during experiment period (2^{nd}-16^{th} weeks) postpartum under intensive system. (GY) she-camels in 1st and 2nd parity; (GA), she-camels in 3^{rd}, 4^{th} and 5^{th} parity.

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