Journal of Advanced Veterinary and Animal Research
ISSN 2311-7710 (Electronic)
http://doi.org/10.5455/javar.2016.c146
A periodical of the Network for the Veterinarians of Bangladesh (BDvetNET)

June 2016
Vol 3 No 2, Pages 160-165.

Original Article

Behavioral and hormonal studies on Egyptian Baladi goat

Azhar F. Abdel Fattah and Shereen El. Abdel-Hamid

• **Received:** March 14, 2016 • **Revised:** April 1, 2016 • **Accepted:** May 10, 2016 • **Published Online:** May 27, 2016

AFFILIATIONS

- **Azhar F. Abdel Fattah**
- **Shereen El. Abdel-Hamid**

Veterinary Public Health,
Department of Veterinary Medicine,
Zagazig University,
Zagazig, Egypt.

ABSTRACT

Objective: The study was conducted to determine the effect of parity of female goat, social ranking and ovulatory responses of does during seasonal anestrus period by exposure to male effect.

Materials and methods: The study was conducted on a flock of Baladi goats at the animal farm of the Faculty of Veterinary Medicine, Zagazig University during November 2014 to January 2015. A total of 54 healthy Baladi goats comprising of 4 males and 50 females aging 12-18 months were used for this study. The goats were raised under indoor raising system, and were released to graze during daylight hours and returned to closed shed. The animals were fed dehydrated alfalfa granules and mixed fodder. The goats were given water *ad libitum*. Sexual behavioral patterns of both male and female goats were observed. During estrus behavioral resposes shown by the does, blood samples were collected from the goats for the examination of luteinizing hormone (LH).

Results: The mounting activity were higher in males in contact with multiparouse females than those of nulliparouse ones. The sexually experienced does induce the activation of L.H hormones leading to stimulation of estrus responses of does. That's why social ranking of does had a significant effect on sexual behavior of bucks when exposed to does during anestrus period. LH hormones secretion in 2nd week in female exposure to males was higher than those of 1st week of exposure at both multiparous and nulliparous females.

Conclusion: It concluded that visual, alfactactory, auditory contact with the male stimulate estrus response of anestrus females to be sexually responsive resulting in an increase in the economic gain of goat farm.

CORRESPONDENCE

Azhar F. Abdel Fattah
Veterinary Public Health,
Department of Veterinary Medicine,
Zagazig University, Zagazig, Egypt.
E-mail: azharfakhry65@yahoo.com

KEYWORDS

Goat parity, Male effect, Ovulatory responses, Social ranking

How to cite: **Fattah AFA, Abdel-Hamid SE (2016). Behavioral and hormonal studies on Egyptian Baladi goat. Journal of Advanced Veterinary and Animal Research, 3(2): 160-165.**

INTRODUCTION

Demand of increasing goat meat can be bet by increasing the frequency of kidding. For this, application of intensive breeding system could be applied where males and females were proportionately kept (Aboul-Ela and Chemineau, 1988).

Sexual behavior and semen quality are considered as the main factors that largely affect male reproductive efficiency. These factors could vary according to breed, geographical location, season of the year and testicular size (Karagiannidis et al., 2000). Several factors influence the estrus and ovulatory responses of female regardless of the season and parity when exposed to male (Rosa and Bryant, 2002).

Factors other than physiological variables account for the difference in responses between multiparous and nulliparous female sexual responses. Especially when females are exposed to ram odor or first contact with male, find sexual behavior of young female are less receptive than multiparous adult females (Gelez et al., 2004a, b). The present study was aimed at determining the effect of parity of female goat, ovulatory responses, and social ranking of does during seasonal anestrus period by exposure to male effect.

MATERIALS AND METHODS

This study was carried out on a flock of Baladi goats between November 2014 and January 2015, belonging to the farm of Faculty of Veterinary Medicine, Zagazig University, Egypt.

Experimental animals

Males: Four adult male goats were used. Theses bucks were kept together in outdoor pen and subjected for 2 months of natural long days (12 light/day) photoperiod starting from November. This treatment stimulates testicular growth, testosterone secretion and sexual behavior. During the study period, animals were fed dehydrated alfalfa granules and mixed fodder from troughs and straw from the ground. The water was provided *ad libitum* from permanent troughs, located separately in a closed yard.

Females: Fifty apparently healthy, 12-18 months aged, seasonal anestrus Egyptian Baladi goats were used. The animals were divided into 2 equal groups, Group A (n=25) included multiparous females with at least two parturitions, Group B (n=25) included nulliparous, which had visual, auditory and olfactory contact with males from birth until puberty before the beginning of the present study. They were identified by using numbers marks with blue, green and red paint on the sides of body.

Male effect: For checking the effect of male, 4 sexually active bucks (2 bucks per group) were introduced in the pens at 6 AM. The bucks were kept with the females for 15 days.

Methods

Animal management: Animals in an indoor system were released to graze during daylight hours and returned to closed shed. The goats were fed in a manger with small cylindrical concentrate pellets.

Behavioral observation: The behavioral observations were done using a focal sample technique as recommended by Dawkins et al. (2007). A stopwatch, field notice (observation sheet) and digital camera were used. Behavioral observations were recorded at every 5 min interval throughout 12 h period /2 weeks; these 2 h daily represented the daylight hours.

The following sexual behavioral patterns were observed:

Females: Estrus behavior response observed by does stood immobile when mounted by buck in 1st and 2nd week of male effect.

Males

(a) Frequency and time (min.) anogenital sniffing: the buck sniffs perianal area of doe**.**

(b) Mean frequency of Flehmen response: Keeping buck head high above the doe or down when follow doe with muzzle close to the ground with stretched neck and arched back, hairs raised of shoulder and neck (Fraser and Broom, 2007).

(c) Mean frequency of nudging: buck nudges on doe flank and rests its head on her back.

(d) Mean frequency and time (min.) of mounting: the buck fixed its forelegs cranial to pelvic of doe (Fraser and Broom, 2007).

Ranking of animal classified according to Meisfjord et al. (2009).

1-A goat with high ranking: when she was dominant over 5 other goats.

2-A goat with medium ranking: when she was dominant over 2-3 other goats.

3-A goat with low ranking: when she was dominant over (0-1) other goats in the home pen.

Blood sample collection: Blood samples were collected into heparinized tubes by jugular vein puncture (Bono et

al, 1983). The samples were collected during estrus behavioral response of does at 1st and 2nd week of male effect. The blood was centrifuged at 2300xg for 10 min at 4^{0}C, and the plasma was stored at -20^{0}C until analysis. LH hormone level was estimated at THEKA LAB, Zagazig City, Egypt.

Statistical analysis: Data obtained from this investigation were analyzed statistically using *t*-test (Tamhane and Dunlop, 2000). Results were presented as mean±SE.

RESULTS AND DISCUSSION

The results, as showed in the **Table 1** indicate that the number and duration of anogenital sniffing were higher in males exposed to nulliparous females than those exposed to multiparous ones and the differences were highly significant (P<0.01). On the other hand, there were no significant differences of the flehmen response and nudging frequency between the males expose to nulliparous and multiparous females (**Table 1**). These findings were in aggreement with Gelez et al. (2004a) and Luna-orazco et al. (2008) who indicated that does responded to male introduction if the males were previously used for long time. While, the mounting frequency and duration were significantly (P<0.01) higher in males that were in contact with multiparous females then those were in contact with nulliparous ones. These results were similar to that obtained by Rosciszewska (1985), Gelez et al. (2004b) and Luna-orazco et al. (2008).

In contrast, Murtagh et al. (1984) and Mellado et al. (2000) reported that parous ewes exhibited better endocrine response and became in cycle after the ram serviced as compared to nulliparous ewes.

We found that estrus response at 1st and 2nd week were significantly higher in multiparous goat as compared to nulliparous one (**Table 2**). Experienced doe influences certain characteristic response to male odor. This includes the activation of LH leading to stimulation of the female sexual behavior toward their sexual partner and display estrus responses. Because the sexually nulliparous does require several learning mechanisms and several contact with males to display different estrus behavior (Rosciszewska, 1985; Gelez et al., 2004b). The results of the present study were similar to that of Murtagh et al. (1984), Walkden-brown et al. (1993) and Mellado et al. (2000). However, the results differed from some previous studies showing that the oestrus response didn't differ between multiparous and nulliparous ewes (Oldham et al., 1985; Gelez et al., 2004a; Luna-orazco et al., 2008).

The pheromonal communication plays an important role in reproductive behavior through olfaction, auditory, visual and tactile stimuli from the chemicals substances released in urine or feces of male (Rekwot et al., 2001). The present study revealed that the social ranking of female goat had a significant effect on sexual behavior of buck in relation to male effect during anestrus period (exposed to bucks for 15 days) (**Table 3**). There was a significant difference of genital sniffing frequency and duration between high ranking and medium ranking multiparous and nulliparous goat. Likewisely, it increased significantly with multiparous high and medium ranking and decreased with multiparous goats with low ranking (3.0±0.13) than nulliparous with low ranking goats (9.01±0.33).

Although, there was no significant difference of flehmen response and nudging frequency among all ranking groups in relation to parity, the mounting frequency and duration were significantly increased (P<0.01) with high and medium ranking multiparous goat than nulliparous ones. The results of the present study were similar to the report of Veliz et al. (2006), who reported that anestrus goats responded well to male effect that was positively influenced by their social ranking, as reported by Veliz et al. (2006).

In contrast, Murtagh et al. (1984), Walkden-brown et al. (1993) and Mellado et al. (2000) demonstrated that the females of the Light and Medium groups showed longer duration of estrus behavior as compared to the females of the Heavy group. Besides, body weight of the female was negatively correlated with the onset of first estrus. These results signifies that the ability of anestrus goats to respond to the male effect can be positively influenced by their body weight.

The plasma LH concentration of goat due to male effect in relation to parity of goat showed that LH concentration increased in multiparous female in both 1st and 2nd week of male effect then in nulliparous ones (**Table 4**). Moreover, LH hormone secretion in 2nd week of male effect was higher than in 1st week of male effect at both multiparous and nulliparous females; these findings were supported by reports of Cohen-Tannoudji et al. (1986), Minton et al. (1991), and Delgadillo et al. (2006). Changes in pharmacological uses may influence LH secretion affecting the odor of male. These results indicated that the effect of ram was an effective model. Luna-orazco et al. (2008) found that LH secretion did not differ between multiparous and nulliparous does in relation to male effect. It is also publised that the male effect is a major factor influencing the oestrus and physiological response in females (Perkins and Fitzgerald, 1994; Flores et al., 2000; Delgadillo et al., 2004).

Table 1. Behavioral observations of buck (mean±SE) for the effect of parity of goat to male effect during anestrus period (exposed to bucks for 15 days).

Behavior / Group	Anogenital sniffing frequency	Anogenital sniffing duration (min)	Flehmen response frequency	Nudging frequency	Mounting frequency	Mounting duration (min)
Group A (multiparous)	14.25±0.16b	0.47±0.10b	15.30±0.24a	6.92±0.11a	4.60±0.13a	1.03±0.15a
Group B (nulliparous)	37.70±0.12a	5.05±0.13a	16.40±0.22a	6.23±0.17a	1.00±0.01b	0.40±0.20b
P-value	**	**	NS	NS	**	**

**$P<0.01$; NS, not significant

Table 2. Behavioral observations of does (mean±SE) for the effect of parity of goat to male effect during anestrus period (exposed to bucks for 15 days)

Behavior / Group	Estrus response in1st week to male effect	Estrus response in 2nd week to male effect
Group A (multiparous goat)	5.25±0.16a	23.17±0.08a
Group B (nulliparous goat)	1.70±0.12b	10.80±0.13b
P-value	**	**

**$P<0.01$; NS, not significant

Table 3. Behavioral observations (mean±SE) for the effect of social ranking on sexual behavior of buck in relation to male effect during anestrus period (exposed to bucks for 15 days).

Behavior / Group	Social ranking of goat	sexual behavior of buck in relation to male effect during anestrus period					
		Genital sniffing frequency	Genital sniffing duration (min)	Flehmen response frequency	Nudging frequency	Mounting frequency	Mounting duration
GroupA (multiparous goat)	High	14.05±0.16b	1.43±0.20b	15.30±0.24a	6.02±0.17a	4.32±0.01a	1.23±0.12a
	Medium	9.07±0.26b	1.00±0.22b	9.30±0.24a	4.12±0.01a	2.60±0.11a	1.00±0.45a
	Low	3.0±0.13b	0.49±0.32b	3.30±0.24a	2.22±0.10a	0.35±0.03a	0.35±0.42a
Group B (nulliparous goat)	High	32.35±0.10a	5.35±0.33a	16.14±0.12a	6.00±0.10a	1.11±0.34b	0.47±0.25b
	Medium	19.37±0.13a	3.15±0.05a	8.30±0.12a	4.00±0.31a	0.55±0.23b	0.30±0.24b
	Low	9.01±0.33a	1.14±0.22a	3.10±0.22a	1.45±0.13a	0.15±0.31b	0.14±0.10b
P-value		**	**	NS	NS	**	**

**$P<0.01$; NS, not significant

Table 4. Mean±SE for LH hormone concentration in plasma (ng/mL) secretion to male effect of goat during anestrus period (exposed to bucks for 15 days) in relation to parity of goat.

LH in plasma (ng/mL) / Parity of goat	LH hormone secretion in1st week to male effect	LH hormone secretion in 2nd week to male effect
Group A multiparous	14.12±0.10a	45.11±0.08a
Group B nulliparous	4.00±0.12b	15.01±0.23b
P-value	**	**

**$P<0.01$; NS, not significant

Table 5. (Mean values ±SE) for LH hormone concentration in plasma (ng/mL) secretion o male effect of goat during anestrus period (exposed to bucks for 15 days) in relation to social ranking of goat.

LH in plasma (ng/mL) / Group	Social ranking	LH hormone secretion in 1st week to male effect	LH hormone secretion in 2nd week to male effect
Group A (multiparous goat)	A goat with high ranking	14.12±0.10a	47.11±0.18a
	A goat with medium ranking	10.12±0.30a	35.11±0.20a
	A goat with low ranking	8.17±0.37a	29.19±0.32a
Group B (nulliparous goat)	A goat with high ranking	4.40±0.23b	15.21±0.28b
	A goat with medium ranking	2.00±0.03b	9.29±0.08b
	A goat with low ranking	0.43±0.23b	4.25±0.18b
P-value		**	**

**$P<0.01$; NS, not significant

Concerning the effect of social ranking on LH hormone secretion in goat plasma during the exposure of bucks for 15 days the results indicated that there was a significant difference (**Table 5**) between goats of multiparous and nulliparous groups. The hormone levels were increased at 1st and 2nd week after the exposure to males at low, medium and high ranking multiparous goats then in nulliparous. These results were similar to that mentioned by (Veliz et al., 2006) as they found that the anestrus goats respond to male effect with sexually active bucks is positively influenced by their social ranking, while Luna-orazco et al. (2008) showed that there was no influence of social ranking on sexual activity of anestrus goat. The results of the present study were similar to that of Delgadillo et al. (2006).

CONCLUSION

It can be concluded that to obtain a good reproductive performance, does should be exposed to male at least 15 days during anestrus period. It will improve the secretion of LH, resulting in enhanced the ovulation and estrus response in does. It is also recommended that male goats should be exposed to natural long day light.

CONFLICT OF INTEREST

Nothing to declare.

ACKNOWLEDGEMENT

We are grateful to all members in our university to finish this study. We would like to thank anonymous referees for their helpful comments on the manuscript.

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