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## **ROLE OF SEXUAL BEHAVIOUR IN MEDIATION OF SUCCESSFUL REPRODUCTIVE PERFORMANCE IN SHEEP AND GOATS**

(With 3 Tables and 2 Figures)

By

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**دور السلوك الجنسي كوسيط لنجاح الكفاءة التناسلية في الأغنام والماعز**

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تمت هذه الدراسة علي عدد أربعة عشر ذكر غنم و اثني عشر ذكر ماعز لتوضيح نقاط الاختلاف في السلوك الجنسي بين كل منهما. كما تم دراسة تأثير التفاعل الإجماعي بين ذكور الماعز علي الكفاءة التناسلية و كذلك التفضيل الجنسي. وقد أوضحت الدراسة أن ذكور الماعز مثارة جنسيا بطبيعة حالها عن ذكور الأغنام. وقد لوحظ في الأغنام تواجد ما يسمى بتحكم السيادة (الذكر السائد يملئ أوامرته علي الذكور المتتحية). أما في الماعز غاب تحكم السيادة مما نتج عنه محاولة الذكور المتتحية الوصول إلى الإناث في وجود الذكر السائد. وقد أوضحت الدراسة النقاط التالية: الفترة حتى ظهور العضو الذكري كانت أطول معنويا في ذكور الأغنام عنه في ذكور الماعز. محاولات الجماع كانت أكثر معنويا في كل من ذكور الماعز السائدة والمتتحية عنها في ذكور الأغنام المتتحية. تواجد الذكور السائد للأغنام في القطيع يؤدي إلى تقلص النشاط الجنسي في الذكور المتتحية. لم تختلف محاولات الجماع معنويا بين كل من ذكور الأغنام السائدة و المتتحية. زاد عدد مرات الجماع الكامل في ذكر الغنم السائد عنه في ذكر الماعز السائد. لم تختلف عدد مرات الجماع الكامل بين ذكر السائد و الذكور المتتحية في الماعز. أثني الماعز قد تفضل ذكرا بعينه في وجود ذكور أخري و بالتال زادت محاولات الجماع الكامل في ذكور الماعز المفضلة عنها في غير المفضلة و علي العكس في الأغنام كان التفضيل من نصيب الذكور. أظهر ذكر الماعز المفضل جماعا قويا مفعما بالطاقة بينما فشل الذكر الغير مفضل أو أدى أداء جنسيا هزيبا نتيجة لإنهاكه.

### **SUMMARY**

A total of 14 rams and 12 bucks were used during this study to investigate the Points of difference between the sexual behavior in sheep and goat, Social interaction of males and its effect on the reproductive

performance and Sexual preference in goat. Our results indicated that bucks were more sexually excited than rams. In sheep, a dominance control existed during the breeding season through which a dominant dictated his orders over subordinates without neither disobedience nor objection. In goat, a loss of dominance control in the herd was clear and subordinates tried to reach the females in the presence of a dominant. The latency till protrusion was significantly ( $P \leq 0.01$ ) longer in rams than that in bucks. Mounting trials increased significantly ( $P \leq 0.05$ ) in both dominant and submissive bucks than that in submissive rams. The presence of a dominant ram resulted in curtailing the sexual activities of subordinates. Mounting trials did not differ significantly between both dominant and submissive bucks. The number of completed mating increased significantly ( $P \leq 0.05$ ) in a dominant ram than that in a dominant buck. The number of completed mating did not differ between both dominant and submissive bucks. In goat, a female may prefer her sexual partner in most cases. Meanwhile, a ram is a key factor in choosing his sexual partner. The number of completed mating in the preferred bucks were significantly higher ( $P \leq 0.01$ ) than that of the non-preferred one. A sexually preferred buck performed a powerful energetic mating. On the contrary, a non-preferred buck may either fail in performing mating or display weak clasping because of being physically exhausted.

**Key words:** *Sexual behaviour, reproductive performance, sheep & goats*

## INTRODUCTION

One component of reproductive performance is serving capacity, the number of completed mating (ejaculations by males in prescribed period of time) of Serving capacity is an important tool in evaluating the potential reproductive performance of male live stock (Blockey, 1981a; Price, 1987). Male goat more sexually active than rams (Price *et al.*, 1998). Although social dominance was clearly expressed between many goats, there was no evidence of psychological inhibition of the sexual behavior of other males in the presence of dominant, such situation has been reported for sheep (Lindsay *et al.*, 1976). In goat loss of dominant control over satellite males resulted in breeding by the subordinates. Similar observation has been described in high density of rutting congregation of mountain sheep (Geist, 1971). Although he observed intense homosexual activity among satellite males, and attack on the dominant, in less apparent degree of social disorder than that observed in

goat (Shank, 1972). On domestic sheep when the receptive female to attending male ratio is high, the dominant can no longer curtail the breeding activity of his subordinates. The opposite situation, has been observed in goats (Lindsay and Robinson, 1961a and Hulet *et al.*, 1962). In goat if they are only a few males in the vicinity and the courting male is dominant he will display guarding or tending behavior in which he follows the female, never herding her, and attempt to block the approach of other males (Hafez and Scott, 1969). Female goat could prefer certain males and that effected its reproductive performance (Price *et al.*, 1984/85). Therefore, They court the preferred male much more actively than non-preferred one and direct a disproportionate amount of agnostic behavior to the non-preferred males during their courtship (Shank, 1972).

Many Egyptian breeders used to manage sheep and goat in a similar way. However, there are no enough studies stating the difference between the sexual behavior of sheep and goat and implementing the point of difference for successful breeding management. Accordingly, this study was carried out to cover the following points:

- 1- Points of difference between the sexual behavior in sheep and goats.
- 2- Social interactions among males during the breeding season and its effect on the reproductive performance.
- 3- Sexual preference in goat.

## **MATERIAL and METHODS**

This study was carried out at the farm of the Faculty of Agriculture, Suez Canal University, Ismilia province. The period of the current work continued from the beginning of August, 2001 till the end of December, 2001.

### *Housing and feeding programs:*

Rams and bucks were housed in two separate yards, which ensured the olfactory, auditory and visual communication with the flock of ewes and nanny goats (Haupt and Wolski, 1982). Each male was given 0.49 Kg of concentrate mixture, 0.67 Kg of hay and rice straw ad libitum per day (Morrison, 1957). Water was available ad libitum to animal throughout the day.

### **Experimental design:**

To differentiate between the sexual behavior of sheep and goats, 14 rams and 12 bucks of different breeds, at the same time, 4 apparently healthy flocks of ewes and goats were used during the study. A social

rank for each male was determined according to Mohamed *et al.* (2000) and Maha *et al.* (2000). Rams and bucks were admitted to the matching female pen separately. This means that both rams and bucks were exposed individually for 20 minutes continuously from the onset of admission. Two experiments were designed as following:

**Experiment (1):**

Right after admitting males to the female's pen, the following behavioral activities were recorded:

- The behavior of the couple (male and female) in sheep and goats right.
- Frequency of flehmen display for both rams and bucks.
- Latency till protrusion of penis for both rams and bucks.
- Frequency of the mounting trials for both dominant and submissive rams and bucks.
- Frequency of completed mating for both dominant and submissive rams and bucks.
- Behavior of the audience (males) in response to the male acts after joining a female pen.

The fore-mentioned parameters were taken according to Blockey (1981a), Fraser and Broom (1990) and Mohamed *et al.* (2000).

**Experiment (2):**

Female goats preferred certain males and that affected the reproductive performance in goats. Sexual preference by a female goat was indicated by her orientative movements toward the preferred male. Accordingly, the mounting trials and completed mating were recorded for both preferred and non-preferred bucks. The behavior of the adult female goats that preferred certain bucks was also observed. The above mentioned experiment was based on the idea of sexual preference according to Price *et al.* (1984/85).

**Statistical analysis:**

The data were statistically analyzed according to Sendecor and Cochran (1980).

## **RESULTS and DISCUSSION**

After joining the pen of females, males of both species displayed nosing of the female's perineum, flehmen, nudging the females and emitting a characteristic sound during chasing. Concerning bucks, additional characteristic behavioural signs were displayed as a slight

protrusion of tongue during chasing coincided with jaw movement, licking and sniffing of penis which mostly followed by flehmen. As a matter of fact, the adult nanny goat showed marked signs of estrous. Meanwhile, the signs were completely silent in ewes. The above-mentioned observations are nearly similar to that mentioned by Fraser (1980) and Price *et al.* (1998). Moreover, a few numbers of ewes urinated in response to the ram entrance. This behavioural sign is actually priming to estrous display (Mohamed *et al.*, 2000).

The previous illustration indicates that bucks are more sexually excited than rams. Actually, a dominant control in sheep results in presence of obedient and contented subordinates. The appearance of aberrant sexual behavior among subordinate bucks (disobedient) may be attributed to the aroused desire and loss of dominance (Lindsay *et al.*, 1976).

**Table 1:** Mean ( $\pm$ ) of flehmen frequency and latency till penile protrusion (sec.) in rams and bucks.

Parameters	Rams	Bucks
Flehmen display	3.66 $\pm$ 0.66	2.75 $\pm$ 0.55
Latency till protrusion (Sec.)	62.5 $\pm$ 12.82**	12.83 $\pm$ 4.79

\*\* Highly significant at  $P \leq 0.01$

Table (1) shows that the flehmen frequency does not differ significantly between rams and bucks. Moreover, the latency till protrusion was significantly ( $P \leq 0.01$ ) longer in rams. The latter result may be attributed to the fact that bucks are more sexually active than rams (price *et al.*, 1998).

**Table 2:** Mean ( $\pm$ ) of flehmen frequency and completed mating in both rams and bucks.

Animals	Mounting trials	Completed mating
1. Rams:		
• Dominant	10.3 $\pm$ 0.91	7.0 $\pm$ 1.31
• Submissive	5.00 $\pm$ 2.06	1.0 $\pm$ 0.44
2. Bucks:		
• Dominant	13.3 $\pm$ 0.84	3.0 $\pm$ 0.96
• Submissive	16.6 $\pm$ 4.58	3.0 $\pm$ 0.68

Concerning the mounting trials, L.S.D.<sub>0.05</sub> = 7.50

Concerning completed mating, L.S.D.<sub>0.05</sub> = 2.69

Mounting trials increased significantly ( $P \leq 0.05$ ) in both dominant and submissive bucks than the submissive rams (table, 2). Decreased number of mounting trials among the submissive rams may due to the effect of a dominant ram which curtailed the sexual activities of his subordinates. Nevertheless, a non-significant difference between both dominant and submissive bucks may indicate the loss of dominance as a dominant was not able to control his subordinates (Shank, 1972). Accordingly, submissive bucks dared to address themselves even in the presence of a dominant.

The number of completed mating increased significantly ( $P \leq 0.05$ ) in a dominant ram (Table, 2). But did not differ significantly between the remaining males. The increased number of completed mating by a dominant ram indicates its experience because of practicing without the distraction of subordinates (Lindsay and Robinson, 1961a and Hulet *et al.*, 1962). On the other hand, the number of completed mating did not differ between both dominant and submissive bucks. This may be attributed to the flaming desire of subordinates, which finally results in getting the attraction of a dominant away from a matting context. That's why dominant buck was not able to curtail the breeding activities of his subordinates (loss of dominance control).

The previous illustration indicates that a preferred buck performed a powerful and energetic mating. Actually, the temporary alliance between a couple ensured repeated successful mating with strong clasping. Verily, this will ensure a higher conception rate. On the other hand, A non-preferred buck may either fail in performing mating or display mating with weak clasping. Doubtless, lack of female orientation during the mating act was a main cause of a weak clasping. The exhausted trials during chasing a female will inevitably result in frustration of non preferred bucks (Fraser, 1980). Ewes had no role in preferring their sexual partners and rams were deciding in that matter.

**Table 3:** Mean ( $\pm$ ) of mounting trials and successful mating for preferred and non-preferred bucks.

Parameters	Bucks	
	Preferred	Non-preferred
1- Mounting trial	18 $\pm$ 3.53	15.5 $\pm$ 1.7
2- Successful mating	6.2 $\pm$ 1.9**	.83 $\pm$ 0.6

\*\* Highly significant difference at  $P \leq 0.01$

The number of completed mating in a preferred buck were significantly higher ( $P \leq 0.01$ ) than that of a non-preferred one (table 3). The increased number of successful mating may be attributed to the firm stance of nanny goats who are preferring certain males as sexual partners. The later situation resulted in saving the energy, which will be reflected on a proper serving capacity. Thus, a high potential reproductive performance will be achieved (Price *et al.*, 1984/85). From the above, it can be concluded that the presence of several bucks will be hostile to each other. Hence, giving a chance for both dominant and submissive bucks individually during performing the sexual encounters will result in successful reproductive performance. On the other hand, the presence of several rams were not hostile to each other. The main disadvantage of the latter housing is the presence of low experienced subordinates. This disadvantage can be counteracted by individual admission of subordinates into the female pen away from the dominant to enable sexual practicing and in turn experience.

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Figure (1): Illustration showing the behavior of the viewers for a sexual scene.

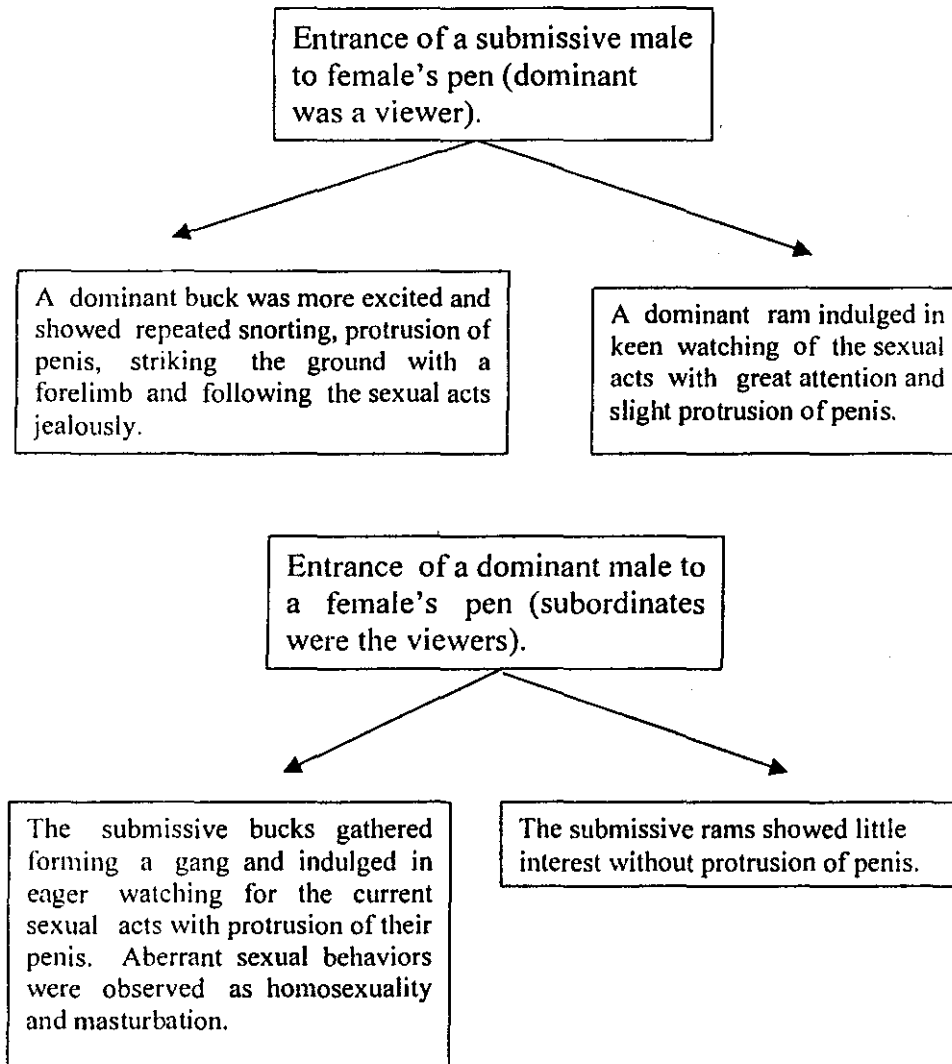


Figure (2): Illustration showing the behavior and out comes of a nanny goat toward a preferred and non- preferred bucks during mating.

