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BREED AND EXPERIENCE EFFECT ON BUCK SEXUAL BEHAVIOUR OF DAMASCUS AND EGYPTIAN-NUBIAN GOATS

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ABSTRACT

The objectives of this study were to compare the sexual behaviour of bucks from 2 pure breeds of goats named Damascus and Egyptian-Nubian (Zaraibi) and to assess its relation with pregnancy and kidding rates of their inseminated does. Twenty-three bucks (n=12 Damascus and 11 Egyptian-Nubian bucks) were used in this study. According to sexual experience, bucks used in this study were either in their first season of service (n=12) with 1.51 years an average age and a mean body weight of 40.65 kg or previously used in service for several seasons (n= 11, 3.34 years and 54.05 kg an average age and body weight). Buck service behaviour towards estrous doe was continuously recorded from the moment of appearance of doe and continued for 30 min. The results revealed that, Egyptian-Nubian bucks were sexually highly active with estrous does compared with Damascus bucks, togehter with higher pregnancy and kidding rates of their inseminated does. They were likely taken less time to ejaculate for first ($p<0.04$) and second time ($p<0.0002$), and tended to sniff, nudge and vocalize more frequently than Damascus bucks. As well as, they were denoted more ejaculations and higher mating efficiency (27.48 v 10.21 %, $p<0.001$). For experience effect, the data revealed limited influence. No great differences in sexual behaviour were recoded between the age groups of bucks used in the present study. Moreover, no relationship was found between ejaculations number and pregnancy and kidding rates as well as litter size. From these results, it can be concluded that, there was breed differences in sexual behaviour of Damascus and Egyptian-Nubian bucks with limited experience effect in this study. In addition, pregnancy and kidding rates as well as litter size were not affected by total number of ejaculations.

Key words: Goat, Nubian, Buck, Sexual behaviour, Pregnancy, Kidding.

INTRODUCTION

Despite the importance of goats as a potential source of meat and milk has been emphasized, goats still receive less attention than the other

livestock species.Todays, goat breeders throughout the world, are searching the best ways of increasing the efficiency and profitability of their farming enterprise. Reproductive behaviour of goats is a major determinant of productivity and economic viability of commercial goat farm (**Maurice Shelton, 1978; Mellado et al., 2006 ; Katz, 2007)**, since high conception rates and prolificacy are indispensable for the financial sustenance of farming system (**Panagiotis et al., 2006)**. Sexual behaviour is mainly influenced by the reproductive potential of both male and female animal as well as the constraints resulting from husbandry handlings **(Chemineau, 1989; Sambraus, 1991; Fabre Nys et al., 1993 and Delgadillo et al., 2001),** and the net effect of all these influences will determine the level and efficiency of reproduction **(Erasmus and Fourie, 1985; Bocquier et al., 1996 ; Absy et al., 2001).**

Sexual behaviour is manifested by a group of traits. In goat buck, it is expressed in the following sequence: anogenital sniffing, flehmen, nudging, tongue-lapping, vocalization, fore-leg striking, mounting attempt of the estrous doe, mounting and ejaculation **(Ian Gordon 1997 ; Vèliz et al., 2004).** These activities do not necessarily occur sequentially or every time, with the vomeronasal system assuming considerable importance **(Ladewig and Hart, 1980 and Thwaites, 1982**). Considering the number of behavioural components described and the possibility of genetic influences, the present study was undertaken to determine that if breed and experience differences in buck sexual behaviour exist and that if there is relationship between mating frequency and pregnancy and kidding rates.

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MATERIALS AND METHODS

Animals

This study was performed on a private farm located at El-Amriya city, Alexandria Governorate, Egypt. Twenty-three bucks from 2 pure breeds of goats (Damascus and Egyptian-Nubian) were used in the present study to show the breed effect on buck sexual behaviour. Damascus bucks (n= 11) averaged 53.75 kg and 2.46 years an average age were exposed to 24 multiparous does during the breeding season, while Egyptian-Nubian bucks (n= 12) with a mean body weight of 39.55 kg and 2.37 years an average age were exposed to 25 does. Estrus was not synchronized, and the does were mated in August-October, 2008 mating season. Only one

mating season was performed in the farm, and the mating period lasted for 45 days. Based on service season, bucks used in this study were divided into two age groups to investigate the experience effect on buck sexual behaviour. The first one (n=6 Damascus and 6 Egyptian-Nubian bucks) aged on average 1.51 years with mean body weight of 40.65 kg and was in the first season of service. These bucks never previously come in contact with an estrous does and only trained to mount at 10-12 months of age with an estrous-induced doe to check its readiness for mating as a routine practice in farm. The other group (n= 5 Damascus and 6 Egyptian-Nubian bucks) aged on average 3.34 years and of 54.05 kg mean body weight had been used previously in service for several seasons (more than two seasons).

Management

Bucks of each breed were housed all together in a semi-covered shed, with visual and auditory contact with the does. Throughout the study period, each buck was given 800-1000 gm of commercial concentrate/day (14.8 % CP), with free access to hay, minerals blocks and fresh drinking water. During mating season, does were checked twice daily at 0800 and 1600 h for estrous behaviour by a group of bucks not used for services. The genitals of each buck of this group were covered before introduction to an estrous female to avoid unwanted intromission (teaser buck). The doe was considered in estrous if she stood immobile when mounted by buck **(Chemineau et al., 1992).**

Data recording

Buck sexual behaviour was assessed individually in 3.5×4m pen with one male and one sexually receptive female to avoid interference from fighting. Buck activity was continuously monitored by focal observation (**Martin and Bateson 1993)** using a video camera (Sony, 450X, Japan) from the first look of estrous female and continued for 30 min **(Bench et al., 2001 ; Ungerfeld et al., 2008).** From these observations, the frequency of anogenital sniffing, nudging, and vocalization and the latency to anogenital sniffing, mounting attempt, mounting and ejaculation were recoded, as well as, the total number of mounts and ejaculations throughout the period of observation. The definitions of behaviour patterns recorded were described in table 1 according to

Bernon and Shrestha (1984). Mating efficiency defined as the ratio of ejaculations to total mounts **(Bench et al., 2001)** was also calculated. All does, were received further insemination after 24h from the first one. Bucks from each breed were used in rotation, in order to avoid the negative effect of doe and buck preferences and assure their cyclic use. The non-pregnant does or the return does were mated again in order to avoid reduce fertility rate. Late pregnancy was diagnosed by abdominal palpation after 100 day of mating. Estrous and natural services dates were recorded for each individual doe during breeding season. Abortions, still births, pregnancy rate (number of does pregnant / does exposed to bucks), kidding rate (number of does kidded / does pregnant) and litter size (number of kids / female) were recorded **(Charring et al., 1992)**.

Table (1): Sexual behaviour component description.

Behaviour	**Description**
Sniffing	Nasal investigation of anogenital region
Nudging	Flank, hip region of ewe physically bumped by head and/or shoulder of ram.
Mount	Attempts to mount or mount without pelvic oscillations.
Ejaculation	Mount accompanied by pelvic oscillations. Usually accompanied by penile insertion.

Statistical analysis

Buck sexual behaviour was compared between the two breeds of goats (Egyptian-Nubian and Damascus) and between the two age groups using independent *t*-test and Chi-square test. The relationship between ejaculations number and pregnancy and kidding rates as well as litter size was carried out by logistic regression coefficient. Statistical analyses were computed using SAS version 12.0 (SAS, 1987). Differences were considered statistically significant at p=0.05 or less. All data are expressed as Means ± S.E. except mating efficiency, still-birth, pregnancy and kidding rates which expressed as percentages.

RESULTS AND DISCUSSION

Breed effect

The results of the present study revealed that the breed of buck influenced the expression of sexual behaviour in goats. Egyptian-Nubian buck showed higher sexual efficiency when compared with Damascus ones. The reaction time, measured from the moment the buck was presented to the estrous female until ejaculation, was shorter in Egyptian-Nubian buck than Damascus buck (1.34 v 3.82 min, $P<0.04$). Moreover, Damascus buck tended to sniff, nudge and vocalize less frequently towards estrous doe as compared to Egyptian-Nubian buck. In addition, the total number of ejaculations throughout the observation period was more clearly higher in Egyptian-Nubian buck than Damascus one togehter with higher mating efficiency (Table 2). This may be due to the reduced sexual interest and libido of Damascus bucks associated with a delay of perception of doe estrous status. These findings are similar to other studies recorded with rams by **Orgeur (1991); Price et al. (1996) ; Panagiotis et al. (2006)** who stated that the number of investigations is associated with high sexual efficiency.

Table (2): Effect of breed on buck sexual behaviour:

Buck breed / Behavioural element	Egyptian-Nubian buck	Damascus buck	*P* - Value
Latency to:			
Anogenital sniffing (sec)	12.4±2.045	18.46±4.86	Ns
First mount attempt (sec)	18.64±2.63	29.08±3.92	0.03
First ejaculation (min)	1.34±0.35	3.82±1.19	0.04
Second ejaculation (min)	4.61±0.89	12.67±1.9	0.0002
Frequency of:			
Anogenital sniffing	44.82±5.99	28.83±5.25	0.05
Nudging	23.65±5.64	11.21±2.12	0.03
Vocalization	33.06±11.09	18.37±5.94	0.02
Mounts / 30min	12.41±1.9	14.94±3.56	Ns
Ejaculations / 30 min	3.41±0.36	1.52±0.14	0.0001
Mating efficiency (%)	27.48	10.21	0.001

Successful reproduction depends on internal fertilization of a female gamete and a male one. To achieve this, a male and female of adequate reproductive status have to come into close contact. This is only possible through a coordinated expression of appropreciate mating response from both male and female animals. Behaviour leading to internal fertilization is obviously very different across species. They vary according to the anatomy of the sexual partner and to the physical and social environment in which this behaviour take place **(Fabre-Nys and Gelez, 2007).**

Breed and individual differences in sexual behaviour have been reported in several studies of goats. In Sudan, the reaction time was calculated in Saanen bucks under tropical climate of about 61.9±7.3 sec **(Ahmed et al., 1997)** in compared with 34.25 ± 2.2 sec for Nubian bucks **(Kamal et al., 2005)**, and this may be attributed to climatic conditions and breed difference. Under Egyptian climatic condition, **Barkawi et al.(2004)** found that Zaraibi bucks took 43.4 ± 1.5 sec with a mean of 1.7 ± 0.04 mounts from the first mount to ejaculation; moreover, the number of mounts per ejaculation did not differ significantly between the first and second ejaculates. On the other hand, Damascus buck showed reaction time of 23.69 ± 2.04 sec during breeding season and 26.25 ± 2.56 sec during non-breeding season **(Ramadan et al., 2009).**

Our results for reaction time were in disagreement with former results, where we recorded longer time (1.34 ± 0.35 and 3.82 ± 1.19 min for Egyptian-Nubian and Damascus bucks respectively) and this may be attributed to the fact that in these studies, calculation of reaction time was occurred during semen collection where estrous does were hold for facilitation of collection, and this tended to reduce this time. Another possible explanation is that, in these studies reaction time was calculated on a basis of time interval between the first mount and ejaculation opposite to our recording from the moment the buck was presented to the estrous female until ejaculation. Also in sheep, **Lindsay (1979)** mentioned that in rams, the ability to perform many completed mounts in a unit time may be innate and within wide limits may not be directly influenced by hormones.

Based on our data, Damascus bucks tended to express reduced rates of sexual interest and libido accompanied by a delay in detecting estrus doe. Coincides with the Damascus goats being seasonal breeder animal **(Al-**

Ghalban et al., 2004 ; Ramadan et al. 2009), it is recommended that hand-mating system that depending firstly on detection of estrous doe by teaser buck then inseminated this doe with a selected active buck being used with Damascus breed to be sure that each doe in estrus will be detected and inseminated with the aim of improving breed fertility. While with respect to Nubian breed, the higher activity of Nubian bucks in perception and mating of estrous does that demonstrated in this study, suggested that there was no risk to miss any doe in estrus if either hand-mating system or to allow bucks to present with a herd of does all time in an insemination groups were applied.

Data presented in table (3) demonstrated that, Nubian goats were expressed higher pregnancy and kidding rates together with higher litter size as compared with Damascus ones. On the other hand, results in table (4) revealed no relation between ejaculations number throughout the recording period and pregnancy and kidding rates as well as litter size as reported previously by **Mellado et al.(2000)** who concluded that neither number of copulations nor number of services from different bucks affected pregnancy or kidding rates. Similarly, in sheep, **Mickelsen et al.(1982)** demonstrated that there were no relationship between conception rate or lambing percentages and number of ejaculations. For that, this requires studying the different risk factors that affecting pregnancy and kidding rates in goats.

For instance, in Mexico, **Mellado et al. (2006)** reported that the most important risk factor affecting pregnancy rate was breed of doe, traditional dairy goats such as Saanen and Toggenburg were nine times less likely to become pregnant compared to Nubian and Granadina goats. Also, in common with other studies with dairy breeds of goats, pregnancy rate was markedly affected by season **(Majid et al., 1993)**.On the other hand, Sexual behaviour and semen quality are the main factors that limit male reproductive efficiency **(Barkawi et al., 2004).** These factors could vary according to the breed, geographical location, season of the year (**Chemineau, 1986; Canedo et al., 1996 ; Karagiannidis et al., 2000),** testicular size **(Dufour et al., 1984 ; Ahmed and Noakes, 1995)** and circulating gonadotrophins **(Perez and Mateos, 1995 ; Kaya et al., 1999).**

Table (3): Abortion, still-birth, pregnancy and kidding rates and litter size of inseminated does.

Doe breed / **Variable**	Egyptian-Nubian does	Damascus does	***P*- value**
Abortion	0	0	-
Still-birth	4.76 %	0	-
Pregnancy rate	90.48 %	81.81 %	0.05
Kidding rate	85.71 %	**81.81 %**	0.05
Litter size	2.11± 0.14	**1.22± 0.1**	0.0001

Table (4): The logistic regression coefficient of total ejaculations number with pregnancy and kidding rates and litter size.

	Pregnancy rate	**Kidding rate**	**Litter size**
Ejaculations number	0.649	- 0.127	1.373
Sig.	0.332 (NS)	0.780 (NS)	0.092 (NS)

(NS) Non significant

Experience effect

Analysis of buck sexual behaviour within breeds in two age groups of this study (Table 5) showed that buck sexual experience only influenced certain aspects of service behaviour. With regard to Nubian bucks, significant difference in sexual behaviour was recoded only in latency to second ejaculate, while for Damascus bucks; the differences were observed in latency to anogenital sniffing and first ejaculate as well as ejaculations number during 30 min-observation session. In several cases, our direct observations revealed that first used bucks were strived to copulate, without exhibiting the rest necessary courtship elements such as anogenital sniffing in a considerable way. On the other hand, in sheep, **Shackleton, 1991** founded that a female which is courted, will stand to mate, while those receiving only forced copulation attempts will run away. Therefore, this may explain the higher latency to ano-genital sniffing and the latency to first ejaculate demonstrated in this study in Damascus bucks that in their first season of service.

Table (5): Effect of experience within breeds on buck sexual behaviour:

	Breeds					
	Egyptian-Nubian buck			Damascus buck		
	Service seasons			Service seasons		
	First season	≥ 2 seasons	*P*-value	First season	≥ 2 seasons	*P*-value
Latency to:						
Anogenital sniffing (sec)	14.00 ± 3.24	10.92 ± 2.61	NS	18.56 ± 6.42	5.36 ± 0.57	0.01
First mount attempt (sec)	19.92 ± 3.00	17.46 ± 4.32	NS	28.8 ± 6.80	29.29 ± 4.86	NS
First ejaculation (min)	1.50 ± 0.46	1.18 ± 0.53	NS	7.18 ± 2.69	1.70 ± 0.37	0.02
Second ejaculation (min)	6.52 ± 1.64	2.98 ± 0.54	0.05	15.79 ± 5.44	11.47 ± 2.07	NS
Frequency of						
Anogenital sniffing	48.87 ± 9.52	41.22 ± 7.87	NS	36.88 ± 9.37	59.7 ± 12.14	NS
Nudging	13.62 ± 3.94	27.37 ± 8.81	NS	11.78 ± 3.28	10.70 ± 2.90	NS
Vocalization	26.37± 14.44	39.00± 17.14	NS	14.44 ± 5.58	20.9 ± 10.27	NS
Total mounts / 30 min	12.12 ± 2.23	12.67 ± 3.14	NS	15.67 ± 6.12	14.4 ± 4.11	NS
Total ejaculation / 30 min	2.62 ± 0.46	4.00 ± 0.55	NS	1.22 ± 0.22	1.90 ± 0.18	0.02

Furthermore, the combined data of both breeds tended to follow the same trend (Table 6). In this study, no great differences in sexual behaviour were recoded between the age groups of bucks. Differences in sexual behaviour were only significant for latency to anogenital sniffing and first ejaculate as well as ejaculations number throughout the period of observation and mating efficiency, whereas, all other parameters of sexual behaviour were non-significant (Table 6).

Table (6): Effect of experience on buck sexual behaviour:

Service seasons / Behavioural element	First season bucks	≥ 2 seasons bucks	*P* - Value
Latency to:			
Anogenital sniffing (sec)	24.14±8.97	8.04±1.38	0.05
First mount attempt (sec)	23.95±3.54	23.59±3.41	Ns
First ejaculation (min)	3.94±1.31	1.44±0.32	0.04
Second ejaculation (min)	8.99±2.07	7.17±1.37	Ns
Frequency of:			
Anogenital sniffing	42.53±6.64	50.95±7.52	Ns
Nudging	12.65±2.47	21.05±5.22	Ns
Vocalization	20.05±7.3	30.00±9.69	Ns
Mounts / 30min	14.18±3.37	13.63±2.55	Ns
Ejaculations / 30 min	1.94±0.27	2.89±0.36	0.04
Mating efficiency (%)	13.69%	21.33%	0.05

The reasons that no great differences existed in sexual behaviour between the two age groups of bucks used in this study were presumably may be attributed to the fact that, first service season group was previously trained to mount at yearling with an estrus-induced female, and also they were sexually fully mature as the old bucks, can to great extent perform complete mating response and to produce good quality semen, where **Skalet et al. (1988)** stated that Nubian bucks started producing good quality semen at 8 months of age. Zaraibi bucks aged 18-19 months were able to produce high semen index and libido especially during summer and autumn **(Barkawi et al., 2004).** This indicates complete physiological maturity of first service season used bucks of the current study associated with appropreciate sexual behavioural response. Similarly, **Chakraborty et al. (1989)** founded that sexual maturity in male Nubian goat was reached at a mean age of 32.4 ± 0.9 weeks at an average body weight of 37.7 ± 3.3 kg with ejaculate volume and sperm concentration at puberty of 0.92 ± 0.07 ml and 1.25 ± 0.37 $\times 10^9$/ml of ejaculate.

The greater male sexual performance depends primarily up on a male having great sexual motivation coupled with vigorous physical ability, while the lesser sexual performance occurs when any combination of

poor sexual motivation, lack of experience, inadequate physical strength, poor coordination, and abnormal conformation occurs **(Price, 1985 ; Katz and McDonald, 1992).** Likewise, in sheep, **Bench et al. (2001)** demonstrated that differences in ram sexual performance appear to be associated with libido and sexual interest rather than the ability to perform efficiently the motor patterns of mounting and copulation. Moreover, Tilbrook et al., 1987 concluded that rams also exhibit mating preferences for particular estrus ewes because the ewes differ in their individual sexual attractiveness. This attractivety is affected by a number of factors, such as breed, age, live-weight, size and general appearance **(Tilbrook and Lindsay, 1987).** Thus, this warrant to show the role of sexual status of doe for sexual stimulation of buck.

CONCLUSION

In conclusion, this study had demonstrated that Egyptian-Nubian buck had more efficient mating response than Damascus bucks. Thus, hand-mating system is recommended for Damascus breed especially with less experienced bucks. Buck experience had little effect on sexual behaviour in this study. Additionally, no relationship was found between ejaculations number and pregnancy and kidding rates as well as litter size. The present work need further study to examine semen characteristics and hormonal status of buck as well as different factors related to both buck and doe that associated with pregnancy and kidding rates.

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تأثير سلالة وخبرة ذكور الماعز علي سلوكها الجنسي في كل من الماعز الدمشقي والنوبي المصرية

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أجريت هذه الدراسة لمقارنة السلوك الجنسي لذكور الماعز الدمشقي والنوبي المصرية وبيان علاقة السلوك الجنسي للذكور بمعدل الحمل والولادة. أستخدم في هذه الدراسة عدد 23 ذكر ماعز (12 دمشقي , 11 نوبي مصري). وعلى حسب خبرة هذه الحيوانات تم تقسيمها إلي مجموعتين. المجموعة الأولي وعددها 12 ذكر ومتوسط عمرها 1.51 سنة و40.65 كجم متوسط وزن الجسم لم تستخدم سابقاً في التلقيح أما المجموعة الأخرى وعددها 11 ذكر بمتوسط عمر 3.34 سنة و54.05 كجم متوسط وزن الجسم قد استخدمت سابقاً في التلقيح لأكثر من موسمين. تم تسجيل السلوك الجنسي لذكور الماعز فردياً من لحظة رؤيتها للإناث فى الشياع وحتى 30 دقيقة. وقد أسفرت النتائج عن الأتي:-

1- وجد اختلافاً واضحاً في السلوك الجنسي لذكور الماعز بين السلالتين. حيث كانت ذكور الماعز النوبي المصرية أكثر نشاطاً عن مثيلتها الدمشقية واستطاعت إجراء القذفة الأولي والثانية في وقت أقل وسجلت عدد أكبر من القذفات خلال مدة الملاحظة . أيضا كان معدل شم الإناث التى فى الشياع والاحتكاك بها وإصدار الأصوات تجاهها أكثر في هذه الذكور عنه في ذكور الماعز الدمشقية.
2 - لم يكن هناك تأثير واضح لعامل الخبرة والعمر علي السلوك الجنسي لذكور الماعز في هذه الدراسة.
3 - كان معدل الحمل والولادة أعلي في اناث الماعز النوبي المصرية عن مثيلتها الدمشقية.
4 - لم يكن هناك علاقة بين عدد القذفات ومعدل الحمل والولادة وأيضا عدد المواليد.

من هذه الدراسة نستنتج الأتي:-
1. وجود تأثير واضح لسلالة ذكور الماعز علي سلوكها الجنسي.
2. وجود تأثير محدود لخبرة وعمر ذكور الماعز في هذه الدراسة علي سلوكها الجنسي.
3. لا يوجد علاقة بين عدد القذفات ومعدل الحمل والولادة وأيضا عدد المواليد.