

## COMPARATIVE STUDY OF MATERNAL AND NEONATAL BEHAVIOUR IN SOME EGYPTIAN SHEEP AND GOATS BREEDS

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### ABSTRACT

Thirty three ewes (10 Ossimi, 11 Barki and 12 Rahmani) with their lambs and eighteen does (10 Zaraibi, 5 Damascus and 3 Alpine) with their kids were used to compare between sheep and goats in different maternal and neonatal behaviour displays. Displays were recorded at three phases, a) during the first hour after birth, b) at one week after parturition and c) at two months after parturition. Animals belonged to the sheep and goat farm of the Faculty of Agriculture, Cairo University.

At first hour after birth, does were physically more efficient at parturition than ewes. Ewes took 1.3 min more than does to expel foetus after appearance of head at the vaginal orifice. Ewes stood for the first time after delivery, 10.5 min later than does. Does began sniffing and licking their kids 1.5 min before ewes did. However, sheep seem to exhibit expression of maternal behaviour more than goats. Compared with does, ewes spent longer time and performed more repeated licking to their lambs, more time and greater number of nursing bouts. Moreover, ewes achieved more care giving displays (higher rate of low - pitched bleats) and less repeated searching behaviour for lambs (lower rate of high - pitched bleats) than does.

During one hour whether after the 1<sup>st</sup> week of birth or at 2 months after parturition, ewes spent more time and frequency of licking the lamb's body, more time and number of nursing bouts than does did. Furthermore, does rejected their kids more frequently than ewes did. It was generally observed that maternal and neonatal behaviours gradually faded throughout the 2<sup>nd</sup> and 3<sup>rd</sup> phases.

The attained results revealed that the mother - young attachment in sheep is stronger than in goats.

**Keywords :** *Ewes, does, maternal displays, neonatal acts, sniffing, licking, low - pitched bleats, high - pitched bleats.*

### INTRODUCTION

One of the marvels of God is that a recently parturient ewe or doe, with no previous experience in care of young, suddenly performs a well adjusted maternal behaviour that lasts and changes until the young is able to survive on its own.

In sheep and goats maternal behaviour affects survivability and growth rate of the young as young are customarily kept with their mothers till weaning. Strong perinatal maternal behaviour in sheep is a crucial factor in decreasing lamb mortality and an important component of ewe productivity (O'Connor *et al.*, 1985). Additionally, the behaviour of the ewe before, during, and after parturition has a major influence on lamb survival (Nowak, 1996). In the meantime, detailed study of maternal behaviour of ungulate does did not start until the early 1970's (Hart, 1985). In the present study we try to

contribute to a better understanding of the behavioural activities of domestic sheep and goats at three stages, the first post-partum hour, at the first week after parturition, and at weaning when the young is two months old. The objective of the present work is to compare between sheep and goats in different maternal and young behaviour displays.

## **MATERIALS AND METHODS**

### **A. Animal :**

Thirty three ewes, 12 primiparous and 21 multiparous, of different local breeds of sheep (10 Ossimi, 11 Barki and 12 Rahmani) with their 36 lambs and eighteen does (10 Zaraibi, 5 Damascus and 3 Alpine), 2 primiparous and 16 multiparous, with their 26 kids were used. The animals belonged to the flock of Small Ruminants Experimental Station, Cairo University. All animals were in a good healthy condition throughout the experimental period. Tests of maternal behaviour were carried out during the normal parturition seasons from autumn 2000 to spring 2001 and from autumn 2001 to spring 2002. Each mother and its young were given a unique number painted on both sides of their bodies.

### **B. Housing:**

Two weeks before the expected date of parturition, ewes and does were isolated from the main herd of pregnant females of the farm and were housed in two 13.0 x 9.5 m. half-shaded pens surrounded by 1.6 m. high fence and shaded by a 3.5 m. high roof (separating pens).

Every three days, ewes and does, imminent to deliver were transferred to a nearby half-shaded pen 12.9 x 8.2 m. with a 1.5 m. high fence and a 3.5 m. high roof (waiting pen). Each pen had a concrete floor covered with deep bedding of rice straw. Each pen had two built in 660 x 48 x 35 cm. troughs, one trough was used for forages and the other for concentrates. Water was available for the animals in every pen.

One week before starting the experiments, a video camera (Hitachi VM-E338E, 8mm, x150 Digital Zoom, Digital Signal processing "D.S.P." and Wide Angle Lens, Tokyo, Japan.) was fixed 1.20 m. high in the waiting pen. A test pen was 9.9 x 8.2 m., with a 1.6 m. high fence and a 3.5 m. high roof with concrete floor without any bedding. The pen was sunny and far from any source of disturbance. At a corner of the test pen, three adjacent delivery cages made from wire mesh, 1.2 x 1.2 m. each, with 1.25 m. high fence and a wire mesh door. These delivery cages were used instead of lambing hurdles as they allowed the observer to watch clearly the observed mother with its young at and after parturition without any disturbance. All observations were recorded using zoom lens video camera (fixed 1.2 m. high and 2.5 m. away from the delivery cage) for the observer to be outside the test pen. In the meantime, a mini T.V. (Greatrodo "7" Portable B/W, No. GR T.V. – 708, Chirra) was used to allow having a clear picture during recording and replay the images. A chronometer was used to measure time after recording period. During parturition period, ewes and does were exposed to normal daylight, while a fluorescent lamp (TL40W/54) was used by night to

illuminate the delivery cages and to give sufficient light for the camera to record clear pictures.

Following parturition and throughout the experimental period (eight weeks), ewes and does with their lambs and kids were housed in two 23.3 x 7.4 m. half shaded pens with a 1.6 m. high fence and 3.5 m. high roof (gestating or holding pens). Each pen had a soil floor covered with deep bedding of rice straw. Each pen had two built in 980 x 40 x 30 cm. troughs, one trough was used for forages and the other for concentrates. Water supply was available for the animals in every pen.

#### **C. Feeding:**

Ewes and does were fed *ad libitum* on Egyptian clover (*Trifolium alexandrinum*) from November to April and from May to September, they were given liberal amounts of Darawa (*Zea maize* L) or Sugar corn (*Sorghum vulgare* var. *succharatum*, Boeral), as well as Egyptian clover hay. Each ewe and doe was supplemented daily with 800 grams of a concentrate mixture. The concentrate mixture consisted of 30% decorticated cotton seed meal, 30% wheat bran, 30% yellow corn, 5% rice bran (in stead of molasses), 3% limestone, 1% Sodium chloride and 1% common salt. Immediately after parturition, each mother received a daily allowance of one kilogram of the concentrate mixture plus 200 grams yellow corn. Animals had free access to water all the time.

#### **D. Experimental procedures:**

Ewes and does were kept under continuous surveillance during the test period, backed up by a continuous video recording and were accustomed to the presence of observer in the waiting pen.

At parturition and after delivery, behavioural patterns of the mother as well its young were recorded in two ways: by the observer (live by hand) according to (Nowak, 1990 and Dwyer *et al.* 1998, in sheep and Delgadillo *et al.* 1997, in goats) and by video tape according to (Bungo *et al.* 1998 and Dwyer and Lawrence, 1998, in sheep and Ramirez *et al.*, 1998, in goats). These two methods of recording ensure high accuracy in recording every behavioural displays and guarantee no missing of data.

The post-partum behavioural acts of each mother and its young were recorded for one hour at three stages:

**1- Immediately after delivery:** This is a sensitive period of a relatively short length depending on the species, which estimated to be one hour after parturition (Collias, 1956 and Klopfer *et al.* 1964), during which the maternal response of the female towards its offspring is established (Hersher *et al.* 1958; Alexander, 1960; Klopfer, 1971 and Le Neindre and Garel, 1976).

**2- At one week after parturition:** By that time, nutrition of the young changes from colostrum to milk which seem to be sufficient and may reach its peak especially in goats (Ashmawi and Abdel-Moneim, 1999). Therefore the survivability is secured to a great extent and the mother and offspring behaviours are well established.

**3- At two months after parturition:** By that time, the weaning of sheep and goats were carried out especially under stationary system and in

commercial farms. Relationship and bond between mother and young are usually faded. Feed seem to be mainly non-milky.

**The following displays were recorded at the previous three stages:**

**1- Immediately after delivery up to one hour:**

**a- Mother acts:**

- 1) Length of labour: The time (in min) between protrusion of the lamb head and expulsion of foetus.
- 2) Time of first standing of dam: The time (in min) elapsed from birth to standing.
- 3) Lambing or kidding position: The different positions ewes or does adopted (standing: time mothers remain in a standing posture and recumbency: time mothers remain in a sitting position, according to Ramirez *et al.*, 1998).
- 4) Sniffing latency: The time (in min) elapsed from lamb's birth to first sniffing.
- 5) Licking latency: The time (in min) elapsed from parturition to first licking.
- 6) Time of licking head: The time (in min) spent in grooming the head and neck of the young (s) during the first hour after parturition.
- 7) Time of licking the rest of body: The time (in min) spent by the mother in licking the trunk and extremities of the young during the first hour post-partum.
- 8) Time of licking the rear part: The time (in min) during which dam groomed the perineal area, buttocks and thighs (rump) of its young during the first hour after parturition.
- 9) Total time of licking: Total time (in min) spent in grooming all parts of offspring's body during the first hour after parturition.
- 10) Frequency of licking head: Number of licking head and neck of young(s) by its mother.
- 11) Frequency of licking the rest of body: Number of licking the trunk and extremities of young.
- 12) Frequency of licking the rear part: Number of licking the perineal area, buttocks and thighs of young.
- 13) Total frequency of licking: The total number of licking all parts of newborn's body by its mother.
- 14) Frequency of low-pitched bleats: Number of mother vocalization made with mouth closed.
- 15) Frequency of high-pitched bleats: Number of mother vocalization made with mouth open.
- 16) Time of nursing bouts: The period (in min) during which a dam nursed without interruption for more than two seconds (2sec.) and regardless of the number of youngs that suckled (according to Delgadillo *et al.*, 1997).
- 17) Number of nursing bouts: Number of nursing episodes.
- 18) Number of rejections: Number of the mother do not permit young to suckle. Rejection was recorded when the young approached its mother and was not permitted access to the udder. During rejection, mother lifted its legs, walked away or butted and threatened the young.

**b- Lamb or kid acts:**

- 1) Time of young lying: The time (in min) spent by the young lying on the ground whether asleep, still or active.
- 2) Latency of successful standing: The time (in min) spent to stand on four legs for at least five seconds.
- 3) Latency to first suckling: The time (in min) elapsed between the young's birth to the moment of first successful suckling (The young has teat in its mouth).
- 4) Frequency of sniffing mother: Number of the young approached its mother and nosing the different parts of mother's body.
- 5) Frequency of licking mother: Number of the young contacted its dam and moved its lips on all parts of dam's body.
- 6) Number of standing attempts: Number of the young was on its knees and supported parts of its weight on at least one foot.
- 7) Number of suckling attempts: The numbers the young was in parallel opposite position and its head beneath mother in udder region but prevented from suckling.
- 8) Number of baaings: Number of high bleats of young.

Birth weight of the lamb or kid as well as body weight of the dam were recorded after parturition using a springy balance, weighing to the nearest 10 grams for young and 200 grams for dam.

**2- At one week and at two months after parturition (for 1h.):**

**a- Mother acts :**

- 1) Time of licking head (min), 2) Time of licking the rest of body (min), 3) Time of licking the rear part (min), 4) Total time of licking (min), 5) Frequency of licking head (count), 6) Frequency of licking the rest of body (count), 7) Frequency of licking the rear part (count), 8) Total frequency of licking (count), 9) Frequency of low-pitched bleats (count), 10) Frequency of high-pitched bleats (count), 11) Time of nursing bouts (min), 12) Number of nursing bouts (count), 13) Number of rejections (count).

**b- Lamb or kid displays:**

- 1) Frequency of sniffing mother (count), 2) Frequency of licking mother (count), 3) Number of baaings (count) .

The maternal and neonatal parameters which were recorded for each dam and each offspring (s) were measured according to (Bungo *et al.*, 1998; Ramirez *et al.*, 1998 and Dwyer *et al.*, 2001).

**E. Statistical Analysis of Data:**

The data were analysed by least squares procedure of the General Linear Models Program of SAS (SAS, 1998). Analysis of variance was performed to evaluate the influence of the main effect of species (sheep vs. goats) on maternal and neonatal behaviour displays. Differences between means were tested using Duncan's New Multiple Range Test.

## RESULTS AND DISCUSSION

### A- Maternal and neonatal behaviour during the first hour after parturition:

#### 1- Mother acts:

Ewes took 1.3 min more than does to expel foetus after appearance of head at vaginal orifice (Table 1). Ewes stood for the first time after delivery, 10.5 min later than does (Table 1). However, differences due to species in each act were not statistically significant (Table 1). Does began sniffing and licking their kids 1.5 min before ewes did without significant difference (Table 1). These results indicated that during the terminal period of parturition and immediately after parturition, does were physically more efficient than ewes.

During licking and grooming, mothers were likely to be immobile whilst grooming. Data in Table 1 showed that recently parturient ewes took significantly ( $P < 0.05$ ) shorter time in licking the heads of their lambs than did does (6.5 vs. 9.1 min). Analysis of variance (Table 1) revealed that animal species had a significant effect ( $P < 0.05$ ) on the time of licking head of offspring. Licking head was considered as "maternal instinct" intended to make neonate more cautious through facilitating breathing and encouraging neural function and activities (McGlone and Stobart, 1986). Hence, it seems that the expression of mother ability is stronger in sheep than goats.

It is clear that goats spent significantly less time of licking the rest of body (4.7 min), licking the rear part (5.0 min) and licking all parts of kid's body (19.3 min) than sheep (7.2, 12.3 and 26.5 min, respectively). Grooming the rest of body was suggested by Ramirez *et al.* (1998) to make neonate more viable through stimulation of peripheral circulatory system as well as reducing heat loss, hence preventing aerobic disorders. Meanwhile, during the first hour after parturition, the time of nursing bouts was markedly less for does than ewes (2.0 vs. 8.0 min). The time of licking the rear part of offspring's body and the time of nursing bouts were significantly ( $P < 0.01$ ) affected by species of animal (Table 1). It can be deduced that ewes spent significantly longer time in licking their lambs after birth than does did. It seems that the woolly cover of lambs needed longer time for licking than the smooth hairy body surface of kids. Grooming is undoubtedly a characteristic behaviour to ungulate mothers (Lent, 1974 and Alexander, 1988). The function of grooming behaviour has been suggested to stimulate respiration and activity in the lamb, to dry and prevent heat loss, and to aid bonding and recognition of the lamb by the ewe (McGlone and Stobart, 1986). Meanwhile, ingestion of amniotic fluids was considered important to establish maternal behaviour (Levy and Poindron, 1987).

On the other hand, the highly significant number of rejections performed by ewes (Table 1) might be considered as a negative maternal behaviour of sheep.

Table (1): The effect of species on maternal behaviour displays exhibited during 1hr. immediately after parturition.

Displays	Factor	Species				Sig.	
		Sheep		Goats			
		No.	$\bar{X}$	No.	$\bar{X}$		S.E.
<b>A. Mother acts:</b>							
1. Time betw. Presence of head and expulsion of foetus	(min)	36	4.2 a	0.84	25	2.9 a	0.79
2. Time of first standing of dam	(min)	17	14.8 a	4.26	7	4.3 a	1.37
3. Sniffing latency	(min)	36	1.9 a	1.12	26	0.4 a	0.14
4. Licking latency	(min)	36	1.9 a	1.12	26	0.4 a	0.14
5. Time of licking head	(min)	36	6.5 a	0.58	26	9.1 b	1.07
6. Time of licking the rest of body	(min)	36	7.2 a	0.63	26	4.7 b	0.71
7. Time of licking the rear part	(min)	36	12.3 a	1.29	26	5.0 b	0.67
8. Total time of licking	(min)	36	26.5 a	2.08	26	19.3 b	1.93
9. Frequency of licking head		36	95.6 a	7.59	26	89.3 a	8.63
10. Frequency of licking the rest of body		36	112.7 a	9.46	26	65.5 b	6.16
11. Frequency of licking the rear part		36	131.8 a	12.06	26	56.5 b	5.21
12. Total frequency of licking		36	340.0 a	26.50	26	211.4 b	17.02
13. Frequency of low-pitched bleats		36	440.7 a	50.04	26	363.7 a	91.00
14. Frequency of high-pitched bleats		24	69.0 a	20.35	15	108.1 a	41.52
15. Time of nursing bouts	(min)	35	8.0 a	0.76	9	2.0 b	0.70
16. No. of nursing bouts		35	23.5 a	2.27	9	5.7 b	1.17
17. No. of rejections		36	240.9 a	25.28	26	138.0 b	13.20
<b>B. Young acts:</b>							
1. Time of young lying	(min)	36	0.9 a	0.14	26	1.3 a	0.24
2. Latency of successful standing	(min)	36	13.1 a	1.61	21	29.9 b	2.47
3. Latency to first suckling	(min)	35	28.7 a	2.28	9	47.3 b	3.88
4. Frequency of sniffing mother		36	23.8 a	1.77	25	8.2 b	1.03
5. Frequency of licking mother		36	70.8 a	4.03	24	35.0 b	5.18
6. No. of standing attempts		36	61.8 a	6.85	26	133.4 b	9.33
7. No. of suckling attempts		35	14.0 a	1.67	23	17.5 a	3.08
8. No. of baatings		35	94.2 a	16.63	26	542.0 b	73.58

Means in rows not followed by the same letter differ significantly from each other (P<0.05) using Duncan's Multiple Range Test.

Sig. : significance of difference \*\* P < 0.01

\* P < 0.05

Low-pitched bleats was emitted to encourage neonate to suckle its mother. High-pitched bleats, on the other hand, was considered as a searching behaviour on lamb removal (Dwyer and Lawrence, 1997) or as protest bleat or frustration call (Kiley, 1972).

In the present study, sheep emitted higher, but not significantly different, frequency of low-pitched bleats than does (Table 1). In the meantime, frequency of high-pitched bleats was less in case of ewes most probably because lambs responded promptly to their dams.

### **2- Young acts:**

Acts displayed by young during the 1<sup>st</sup> hour after birth; (Table 1) reflected reactive responses of lambs to their dams' maternal behavioural expression. Although time of young lying did not differ significantly between lambs and kids (Table 1), yet most of the other acts, i.e. latency to successful standing and latency to 1<sup>st</sup> suckling were less for lambs than kids. The obtained observations received confirmity from the results of different researchers. New-born lambs were reported to stand for the first time within 15min (Alexander *et al.*, 1980 and Hafez, 1987). Kids, on the other hand, stood on the four hooves after 20.6 min (Allan *et al.*, 1991) or 18 min (Malfatti *et al.*, 1991). Meanwhile, the first suckling of youngs started after 29.5 min (Sharafeldin and Kandeel, 1971) or within 60 min (Lickliter, 1985; Allan *et al.*, 1991 and Malfattit *et al.*, 1991).

Other acts exhibited by lambs towards their dams supported the assumption that expression of maternal behaviour is higher in ewes than does. Lambs sniffed and licked their mothers more frequently than kids did ( $P < 0.01$ ) (Table 1). Meanwhile, attempts to stand were highly significant ( $P < 0.01$ ) more for kids than for lambs (Tables 1), a matter that might reflect a better grooming of lambs than kids. Moreover, lambs succeeded after fewer number of attempts to suckle their mothers (Table 1) with significantly ( $P < 0.05$ ) less number of baaings compared to kids. Anecdotal accounts confirmed the previous findings. Lent (1974), Lickliter (1984a,b) and Hart (1985) reported that while sheep are followers species (Lambs spend most of their time within a very short distance of the mother), goats are intermediate between follower and hider (Kids are hidden for as long as eight hours while the mother feeds).

The higher expression of maternal behaviour in sheep could be attributed to ingestion of greater amounts of amniotic fluids as they groomed their lambs for longer time. Ingestion of amniotic fluids is important to establish maternal behaviour (Levy and Poindron, 1987).

In view of the obtained results it might be concluded that the expression of maternal behaviour is generally higher in sheep than goats, a matter that might explain the comparatively lower mortality rate in lambs than Kids under local condition.

### **3- The effect of species on position at delivery of twins:**

Results in Fig (1) showed the difference between sheep and goats in position of mother at parturition of 1<sup>st</sup> and 2<sup>nd</sup> young. Relatively higher



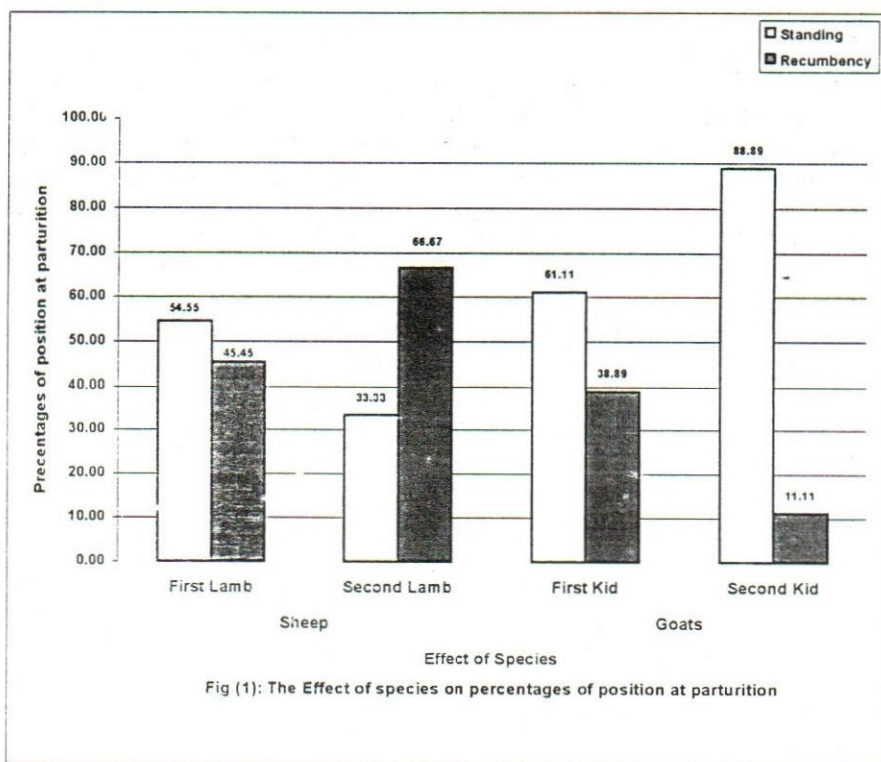


Fig (1): The Effect of species on percentages of position at parturition

percentage of the ewes (54.55%) delivered the 1<sup>st</sup> lamb in the standing position and 66.67% of the ewes gave birth of the 2<sup>nd</sup> lamb in the recumbency position. It seemed that the physical stress the ewe underwent during parturition of the 1<sup>st</sup> lamb forced her to be lying down during delivery of the 2<sup>nd</sup> one. Different observations were recorded by some authors in respect to position at lambing. In this respect, Sharafeldin *et al.* (1971) observed that the rupture of the amniotic sac in parturient Barki ewes occurred in most cases when the ewes were lying down. Hart (1985) reported that ewe lamb usually lie down during most of delivery. Alexander *et al.* (1980) noticed that delivery of sheep occurs while the ewes are standing or lying down, but it is often completed by the act of standing. Meanwhile, Keszthelyi *et al.* (1987) showed that during parturition, 83% of Hungarian Combing Wool Merino lambed in the standing position.

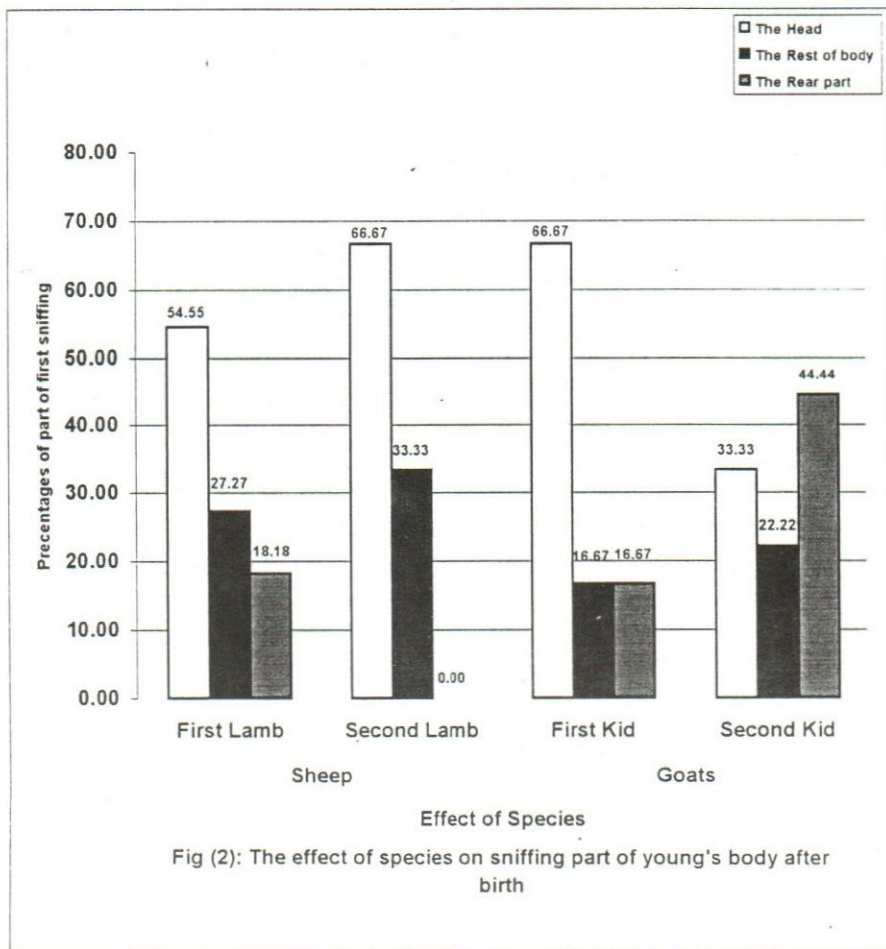
As for goats, it was found that 61% and 89%, respectively of does delivered the first-and second- twin kids in the standing position. This is contrary to the findings of Allan *et al.* (1991), Ramirez *et al.* (1995) and Das and Tomer (1997) who reported that delivery in does while sitting was more frequent than in the standing posture.

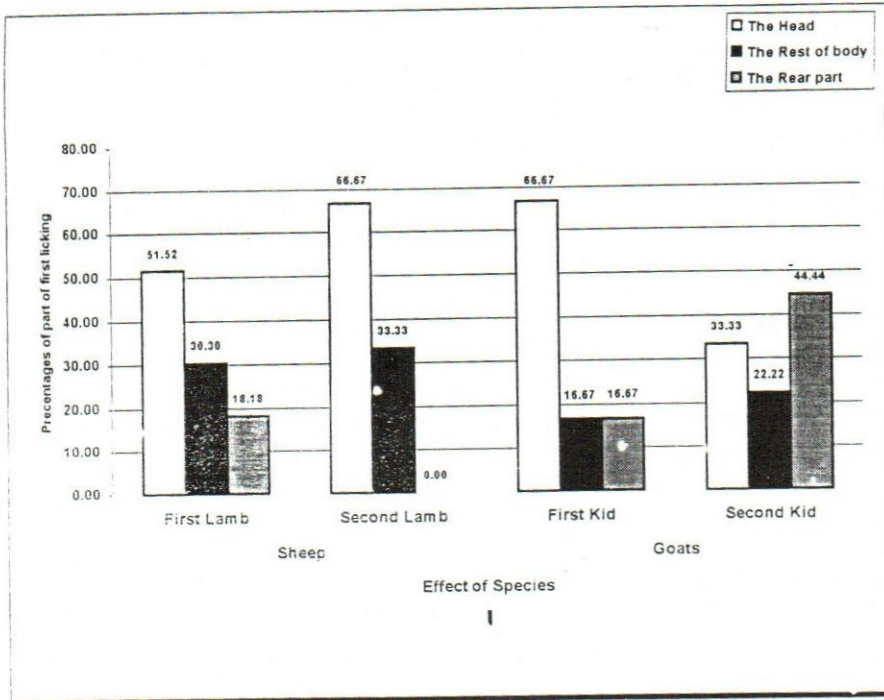
In view of the present results it seems that goats are more tolerant to the stress of parturition than sheep. It was generally observed that during the terminal period of parturition and immediately after parturition, does were physically more active and alert than ewes.

**4- The effect of species on sniffing and licking parts of young's body after birth:**

It can be seen (Fig. 2 and 3) that, in sheep, most of sniffing and licking acts of the 1<sup>st</sup> lamb were directed primarily to the head while the rest of body and the rear part received less attention. In the meantime, the rear part of the 2<sup>nd</sup> lamb was not sniffed or licked (Fig. 2 and 3). While in goats, the head of the 1<sup>st</sup> kid was intensively sniffed and licked (66%) while the rest of body and the rear part were equally sniffed and licked (17% for each). The perineal area of the 2<sup>nd</sup> kid received the highest percentage of sniffing and licking (44%) followed respectively by head (33%) and the rest of body (22%).

The obviously higher percentage of sniffing and licking the head of the newborn whether in sheep or goats was already observed by Sharafeldin *et al.* (1971), Arnold and Morgan (1975), Bareham (1976), Gonyou (1984), Hart (1985), Mervat (1985) and Ramirez *et al.* (1998), all reported a tendency of grooming the head of the newborn before other parts of body in sheep and goats.





**B. At one week after parturition:**

**1- Mother acts:**

Results in Table 2 showed that sheep spent 0.3 min more in licking head of lamb and licked their lambs' head more frequently than did goats (37.6 vs. 27.4 times). Differences in time or frequency of licking head between sheep and goats were statistically significant ( $P < 0.05$ ). However, the time and frequency of licking the rest of body were almost the same for sheep and goats (Table 2). Sheep licked the rear part for longer time (0.7 min) and frequently more (10.2 times) than did goats. Statistically the differences between sheep and goats in previous acts were non-significant (Table 2). Licking the perineal area was suggested by Sharafeldin and Kandeel (1971) to stimulate the physical activities, i.e. push and kick the lamb to stand up and suckle. However, total time of licking the young was 1.1 min longer and 20.1 times more in sheep than goats; without significant differences (Table 2).

Frequency of low-pitched bleats was obviously more and significantly ( $P < 0.01$ ) higher for goats than sheep. Whereas, frequency of high-pitched bleats was less for goats than sheep, but the difference was non-significant (Table 2). It seemed that does increased the low-pitched bleats to encourage the kid to stand up and approach the udder. In the meantime, does had less "searching act" for kids which moved away from the mother by uttering less high-pitched bleats than ewes. This result disagrees with that obtained by Lickliter (1984a,b) who found that kids recognized their dams by means of auditory cues as they heard and responded to their dams voice (evoked more frequent high-pitched bleats) by leaving their hiding box before actually seeing them.

The time of nursing bouts was significantly ( $P < 0.01$ ) longer for sheep than goats. Also, the number of nursing bouts of sheep was 9.8 times more and was significantly ( $P < 0.05$ ) different from that of goats (Table 2).

This result disagrees with that reported by Delgadillo *et al.* (1997) who noticed that nursing frequencies in Creole does were higher (39 times/11h) at the first week after kidding. In harmony with this result, number of rejections performed by does was 83.5 times more and significantly different ( $P < 0.01$ ) from those of ewes. Similar findings were reported by Malfatti *et al.* (1991) who found that some Italian indigenous does left their kids alone without any care for some hours after birth.

## **2- Young acts:**

Acts displayed by offspring, shown in Table 2, revealed that lambs sniffed their dams 9.1 times more but licked them 9.4 times less than kids. The differences, however, were highly significant ( $P < 0.01$ ) for frequency of sniffing and non-significant for frequency of licking. Although, number of baaings exhibited by kids exceeded those manifested by lambs, yet the difference was non-significant (Table 2).

Sniffing and licking are olfactory and gustatory behaviours performed by young to encourage its dam. Lambs recognized their mothers in longer time than did kids as they performed higher rate of sniffing. But lambs stimulated their mothers less as they licked them less. On the other hand, kids emitted more number of baaings to recognize their dams than lambs.

The present results lead to conclude that olfactory and gustatory cues seemed to be primarily responsible for the initiation and maintenance of mother-young contact only during one hour after birth. However, at one week after birth, olfactory cue was to great extent, responsible for maintenance of mother-young attachment.

## **C- At two months after parturition:**

### **1- Mother acts:**

Time of licking head, rest of body and the whole body were almost the same, without any significant differences between sheep and goats (Table3). However, time of licking the rear part of body was significantly ( $P < 0.05$ ) longer for goats. Meanwhile, the frequency of licking the head was similar in sheep and goats. But goats licked the rest of body, the rear part and the whole body significantly ( $P < 0.01$ ) more frequently than did sheep (Table3).

Frequency of low- and high-pitched bleats were significantly higher ( $P < 0.01$ ) for goats than sheep (Table 3). It seemed that kids were less dependent on their mothers than lambs at weaning time. Also, Table 3 showed that time of nursing bouts was longer, but not significantly different, for ewes, compared to does and the number of nursing bouts was nearly the same for ewes and does. Again this might reflex the stronger attachment between lambs and ewes than that between kids and does. In this context, the number of rejections of does towards the kids was significantly ( $P < 0.05$ ) more than ewes (Table 3), a matter that confirmed our assumption that kids were less attached to their mothers at weaning than lambs.

Table (2): The effect of species on maternal behaviour displays exhibited at 1 week after parturition.

Factor	Species						Sig.	
	Sheep			Goats				
	No.	$\bar{X}$	S.E.	No.	$\bar{X}$	S.E.		
<b>A. Mother acts:</b>								
1. Time of licking head (min)	36	0.9	a	0.10	0.6	b	0.10	*
2. Time of licking the rest of body (min)	36	0.5	a	0.08	0.5	a	0.10	
3. Time of licking the rear part (min)	36	3.3	a	0.31	2.6	a	0.38	
4. Total time of licking (min)	36	5.1	a	0.39	4.0	a	0.55	
5. Frequency of licking head	36	37.6	a	3.41	27.4	b	2.96	*
6. Frequency of licking the rest of body	36	29.3	a	3.09	29.6	a	3.62	
7. Frequency of licking the rear part	36	92.7	a	6.10	82.5	a	7.31	
8. Total frequency of licking	36	159.6	a	11.11	139.5	a	13.00	
9. Frequency of low-pitched bleats	32	34.2	a	6.00	74.6	b	15.26	**
10. Frequency of high-pitched bleats	32	159.0	a	28.99	109.8	a	29.86	
11. Time of nursing bouts (min)	36	7.4	a	0.83	4.6	b	0.73	*
12. No. of nursing bouts	36	27.1	a	2.53	17.3	b	2.62	*
13. No. of rejections	36	103.9	a	14.21	187.4	b	25.13	**
<b>B. Young acts:</b>								
1. Frequency of sniffing mother	36	21.4	a	2.46	12.3	b	1.25	**
2. Frequency of licking mother	35	36.6	a	3.77	46.0	a	5.88	
3. No. of baaings	8	8.8	a	7.18	13.9	a	2.52	

Means in rows not followed by the same letter differ significantly from each other (P<0.05) using Duncan's Multiple Range Test.

\* P < 0.05

\*\* P < 0.01

Sig. : significance of difference

Table (3): The effect of species on maternal behaviour displays exhibited at 2 mo. after parturition.

Factor	Species						Sig.
	Sheep			Goats			
	No.	$\bar{X}$	S.E.	No.	$\bar{X}$	S.E.	
<b>A. Mother acts:</b>							
1. Time of licking head (min)	35	0.7	0.10	24	0.5	0.07	
2. Time of licking the rest of body (min)	35	0.4	0.07	24	0.5	0.08	
3. Time of licking the rear part (min)	36	0.8	0.14	24	1.4	0.17	*
4. Total time of licking (min)	36	2.3	0.26	24	2.8	0.29	
5. Frequency of licking head	35	31.9	3.49	24	32.2	2.98	**
6. Frequency of licking the rest of body	35	20.9	2.72	24	34.4	3.26	**
7. Frequency of licking the rear part	36	38.2	4.64	24	70.3	7.25	**
8. Total frequency of licking	36	89.6	9.76	24	136.8	12.02	**
9. Frequency of low-pitched bleats	28	11.4	2.85	24	86.0	22.67	**
10. Frequency of high-pitched bleats	30	120.2	21.07	24	278.0	50.48	**
11. Time of nursing bouts (min)	36	1.2	0.23	18	0.9	0.44	
12. No. of nursing bouts	36	8.4	1.82	18	8.3	2.86	
13. No. of rejections	36	92.8	20.42	24	149.7	16.34	*
<b>B. Young acts:</b>							
1. Frequency of sniffing mother	36	17.1	2.68	24	14.1	1.22	**
2. Frequency of licking mother	36	27.5	3.03	24	41.6	3.85	**
3. No. of baaings	10	6.4	2.65	24	117.0	32.79	*

Means in rows not followed by the same letter differ significantly from each other (P<0.05) using Duncan's Multiple Range Test.  
 Sig. : significance of difference \* P < 0.05 \*\* P < 0.01

## **2- Young acts:**

While frequencies of sniffing ewes and does were similar and did not differ significantly, frequency of licking was significantly ( $P < 0.01$ ) higher for does than ewes (Table 3). Number of baaings was markedly and significantly ( $P < 0.05$ ) higher for kids than lambs. Kids gave 110.6 more baaings than lambs. It seemed that kids expressed more care soliciting behaviour than lambs as a reactive response to their mothers' neglections.

Concerning maternal and young behaviours during the three stages of this study, it could be concluded that sheep seem to exhibit expression of maternal behaviour more than goats. Although does were physically more efficient at parturition than ewes, yet the later spent longer time and performed more repeated licking to their lambs, more time and number of nursing bouts and more care giving acts (higher rate of low-pitched bleats) and less repeated searching behaviour (lower rate of high-pitched bleats) of lambs. These results may suggest that the relationship between the dam and its young was stronger in sheep than in goats.

During one hour after the 1<sup>st</sup> week of birth and throughout the suckling period up to the 8<sup>th</sup> week of lactation, it was found that ewes spent more time and frequency of licking the lamb's body, more time and number of nursing bouts than does did. In the meantime, does rejected their kids more frequently than ewes did. Generally observed that the attachment between mother and young became weaker over the period from the 1<sup>st</sup> to the 8<sup>th</sup> week after birth. This result is in harmony with that reported by Hinch (1989) who showed that the frequency of attempts to suckle was significantly ( $P < 0.001$ ) greater during week 1 and 3 than during weeks 6 and 9 after birth. Meanwhile, time and number of nursing bouts of sheep and goats were obviously decreased from 1<sup>st</sup> week to 4<sup>th</sup> week after parturition. Similar findings were observed by Delgadillo *et al.* (1997) and Bungo *et al.* (1998). Delgadillo *et al.* (1997) noticed that nursing frequencies in the mothers of Creole goats decreased significantly ( $P < 0.001$ ) from week 1 (median 39 times/11h) to week 4 (14 times/11h). Whereas, Bungo *et al.* (1998) observed significant ( $P < 0.05$ ) decline in both suckling per bout and suckling duration per hour, from the 1<sup>st</sup> to 3<sup>rd</sup> week after birth in Tokara native kids (27.9 and 143.5 vs., 14.3 and 54.6 second/h., respectively). The reason for the faded expression of maternal behaviour as the young advanced in age could be attributed to more consumption of non-milky feed by the young, and consequently it becomes less dependent on its mother. Squible *et al.* (1990) reported that lambs exposed to a feed may learn to consume it more readily at 4 to 8 weeks of age than when older or younger.

On the other side, our results revealed that maternal expression faded more with advancement of age in goats than sheep.

In conclusion, it may be recommended to give more attention and care to kids than lambs during the early stages of their lives as does express less interest in their youngs.

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### دراسة مقارنة للسلوك الأموي والبنوي في بعض أنواع الأغنام والماعز المصرية

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استخدم ٣٣ نعجة (١٠ نعاج أوسيمي و ١١ نعجة برقي و ١٢ نعجة رحمانى) مع حملانيها (٣٦ حمل) و ١٨ عنزة (١٠ عنزات زرايبي و ٥ عنزات دمشقى و ٣ عنزات البين) مع جدائها (٢٦ جدي) لمقارنة المظاهر السلوكية الأموية والبنوية المختلفة بين الأغنام والماعز. وقد سجلت كل المظاهر عند ثلاثة مراحل (أ) خلال الساعة الأولى بعد الولادة، (ب) بعد أسبوع واحد من الولادة، (ج) بعد شهرين من الولادة. تنتمى الحيوانات المستخدمة إلى مزرعة الأغنام والماعز بكلية الزراعة - جامعة القاهرة.

خلال الساعة الأولى بعد الولادة، كانت العنزات بدنياً أكثر كفاءة من النعاج أثناء عملية الولادة. استغرقت النعاج ١,٣ دقيقة أكثر من الماعز لنزول الجنين بعد ظهور رأسه من فتحة الحيا. تمكنت النعاج من الوقوف لأول مرة بعد الولادة متأخرة عن العنزات بحوالي ١٠,٥ دقيقة. بدأت العنزات لعق وشم جدائها لأول مرة بعد الولادة مبكراً عن النعاج بحوالي ١,٥ دقيقة. مع ذلك، أظهرت الأغنام سلوك أموى أقوى من الماعز. استغرقت النعاج وقتاً أطول وتكرارات أعلى في لعق حملانيها مقارنة بذلك في الماعز. أيضاً، كانت النعاج أكثر في زمن وعدد مرات رضاعة الحملان من أمياتها بدون انقطاع عن الماعز. علاوة على ذلك، أظهرت النعاج سلوكيات توجيه العناية أكثر من الماعز (معدل عالي من إصدار الثغاء بصوت منخفض)، وأظهرت النعاج تكرارات أقل من سلوكيات البحث عن حملانيها (معدل منخفض من الثغاء بصوت مرتفع) مقارنة بالماعز.

خلال ساعة واحدة سواء كانت بعد أسبوع من الولادة أو عند شهرين بعد الولادة، استغرقت النعاج وقتاً أكبر وتكرارات أكثر في لعق جسم حملانيها، ووقتاً أكبر وعدد مرات لرضاعة الحملان من أمياتها بدون انقطاع مقارنة بتلك في الماعز. إضافة إلى ذلك، كانت الماعز أكثر تكراراً في رفض جدائها عن النعاج.

من الملاحظ بصفة عامة أن السلوكيات الأموية والبنوية اضمحلت تدريجياً خلال المرحلتين الثانية والثالثة.

وأظهرت النتائج المتحصل عليها أن الارتباط بين الأم وصغيرها تكون أقوى في الأغنام عن الماعز.