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Original Article

Study of Reproduction in the Local Reem Gazelle (Gazella subgutturosa marica)

Mohammed-Ali Shahooth[1], Sadeq Jaafer Zalzala[2], Saad Akram Hatif[2]

[1]College of Vet. Medicine, Al-Anbar, Iraq and [2]College of vet. Medicine, Baghdad, Iraq

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Abstract

This study was performed in the College of Veterinary Medicine at AL-Anbar university, in order to determine the breeding season of Arabian sand gazelles (Reem gazelles) (*Gazella subgutturosa*). Thirteen healthy Reem gazelles (3 males and 10 females), in the age (2.5 -5) year, were purchased from Iraqi Natural Protected in Iraq. The seasonal estrus signs observed in the November 2010.The hormonal program began out of season on April 2011, all gazelles were non-pregnant. 10 female gazelles were divided into two groups: control group and treated group (5 for each group). Treated group were given intra-vaginal sponges (progestagen 60 mg), sponges removed after 11 days, subsequent by I/M injection of PMSG (Folligon, 400 IU). Treated females show elevated values of (Estradiol, FSH, and LH), after application of hormonal program. Gestation periods are fixed to range between (152-165) days .All births were recorded in October 2011, the newborn kids were alive, healthy, suckling milk normally 30 minutes post-parturition, and no congenital anomalies were detected. Two cases record twins and others show single births. Concluded that the Arabian sand gazelles (Reem gazelles) (*Gazella subgutturosa*) in Iraq was a seasonal animal, and the main breeding season in November.

Keywords: Gazella , reproduction , season

INTRODUCTION

A gazelle was belonging to family (Cervidae) which has almost a worldwide distribution [**1**]. Four subspecies of goitered gazelle have been identified: Mongolian goitered gazelle (*Gazella subgutturosa hilleriana*), Arabian sand gazelle (*G. s. marica*), Yarkand gazelle (*G. s. yarkandensis*), and Persian goitered gazelle (*G. s. subgutturosa*) [**2-3**]. *Gazella subgutturosa marica* was classified as Vulnerable (population size were reduced 30% over the last 10 years or three generations) by the [**3**] with 35% of the global population share associated with Saudi Arabia [**4]** and "endangered" by [**5**]. Regarding reproductivity of goitered gazelles, little researches were done like estrus, ovulation, gestation, and parturition in females. Most males mate with 2 to 12 females, however, some males do not mate at all. Males mount their mates by standing on their hind legs with their forelegs spread apart and touching her with only his pelvis [**6**]. In Iraq, little information and knowledge were found about gazelles, their feed, handling, habits, behaviors, reproductive characters, gestation, and even their numbers were unknown. For this reason this thesiswas designed so as to focus a light on some reproductive criteria.

Therefore this study included:

1) Fixation of breeding season of Reem gazelles (*Gazella subgutturosa marica*) via recording all behaviours and observations especially concerning females before the beginning of experiment.
2) Induction of estrous and ovulation out of breeding season in Reem gazelles (*Gazella subgutturosa marica*).with study the possibility of synchronization by hormonal program
3) Following up the path of pregnancy (Pre-, within and post-) parturition with a reference to possibility of twin in reem gazelli

MATERIALS AND METHODS

A total of 13 healthy Arabian sand gazelles (*Gazella subgutturosa marica*) (also called Reem gazelles) included 3 of them adult males and 10 were adult females. The age of animals were ranged about (2.5 – 5) years. female gazelles were divided into two groups : control group contained 5 adult gazelles numbered from (1 to 5), and treated group contained 5 adult gazelles numbered from (6 to 10). Treated female gazelles were given progestagen sponges with Pregnant Mare Serum

***Corresponding Author Address**: Raghad DH. Abdul-Jalill, Al- Mustansiriah University, Collage of Sciences, Biology Department, Iraq; E-mail: raghadalshybany@yahoo.co.uk*

Gonadotropin (PMSG). Intra-vaginal sponges impregnated with (60) mg fluorogestone acetate (FGA) were used to provide a steady and continuous release of progestagen and inhibit the normal follicular growth and subsequent release of oestradiol. These intra-vaginal sponges (60 mg) were removed after 11 days and a (400 IU) intramuscular injection of PMSG (Folligon) was given I/M to each female. Hormonal assay was done for 4 hormones (Progesterone, Estrogen, Follicular Stimulating Hormone FSH, and Luteinizing Hormone LH). These hormones were tested by Radioimmunoassay at Alnadaer Clinical Laboratory in AL-Harthia zone – Baghdad – Iraq. Blood samples were collected from the jugular vein, allowed to clot for 2-3 hrs at room temperature and separated by centrifugation on 2000 rpm for 15 minutes [**7**] [**8**]. The serum was frozen and stored at 1°C until assayed [**9**]. The immunoradiometric assay of FSH and LH was a sandwich-type assay [**10**].

RESULTS AND DISCUSSION

Gazelles (*Gazella subgutturosa marica*) express significant signs during natural estrus phase such as noticed: All those criteria or most of them were noticed mostly on November 2010 (before the beginning of experiment) as recorded in (table 1) as seen by myself as well as professional worker.

Table (1). Time of clinical observations of female gazelles in the estrus phase naturally occurred.

No. of female gazelle	Time of estrus
1 , 3 , 6	10 / November (early morning)
2	13 / November (early morning)
4	None
5	29 / October (early morning)
7	2 / December (afternoon)
8	21 / November (early morning)
9	15 / November (early morning)
10	7 / December (afternoon)

It has been conducted that those signs were denoted to estrus phase, and it could be concluded that the reproductive season of Arabian sand gazelles (Reem gazelles) (*Gazella subgutturosa marica*) mainly in November with some exceptions. In other studies about estrus cycle, [**11**] had investigated oestrous cycles of seven captive Mohor Gazelles (*Gazella dama mhorr*) via hormone profiles obtained from faecal samples collected each day from cyclic females, they found no significant differences among gazelles except mean faecal oestrogen excretion during both the luteal and follicular phases of the oestrous cycle varied. Four female gazelles were randomly selected for hormonal assessments (before the beginning of experiment) were revealed declined values for all measured hormones (Progesterone, Estradiol, FSH, and LH) (table 2).

Table (2). Showing values of assessed Progesterone, Estradiol, FSH, and LH hormones before the beginning of the experiment.

Gazelle No.	Progesterone (ng / ml)	Estradiol (pg / ml)	FSH (milli IU / L)	LH (milli IU / mL)
3	0.17	38	0.9	0.18
4	0.32	47	1.6	0.29
7	0.25	43	1.2	0.22
10	0.14	40	0.7	0.15

ng / ml = nanogram / milliliter; pg / ml = picogram / milliliter; milli IU / mL = milli-international unit / milliliter

The values displayed in table (2) represented that all gazelles were out of season (during April) because of the low ovarian activity. We have limited idea about seasonality of gazelles, but some authors have studied seasonal differences in group size gazelles [**12**] they found variable sexual behaviors of gazelles both small age females and larger one. After 11 days from experiment, removal of the sponges was done (from the treated group), and intramuscular injection of PMSG (400 IU)

stimulate sexual efficiency to elevate measured hormones, Estradiol, FSH, and LH. In contrast to Progesterone hormone that revealed decreased values (table 3). While gazelles of control group show decreased values for all hormones suggested negative results (anestrus).

Table (**3**). Showing values of assessed Progesterone, Estradiol, FSH, and LH hormones before the beginning of the experiment.

Group	Gazelle No.	Progesterone (ng / ml)	Estradiol (pg / ml)	FSH (milli IU / L)	LH (milli IU / mL)
Control	1	0.22	43	1.1	0.21
	2	0.41	51	1.9	0.40
	3	0.32	48	1.7	0.32
	4	0.20	42	0.8	0.18
	5	0.26	46	0.9	0.26
Treated	6	0.9	286	11.6	27.6
	7	1.1	307	14.2	31.3
	8	0.8	273	9.3	26.7
	9	1.3	326	18.7	37.4
	10	1.1	312	15.1	32.8

ng / ml = nanogram / milliliter; pg / ml = picogram / milliliter; milli IU / mL = milli-international unit / milliliter

Our findings were nearly related to many investigators like [**13**] who collect fresh fecal samples from eight female mountain gazelles (Two pregnant, others were not) for two months. He measured the progestagen during the luteal phase, follicular phase and estrous cycle in adult female gazelles, which were 12.5±1.2 days, 5.9±0.59 days and 18.8±0.98 days. They found significant differences in both luteal and follicular phases. It is well known that sexual steroid hormones regulates activity, and those hormones measured by workers like [**11**] who investigated oestrous cycles of seven captive Mohor Gazelles (*Gazella dama mhorr*) via hormone profiles obtained from faecal samples collected each day from cyclic females, they measured the concentrations of faecal progestagen metabolites which remained roughly constant for the first 10 weeks of gestation. While other researchers disagreed this idea, like [**14**] who evaluate plasma prolactin and progesterone hormones concentrations in groups of females in Uzbekistan on Persian gazelles (*Gazella subgutturosa subgutturosa*), and on sand gazelles (*Gazella subgutturosa marica*) at Saudi Arabia, they found that the estrous season was shorter in females from Uzbekistan. Intramuscular injection of PMSG (Folligon) (400 IU), many sexual behaviors of treated group were recorded that were the same like to those mentioned previously in clinical observations in estrus phase. Arabian sand gazelles (Reem gazelles) (*Gazella subgutturosa marica*), estrus phase of treated gazelles were noted after I/M administration of PMSG (400 IU) as in (table 4).

Table (4). Showing time at which female gazelles of treated group being in estrus phase after intramuscular injection of PMSG.

No. of female gazelle	Time of estrus (hrs.)
6	20 hrs.
7	33 hrs.
8	65 hrs.
9	42 hrs.
10	51 hrs.

It is accepted that gazelles may be synchronized successfully, which proved by Pickard *et al*., (2001)(10) who had evaluated oestrous cycles of seven captive Mohor Gazelles (*Gazella dama mhorr*) via hormone profiles, they succeeded to induce estrous synchronization using controlled internal drug release (CIDR) devices, before natural mating with an intact male. We could not recognize all gazelles express visible estrus signs as [**15**]. After mating about 30 days, hormonal assay was done to assess progesterone hormone levels by radioimmunoassay to detect if the females were pregnant or not. Progesterone hormone levels showed increased levels to all mounted female gazelles of treated group as presented in (table 5). While the female gazelles of control group showed anestrus signs such as absence of estrus signs, refuse of female gazelles to accept males, and show ordinary behaviors.

Table (5). Assessment of progesterone hormone levels at 30 days after mating when compared with control.

Control group		**Treated group**	
Gazelle No.	**Progesterone (ng / ml)**	**Gazelle No.**	**Progesterone (ng / ml)**
1	**0.31**	**6**	**2.6**
2	**0.44**	**7**	**3.3**
3	**0.38**	**8**	**2.0**
4	**0.20**	**9**	**5.2**
5	**0.25**	**10**	**3.9**

ng / ml = nanogram / milliliter

Our results showed increase in progesterone hormone levels indicating a pregnancy state, another noticed that exogenous progesterone increases the estrus phase and potentiate ovaries in treated gazelles, and this finding was evidenced by [**16**] who indicated that administration of exogenous progesterone to heifers, raise plasma progesterone concentrations to high levels rather than prolong the luteal phase of the estrous cycle, also they resulted in prolonged growth of the dominant follicle, increased estradiol secretion and reduced fertility. All births were recorded in October 2011. Normal gestation periods and numbers of newborns were listed in (table 6). The gazelles numbered 7 and 9 were shown births of twining. All offspring kids were alive, healthy, and no congenital anomalies were detected.

Table (6). Numbers of gestation periods and newborn of Arabian sand gazelles.

Gazelle No.	**Gestation period (days)**	**No. of Newborns**
6	**161**	**Single**
7	**152**	**Twin**
8	**158**	**Single**
9	**154**	**Twin**
10	**165**	**Single**

Our results may be acceptable by many researchers as [**17**] who registered some gazelles' species birth seasonality from 2004 to 2007 and some biological characteristics at Al Wabra Wildlife Preservation (AWWP), They found Seasonal, two-peaked: Persian goitered gazelle (0-43% of all newborns being born per month, 77 % being born in March to May, 14% in September to October), Reem gazelle (0 - 46 % , 75 % in February to May, 18 % in September to November). In addition, they recorded Wave-like, summer high: Dama gazelle (0-20%, 46% in June to August), Soemmering´s gazelle (2-19 %, 60 % in April to July), Thomson's gazelle (0-23%, 58% in May to July). While they registered non-seasonal gazelles like Chinkara gazelle (5–15%), Dorcas gazelle (4–14%) Idmi gazelle (4–11%), Pelzeln's gazelle (6–10%), Red-fronted gazelle (6–13 %), Saudi gazelle (3–16 %), Speke´s gazelle (3–15%).

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