

# Lambing and neonatal behaviour of Djallonke × Sahel crossbred sheep. 1. Maternal behaviour

A. K. TUAH, K. OPPONG-ANANE & K. OWUSU-ADUOMI

(A.K.T. & K.O.-AD.: Department of Animal Science, University of Science and Technology, Kumasi, Ghana; K. O.-AN.: National Director, Ghana Govt/UNDP/FAO Sheep and Goat Project Farm, Ejura, Ghana)

## SUMMARY

Observations were made of the behaviour of 52 ewes during lambing. The parameters recorded were duration and distance of isolation of dam from the main flock, grooming and rejection of lambs by their dams. The effects of age and parity of dam and birth weight and sex of lamb on these behavioural characteristics were analysed. Age and parity of dam and birth weight and sex of lamb significantly ( $P < 0.01$ ) influenced duration and distance of isolation and duration of grooming. These parameters, however, did not significantly ( $P > 0.05$ ) influence rejection.

Original scientific paper. Received 29 Jul 88; revised 4 Oct 90.

## Introduction

The national ruminant population of Ghana compared to that of non-ruminants is low though raising ruminants, particularly sheep and goats, may have advantages over raising non-ruminants, especially with respect to feeding. This low population is partly due to a high incidence of lamb mortality. This is the result of lack of good lambing management. The behaviour of the ewe towards the neonate and the response which the neonate gives it must be well understood if the best shepherding is to be carried out at parturition.

No systematic observations on the parturient behaviour of sheep have been reported in West Africa. However, reports from other parts of the world (Owen, 1976; Blood, Henderson & Radostis,

## RÉSUMÉ

TUAH, A. K., OPPONG-ANANE, K. & OWUSU-ADUOMI, K.: *Agnelage et le comportement neo-natale des moutons métis Djallonke × Sahel. 1. Les comportements maternelle.* Les comportements de cinquante-deux brebis ont été observés pendant l'agnelage. Les paramètres enregistrés étaient la durée et la distance d'isolation de la mère du troupeau, le soins et le rejet des agneaux par leurs mères. Les effets d'âge et de la parité de la mère et le poids de naissance et la sexe des agneaux sur les caractères de comportement ont été analysés. L'âge et la parité de la mère et le poids et la sexe des agneaux ont significativement influencé ( $P < 0.01$ ) la durée et la distance d'isolation et la durée de soins. Ces paramètres, cependant, n'ont pas significativement influencé ( $P > 0.05$ ) le rejet.

1981) indicated that poor mothering, failure to obtain milk, infectious and non-infective postnatal agents are the main causes of the reduced rate of multiplication in sheep. The purpose of this work was to study the behaviour of the ewe at parturition, which might help in evolving an effective lambing management system.

## Materials and methods

### Source of data

The data used in this study were observations made during the lambing of 52 ewes from 1 Jan 83 to 18 Feb 83 on the Ghana Government/UNDP/FAO Sheep and Goat Project Farm at Ejura.

### Location, climate and vegetation

Ejura lies on latitude 7° 23' N and longitude 1° 22'

W, about 104 km north of Kumasi.

The average monthly temperatures vary between 26.1 and 28.9°C. Higher temperatures occur during the months of November to April when the dust-laden North East Trade Winds prevail. The average maximum temperatures occur in February and March while the lowest are experienced in July. The mean annual rainfall is about 1500 mm. It has two peaks which occur in April-June and September-October. A short dry season separates the two peaks in August. The major dry season (Harmattan) lasts from November-February and sometimes to early March (Bartrop-Sackey, 1979). The area lies in the transitional zone between the high forest and the interior savanna. This transitional vegetation, sometimes described as derived savanna, is characterized by a mixture of tall trees, shrubs and grasses (Bartrop-Sackey, 1979).

#### *Feeding, housing and management of the flock*

The animals were grazed on paddocked pasture during the day and housed in sheds during the night. They were given supplementary feed (dried brewers' spent grains, 200 g/head/day) in the mornings and evenings during the dry season and also during critical periods of gestation. The animals were counted every month. All deaths were recorded and in almost all cases post-mortem examinations were conducted to find the cause of death. Routine medication included dipping and drenching against external and internal parasites respectively. Overgrown hooves were trimmed.

#### *Mating of animals and observations made during lambing*

Fifty-two ewes of all ages were mated in August and early September 1982 to lamb in January and February 1983. During lambing, ewes were observed continuously during the day on pasture and during the night in illuminated sheds. Observations were recorded from the time ewes isolated themselves from the main flock till 6 h after lambing.

#### *Duration and distance of isolation*

The duration of isolation was the time interval

between the time ewe isolated itself (10 m) from the closest member of the main flock and the time it completely lambed. The distance of isolation was the distance between the isolated animal and the nearest member of the flock.

#### *Grooming*

Grooming is the licking of foetal membranes from the neonate immediately after birth. The duration of grooming was the time interval between the time the ewe initiated and completed grooming.

#### *Rejection or acceptance*

The distance between the ewe and the lamb was recorded during the first 6 h *post partum*. If the distance was less than 1 m or between 1 and 5 m, it indicated acceptance and if more than 5 m it indicated rejection as suggested by Kilgour (1972).

#### *Age and parity of the dam*

There were four age groups: 2, 3, 4 and 5 years and above. Parity is the number of gestations and their subsequent parturitions. There were five parity groups: 1, 2, 3, 4 and 5 and above. The age and parity were determined from farm records.

#### *Birth weight and sex of lamb*

All the recorded birth weights were grouped into three classes: 1.5-2.0, 2.1-2.5, and 2.6 kg and above. Birth weights were recorded 6 h *post partum*. This was to prevent interruptions in the establishment of the mother-neonate bond. The sex of the neonate was also recorded.

#### *Experimental design and statistical analysis*

A completely randomized design (CRD) was used for the experiment. There were four treatments corresponding to age, parity, birth weight and sex of lamb. The analysis of variance was used to test significance (Steel & Torrie, 1980). Tukey's *W*-procedure was used to compare the individual treatment means where significant differences were observed (Steel & Torrie, 1980).

## **Results**

The results of the study are summarized in Tables 1-4.

TABLE 1

*Effect of Age of Dam on Maternal Behaviour*

No. of ewes	Age of dam (yr)	Mean duration of isolation (min)	Mean distance of isolation (m)	Mean duration of grooming (min)	% rejection
20	2	106.2 <sup>a</sup>	49.4 <sup>a</sup>	33.2 <sup>a</sup>	35
9	3	42.4 <sup>bc</sup>	34.7 <sup>b</sup>	20.0 <sup>b</sup>	10 <sup>b</sup>
10	4	61.7 <sup>b</sup>	37.8 <sup>b</sup>	18.2 <sup>b</sup>	11 <sup>b</sup>
13	5 & above	32.0 <sup>c</sup>	13.2 <sup>c</sup>	20.6 <sup>b</sup>	0 <sup>c</sup>
SE		16.4	7.6	3.4	7.4

Means in the same column with different superscripts are significantly different ( $P < 0.01$ ).

TABLE 2

*Effect of Parity of Dam on Maternal Behaviour*

No. of ewes	Parity of dam	Mean duration of isolation (min)	Mean distance of isolation (m)	Mean duration of grooming (min)	% rejection
16	1	124.9 <sup>a</sup>	54.1 <sup>a</sup>	32.7 <sup>a</sup>	44
13	2	40.6 <sup>c</sup>	34.5 <sup>b</sup>	25.6 <sup>b</sup>	7
5	3	27.2 <sup>c</sup>	31.2 <sup>b</sup>	20.2 <sup>bc</sup>	25
6	4	85.0 <sup>b</sup>	40.5 <sup>b</sup>	17.3 <sup>c</sup>	0
12	5 & above	32.8 <sup>c</sup>	11.4	19.8 <sup>bc</sup>	0
SE		18.7	6.9	2.8	8.5

Means in the same column with different superscripts are significantly different ( $P < 0.01$ ).

TABLE 3

*Effect of Birth Weight on Maternal Behaviour*

No. of ewes	Birth weight (kg)	Mean duration of isolation (min)	Mean distance of isolation (m)	Mean duration of grooming (min)	% rejection
10	1.5-2.0	84.7 <sup>a</sup>	37.4 <sup>a</sup>	13.2 <sup>b</sup>	40
28	2.1-2.5	69.8 <sup>a</sup>	37.6 <sup>a</sup>	32.4 <sup>a</sup>	18
14	2.6 & above	45.5 <sup>b</sup>	30.3 <sup>b</sup>	20.0 <sup>b</sup>	0
SE		11.4	10.0	5.6	11.6

Means in the same column with different superscripts are significantly different ( $P < 0.01$ ).

*Isolation*

All ewes isolated themselves from the rest of the flock before lambing. The mean duration of isolation was 68.2 min. It varied from 32 to 106 min (Table 1). The duration of isolation was significantly ( $P < 0.01$ ) influenced by age, parity, birth weight and sex

of lamb. The duration of isolation was generally longest in 2-year-old ewes giving birth for the first time and shortest in older ewes (Tables 1 and 2). The longest duration was observed in a 2-year-old ewe (430 min) and the shortest in an 8-year-old ewe (12 min). Generally, the duration of isolation was

TABLE 4

*Effect of Sex of Lamb on Maternal Behaviour*

No. of lambs	Sex of lamb	Mean duration of isolation (min)	Mean distance of isolation (m)	Mean duration of grooming (min)	% rejection
23	Male	92.8 <sup>a</sup>	38.7 <sup>a</sup>	27.3 <sup>a</sup>	21.0
29	Female	45.1 <sup>b</sup>	30.6 <sup>b</sup>	24.7 <sup>b</sup>	11.0
SE		25.4	4.9	1.9	5.0

Means in the same column with different superscripts are significantly different ( $P < 0.01$ ).

shorter for ewes giving birth to heavier lambs than those giving birth to lighter lambs (Table 3) and also in male than in female births (Table 4).

The distance of isolation was significantly ( $P < 0.01$ ) influenced by age, parity, birth weight and sex of lamb. Older or experienced ewes isolated themselves for shorter distances from the flock than younger ewes (Tables 1 and 2). A 2-year-old ewe isolated itself by a distance of 69 m while a 7-year-old ewe isolated itself by only 3 m.

The distance of isolation increased with increase in birth weight (Table 3) and also ewes carrying male lambs isolated themselves farther than those with females (Table 4). The mean distances of isolation were 39.8 and 36.5 m for lambing in paddocks and sheds respectively.

#### *Grooming and rejection*

The duration of grooming was significantly ( $P < 0.01$ ) affected by age, parity, birth weight and sex of lamb. Older and experienced ewes groomed their lambs for a shorter period than younger ewes (Table 1). Males were groomed longer (27.0 min) than females (23.1 min) and heavier lambs were groomed longer than lighter lambs (Table 3).

Maternal rejection of lambs was not significantly ( $P > 0.05$ ) affected by age, parity, birth weight and sex of lamb. However, rejection was higher in younger ewes and absent in older ewes. Rejection only occurred in birth weight ranges from 1.5 to 2.0 kg and from 2.1 to 2.5 kg (Table 3).

#### **Discussion**

Ewes normally isolate themselves from the rest

of the flock just before lambing to ensure strong bondage between the ewe and lamb before they rejoin the flock. Isolation also reduces disturbances from other ewes, prevents poaching and it is done to seek favourable microclimates (Kilgour, 1972). Alexander (1960) also noted that ewes separated themselves from other ewes to prevent crushing of their neonates.

Older ewes with previous parturitions isolated themselves for a shorter period in this trial. This is similar to the observations made by Wallace (1949). He noted that maiden ewes isolated themselves for about 4 h while older ewes isolated themselves for only about 1 h. This is because older ewes can endure the pain of labour and also establish the mother-neonate bond earlier than younger ewes. In the present work, however, the mean duration of isolation was about 2 h for maiden ewes and half hour for older ewes (Table 1).

It was expected that an increase in birth weight would result in an increase in the duration of isolation as delivery of heavier lambs were more likely to be delayed. But the duration of isolation decreased with increase in birth weight. This was because an increase in birth weight was also associated with an increase in age of dam.

According to Wallace (1949) and Hafez *et al.* (1969), older ewes isolated themselves for shorter distances from the flock than younger ones. They noted that younger ewes isolated themselves farther because the pain of labour was greater than in older ewes. In the present work also, older ewes isolated themselves by shorter distances than younger ewes. Ewes carrying male lambs also

isolated themselves farther than those carrying females.

Grooming has a thermoregulatory function. It prevents excessive evaporative cooling of the lamb (Hafez *et al.*, 1969; Owen, 1976). If a newborn is left unlicked for even as short a time as one hour, it may fail to stand and may subsequently die (Hafez *et al.*, 1969). They further noted that grooming established an attachment of ewe to lamb and also served to distinguish the lamb from other lambs. Licking the neonate also helps in establishing urination and defecation. Selman, McEwan & Fisher (1970) have reported that with cattle, the duration of grooming was 33-48 min for cows and only 11 min for heifers. This does not agree with the results of the present trial as the duration was longer in maiden ewes (34.5 min) than in older ewes (20.6 min) (Table 1).

According to Selman, McEwan & Fisher (1970), the neonate might be rejected because of unusual disturbances to the mother at parturition. Rejection decreased with an increase in maternal age. Younger ewes rejected their lambs because they might have encountered more painful labour. Selman, McEwan & Fisher (1970) reported that in cattle, rejection was greater in heifers and also in prolonged births which is similar to the present findings.

It was expected that rejection would increase with increase in birth weight. Rejection was greatest in birth weight ranges of 1.5-2.0 kg and 2.1-2.5 kg and absent in heavier lambs. This might be because the heavier lambs were dropped by older ewes.

### Conclusion

Ewes isolate themselves when about to lamb. Their behaviour at lambing was significantly ( $P < 0.01$ ) influenced by dam age and parity and birth weight and sex of lamb. The most important behavioural traits which were affected by these factors were duration and distance of isolation and duration of grooming.

### Acknowledgement

The authors are greatly indebted to Mr J. M. Nani-Nutakor of the Department of Agricultural Economics, Faculty of Agriculture, UST, Kumasi for his help in the statistical analysis. Appreciation is also extended to the entire staff of the Ghana Government/UNDP/FAO Sheep and Goat Project Farm at Ejura for their immense help during observations. Miss Gladys A. Ndziba is acknowledged for typing the manuscript.

### REFERENCES

- Alexander, G.** (1960) Maternal behaviour in Merino ewes. *Proc. Aust. Anim. Prod.* **3**, 105-114.
- Bartrop-Sackey, I. I.** (1979) *The effects of national agricultural policy on rural development in Ashanti Region of Ghana. A case study of Ejura* (MSc Thesis). Kumasi: Faculty of Architecture, University of Science and Technology.
- Blood, D. C., Henderson, J. A. & Radostis, O. M.** (1981) Diseases of the newborn. In *Veterinary medicine* (ed. D.C. Blood, J.A. Henderson and O.M. Radostis), Ch. 3, pp. 59-79. London: Bailliere Tindall.
- Hafez, E. S. E., Cairns, R. B., Hulbet, C. W. & Scott, J. B.** (1969) Maternal and neonatal behaviour. In *Reproduction in farm animals*, 2nd ed. (ed. E.S.E. Hafez), pp. 21. Baltimore: Williams and Wilkins.
- Kilgour, R.** (1972) Behaviour of sheep at lambing. *N.Z. J. Agric.* **125**(3), 23-27.
- Owen, J. B.** (1976) Lambing. In *Sheep production*, 2nd ed. (ed. J.B. Owen). London: Bailliere Tindall.
- Selman, I. E., McEwan, A. B. & Fisher, E. W.** (1970) Studies on natural suckling in cattle during the first 8 hours *postpartum*. I. Behavioural studies (dams). *Anim. Behav.* **18**, 276-283.
- Steel, R. G. D. & Torrie, J. H.** (1980) *Procedures of statistics*. London: McGraw Hill Book Company Inc.
- Wallace, L. R.** (1949) Observations on lambing behaviour in the ewe. *Proc. N.Z. Soc. Anim. Prod.* **9**, 85-95.