

Effect of birth difficulty on ewe maternal behaviour and lamb survival

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Survival of the neonate relies on the integrated expression of appropriate behaviours from both mother and young. In this study, the effect of birth difficulty on maternal and lamb behaviours and its influence on lamb survival was investigated in crossbred primiparous ewes (½ Finnish x ½ Rahmani). Assisted ewes spent significantly ($P < 0.05$) less time licking (30.83 ± 1.39 min/2 h) and nosing (24.25 ± 1.79 time/2 hr) their lambs than unassisted mothers (38.52 ± 2.96 min, 28.80 ± 1.68 time/2 h) respectively. They were found to be more aggressive towards their lambs when attempt to suck (9.80 ± 0.33 , 12.90 ± 0.84 and 10.50 ± 0.50 time/2 h) when compared with unassisted one (8.00 ± 0.33 , 10.20 ± 1.52 and 7.66 ± 0.88 time/2h) respectively. Lamb behavioural development were found to be significantly ($P < 0.05$) affected by birth difficulty with lambs that require assistance at birth even if they survive the birth process, they were slower to progress through the sequence of neonatal behaviours. These lambs were therefore at greater risk of not surviving to weaning (28.57% vs. 11.42). It could be concluded that ease of delivery was an important factor determining the subsequent behaviour of the lamb and ewe and hence lamb survival, thus manipulation of husbandry and breeding system to improve delivery will improve lamb survival.

High pre weaning lamb mortality greatly reduces the efficiency and profitability of lamb production. In many flocks all over the world, 10-35% of lambs die by the six months of age (Rook *et al.*, 1990) with neonatal lambs at greatest risk (Gama *et al.*, 1991). Although most producers realize that an efficient and profitable system should minimize lamb morbidity and mortality, existing programmes may not adequately quantify the factors implicated in lamb deaths (Nash *et al.*, 1996). Two main factors, dystocia and starvation-exposure have been most often implicated with lamb losses, (Dwyer, 2003).

Dystocia was related primarily to presentation problems (Thomas, 1990 and Clarke *et al.*, 1997) but not to ewe age (Knight *et al.*, 1988; Haughey, 1993 and Morris *et al.*, 2000) or pre-lambing ewe body weight but, it would appear that weaker ewes are more likely to have difficult birth than ewes in better condition (Clarke *et al.*, 1997). Additionally, ewe maternal behaviour was known to be affected by difficult delivery (Alexander *et al.*, 1990 and Dwyer *et al.*, 2001). Unassisted ewes gave more appropriate behaviours at birth and tended to remain closer to their young during the first hours following birth. On the other hand, assisted mothers appear exhausted with

poor mothering ability (Nowak, 1990 and Dwyer *et al.*, 2001) which may influences lamb survival. (Nowak *et al.*, 2000 and Darwish, 2004).

It has been known that difficult birth is also associated with slower neonatal lamb behavioural progress, being less active in the early postnatal period (Hinch *et al.*, 1986; Cloete, 1993 and Dwyer, 2003). Lambs with uncomplicated deliveries or those requiring minimal assistance resulting in fewer lambs deaths (Knight *et al.*, 1988; Fogarty *et al.*, 2000; Nowak *et al.*, 2000 and Darwish, 2004).

The present study investigated how lamb and maternal behaviours were affected by birth difficulty and their consequences on lamb survival.

Material and Methods

This study was carried out in the Animal Production Research Station, New Bahigah Governorate, Egypt during winter season of lambing (February-March, 2005) to investigate the effect of birth difficulty on:

Ewe maternal behaviour, neonatal lamb behavioural development, and lamb postnatal and lamb mortality.

Animals. The study was conducted on 42 crossbred single bearing primiparous pregnant ewes (½ Finnish x ½ Rahmani) with an average body weight of 42 kg and 15 months of age. These

were divided into 2 groups according to the need of assistance at delivery 1- unassisted group (n=35). 2- Assisted group (n=7).

Management. Each ewe during the late stage of pregnancy (last 6 weeks) was allowed a diet consists of one kg concentrate (16% protein, according to NRC, 1996) and green fodder (*Trifolium alexandrinum*) that added *ad-libitum*. Fresh clean water was available at *ad-libitum*.

Ewes were lambing in large straw-bedded pens (7 x 10 m) in groups of 10-12 animals /pen. They were transported to lambing pens 2 weeks before lambing. Ewes were vaccinated with a colostridial vaccine (Covexin) in 17th week of pregnancy.

As far as possible ewes were allowed to give birth and care for their lambs without assistance. However, lambing assistance was given if the ewe had failed to progress through a time schedule of events; one hour after the appearance of fluids without appearance of parts of the lamb and/or 2 hours after parts of the lamb were seen at the vulva without obvious progress being made. In all cases, intervention was kept to minimum and mainly involved correcting lamb presentation before the ewe continued the birth process.

Data recording. As lambing approaches, the pregnant ewes were observed continuously in the lambing pen for the exact time of lambing. The observation was started immediately after the lamb born by focal animal observation using video camera. The recording was continuous during the first 2 hours following birth.

Ewe data including, grooming the lamb and rumble as well as distress calls, facilitate sucking and prevent sucking (backing, circling, forward movement).

Lamb data.

A- behaviour patterns, they included. First shake of head, first attempt to stand, first successful stand, time to reach the udder, time to first successful suck and time spent sucking /2 h.

B- lamb performance. Each lamb was weighted 2h after of birth by digital weighing machine and lamb weighting was repeatedly each week, until weaning (2 months).

C- lamb mortality. Lamb mortality was recorded during the period from birth until weaning.

Statistical analysis. Tests of significance (T-test and Chi-square) were used to test the effect of birth difficulty (assisted vs. unassisted) on

maternal and lamb behaviours and their consequences on lamb survival.

Results and Discussion

Assisted ewes did not spend as much time licking (30.83 ± 1.39 min/2 h, $P < 0.05$) and nosing (24.25 ± 1.79 time/2 h, $P < 0.05$) their lambs when compared with unassisted mothers, which tended to express appropriate maternal behaviour at birth (38.52 ± 2.96 min, 28.80 ± 1.68 time/2 h) respectively.

With regard to the ewe response to lamb sucking attempts (Table, 1), the rate of ewe standing was found to be higher in unassisted ewes (25.00 ± 1.34 time/2 h, $P < 0.05$) than assisted one (20.25 ± 1.10 time/2h). This appeared to be due to the higher sucking frequency of lambs from unassisted mothers which appeared more active at birth associated with better mothering ability. On the other hand, assisted ewes were found to be more aggressive towards its neonate by moving away when the lamb attempts to suck (9.80 ± 0.37 , 12.90 ± 0.84 and 10.50 ± 0.50 time/2 hr) than unassisted one (8.00 ± 0.40 , 10.20 ± 0.52 and 7.66 ± 0.88 time/2 h) respectively.

With reference to lambing vocalization (Table, 1), the data demonstrated a significant differences ($P < 0.05$). Rumble call is a specific lambing vocalization associated with maternal care that plays an important role in ewe-lamb bond formation (Nowak, 1996), it was found to be significantly higher ($P < 0.05$) in unassisted mothers (298.50 ± 14.15 time/2 h) that is characterized by adequate mothering ability than assisted one (235.60 ± 20.10 time/2 h). While for distress call which usually associated with aggression and the separation from the neonates there was the opposite. These results were in agreement with studies reported by (Alexander *et al.*, 1990; Dwyer *et al.*, 2001 and Dwyer, 2003) who demonstrated that ewe maternal behaviour was found to be affected by difficult delivery.

The data presented in Table (2) demonstrated that, lamb neonatal progress is a function of proximate mechanisms such as the ease of delivery. These results illustrated that lambs required manual delivery were significantly slower than other lambs to perform all neonatal behaviours. Significantly ($P < 0.05$), smaller numbers of these lambs were seen sucking within the initial recording period (Table 2).

Table (1): The effect of birth difficulty on ewe maternal behaviour.

Variable Treatment	Grooming time (min)	Nosing frequency	Rumble call frequency	Distress call frequency	Facilitate sucking frequency	Prevent sucking frequency		
						Backing movement	Circling movement	Forward movement
Assisted group	30.83 ±1.39 ^b	24.25 ±1.79 ^b	235.6 ±20.10 ^b	65.40 ±2.54 ^a	20.25 ±1.10 ^b	9.80 ±0.37 ^A	12.90 ±0.84 ^a	10.50 ±0.50 ^A
Unassisted group	38.52 ±2.96 ^a	28.80 ±1.68 ^a	296.5 ±14.15 ^a	55.25 ±2.05 ^b	25.00 ±1.34 ^a	8.00 ±0.40 ^B	10.20 ±0.52 ^b	7.66 ±0.88 ^B

Capital letters means within the same column carrying different letters are significantly different at (P<0.01).
Small letters means within the same column carrying different letters are significantly different at (P<0.05).

Table (2): The effect of birth difficulty on lamb behaviour.

Variable Treatment	First shake of head after birth (min)	First attempt to stand after birth (min)	First successful stand after birth (min)	Time (min) to reach the udder	First successful sucking after birth (min)	Time (min) spent sucking/ 2hr
Assisted group	0.43 ±0.02 ^A	3.66 ±0.21 ^a	19.07 ±0.52 ^a	29.65 ±0.66 ^a	38.47 ±1.28 ^a	10.78 ±0.60 ^b
Unassisted group	0.36 ±0.01 ^B	2.92 ±0.17 ^b	17.18 ±0.53 ^b	25.44 ±0.53 ^b	34.67 ±0.75 ^b	14.38 ±1.25 ^a

Capital letters means within the same column carrying different letters are significantly different at (P<0.01).
Small letters means within the same column carrying different letters are significantly different at (P<0.05).

Table (3): The effect of birth difficulty on lamb body weight (kg).

Variable Treatment	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Assisted group	3.45 ±0.30 ^b	4.43 ±0.26 ^b	5.35 ±0.34 ^b	6.48 ±0.15 ^B	7.40 ±0.17 ^B	8.38 ±0.23 ^B	9.40 ±0.24 ^b	10.08 ±0.22 ^b
Unassisted group	4.76 ±0.12 ^a	5.89 ±0.14 ^a	7.08 ±0.11 ^a	8.48 ±0.15 ^A	9.59 ±0.07 ^A	10.61 ±0.17 ^A	11.57 ±0.05 ^a	12.47 ±0.12 ^a

Capital letters means within the same column carrying different letters are significantly different at (P<0.01).
Small letters means within the same column carrying different letters are significantly different at (P<0.05).

Table (4): The effect of birth difficulty on lamb weight gain (kg).

Variable Treatment	Gain 1	Gain 2	Gain 3	Gain 4	Gain 5	Gain 6	Gain 7	Total Gain
Assisted group	0.98 ±0.12 ^b	0.93 ±0.11 ^b	1.13 ±0.34 ^b	0.93 ±0.05 ^b	0.98 ±0.15	1.03 ±0.13	0.68 ±0.13 ^b	6.63 ±0.29 ^b
Unassisted group	1.13 ±0.19 ^a	1.19 ±0.20 ^a	1.40 ±0.15 ^a	1.11 ±0.12 ^a	1.02 ±0.15	0.96 ±0.14	0.90 ±0.09 ^a	7.71 ±0.21 ^a

Small letters means within the same column carrying different letters are significantly different at (P<0.05).

Table (5): The effect of birth difficulty on lamb mortality.

Variable Treatment	Number	Mortality (%)	Chi-square
Assisted group	2/7	28.57 ^a	5.38 [*]
Unassisted group	4/35	11.42 ^b	

Different small letters means within the same column are significantly different at (P<0.05).

Injury to the foetal CNS, either by haemorrhage or asphaxia, has been shown to be associated with birth stress and prolonged deliveries (Haughey, 1993). Damage to the foetal CNS can cause impaired sucking and locomotor activity in lambs and impairs the thermoregulation in the neonate (Cloete, 1993). The ability to maintain body temperature is related to behaviours (Slee and Springbett, 1986 and Dwyer, 2003), damage to the CNS affecting both behaviour and thermoregulatory ability, may account for the observed slow behaviour of the lambs in the present study following difficult delivery. Moreover, birth difficulty may result in trauma, either physical injury or hypoxia which continue to affect lamb development over the post natal period as mentioned in the previous studies of (Hinch *et al.*, 1986; Cloete, 1993 and Dwyer, 2003) who stated that lambs that had difficult delivery were significantly slower to perform all behavioural landmarks after birth than lambs with uncomplicated delivery.

There was a significant difference ($P < 0.05$) between the lambs in performance due to birth difficulty (Tables 3 and 4). Lambs born to unassisted mothers had higher growth rate from birth till weaning than lambs from assisted ewes.

The enhanced growth and survival of lambs that were active at birth in this study might be related to the nutritional and immunological benefits of early colostrum ingestion and also to the effects of sucking behaviour on the establishment of ewe recognition in the lamb. The present results were in close accordance with the results of (Nowak *et al.*, 2000 and Darwish, 2004) who demonstrated that lamb growth was greater in lambs that stand and suck quickly in the early post natal period.

Lambs born to assisted ewes had significantly ($P < 0.05$) Table (5) higher mortality (28.57%) than lambs born to unassisted one (11.42%). The higher mortality in lambs from assisted ewes might be related to its poor mothering ability associated with frequent separation from their lambs at birth. In addition, lambs born to assisted mothers were less active at birth and take longer time to stand and suck. Consequently higher lamb mortality was recorded where lamb survival is crucially dependent on the expression of adequate behaviours from both the ewe and lamb at birth. Any impairment in these behaviours will increase the probability that the lamb will not survive. Similar results were recorded by (Knight *et al.*, 1988; Alexander *et al.*, 1990;

Fogarty *et al.*, 2000 and Darwish, 2004) who suggested that the behavioural traits, which should theoretically maximize the survival of the lamb including: birth of short or average duration, intense persistent grooming and absence of aggression towards the neonate.

In conclusion, this study had demonstrated that birth difficulty is a risk factor, which had adverse effect on ewe and lamb behavioural progress and consequently affecting lamb survival. Thus lamb behavioural development may be a key factor in promoting lamb survival. Understanding the prenatal processes that affect lamb behaviour is likely to be important in managing sheep flocks for maximum survival of lambs.

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