

Patterns of Maternal Behaviour in Sheep

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Abstract

The mother-offspring behaviour patterns were monitored in 10 ewes and their new-born lamb(s), during one month, between 1015 am and 1915 pm. Inside the shelter, the temperature ranged between 9 and 20°C and outside, there was sunny weather, with mild wind blow. The observations were made from 10 m distance, without breaking into the sheep's flight zone. There were observed 2130 patterns of ewe-lamb interaction, belonging to 22 main manifestations of maternal behaviour. The most frequently observed behaviour in the ewes was lamb grooming (licking): licking the head of the lamb was observed 356 times (41%), followed by licking the forequarter – 265 times (30%), the back of the lamb – 131 times (15%), the abdominal area – 91 times (10%) and the perineal and/or anogenital area – 36 times (4%). Studies of maternal and neonatal behaviour in sheep contribute to development of management practices, resulting in decreased neonatal mortality, increased meat production and improvement of animal health and welfare. They also confirm the importance of ethology in the veterinary practice.

Keywords: ethology, grooming behaviour, maternal behaviour, sheep, welfare.

1. Introduction

The first hours after birth are important because during this period a bond is established between the ewe and her offspring [1]. It has been found that the first hour after birth is crucial for establishing the connection between the ewe and the new-born, connection which further influences the sucking behaviour [2,3]. The maternal behaviour of sheep affects the survival and growth of the lamb, and the ewe-lamb relationship is essential for production and is important for improving reproductive efficiency. Many studies have described normal behavioural patterns of sheep and lambs [3,4]. Ethologists and scientists have conducted numerous studies on different species over several years [3,5,6,7] and significant contributions to animal husbandry and welfare have been obtained from these studies. Mothers'

interest in offspring after birth is as important as reproductive performance in sheep production. The chances the lamb to survive and the protection against external conditions will be significantly influenced by a successful relationship between the ewe and her lamb. The behaviour of the ewes near parturition and in the postpartum period has a major impact on the survival of the lamb, such as an effect on weaning weight and therefore on productivity, especially under extensive growing conditions [8,9]. The specific maternal behaviour of the sheep (licking / grooming, allowing and facilitating sucking attempts, sniffing and nosing the lamb) promote the recognition and a close relationship between the ewe and her lamb [10,11].

Dwyer et al. [12] found that the basis of the sheep's maternal behaviour after parturition is the strong attraction to amniotic fluids, which after licking the lamb, leads to care giving and recognition of the lamb. This connection is made based on the olfactory sense of the mother sheep. That is why the grooming behaviour is an

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important first step in preparing the new-born lamb for its new environment and life. Licking also makes the lamb clean and dry.

2. Materials and methods

The observations began when the anterior limb of the lamb was externalized and continued from the expulsion of the first lamb until one hour postpartum. The main regions of the lamb's body were defined according to Waiblinger et al. [13], as:

- 1) the head, which also includes the neck,
- 2) the middle part (includes the genital area and the rump),
- 3) the back (includes the trunk and extremities).

The first hours of licking and sniffing, as well as the time spent caring for the lambs in the first hour postpartum, were measured separately for all the main parts of the body; The expulsion time (time interval from the moment when the front limbs of the lamb clearly leave the body) was recorded. In addition, lambs' behaviours were recorded, such as the first attempts to get up and suckle, as well as the exact times for the first standing and the first suckling.

Behavioural data were collected on 10 primiparous and multiparous sheep from the farm of the Research and Development Station for Sheep and Goats Caransebeș, Caraș-Severin County.

The temperature of the air in the shelter, during the observations, was between 0 and 20°C, and the days were sunny or cloudy with a mild wind blow. The sheep were observed during January, February and March, 2020, between 10:15 am and 19:15 pm.

The behaviour was recorded by the observer, who positioned himself at a distance of 10 m, outside the sheep's flight zone. Sheep were accustomed to humans because shepherds stayed with them for most of the day (24 hours) during parturition.

The normal presumption of distribution was tested with the Kolmogorov-Smirnov and Shapiro-Wilk tests before ANOVA and the independent test. Data are expressed as mean \pm standard errors for continuous variables and number and / or percentage for categorical variables. In this study, the chi-square test was used for categorical variables, such as maternal behaviour (number). The ANOVA test was used to compare the time of first licking and sniffing, the total time of licking,

the time of the first standing attempt, the time of the first successful standing, the time of the first attempt to suck, the time of the first sucking (minutes and seconds). The DUNCAN multiple comparison test was used to determine significant differences in the means obtained after ANOVA.

3. Results and discussion

The ewe-lamb interaction was observed for each sheep after giving birth, until the lambs suckled for the first time. Each behaviour sequence was noted in order to identify whether behavioural sequences were found at a frequency that was higher or lower than those produced by chance. The categories of behaviour used in the final analysis and are shown in Table 1.

Although the final analysis used 22 behaviours, initial data identified the possibility of 32 behavioural categories. Behaviours that were not found at more than 0.5% were eliminated; these categories included: other sheep come to help the lamb; the sheep moves away from the lamb and no longer investigates it; sheep that go to another lamb; suckling; sheep approaching the lamb; lambs approaching other sheep; sheep protecting the lambs; lambs in need of help; the sheep pushes back half of the lamb's body; the sheep stay away from the lamb. All these behaviours could occur, but were not observed only at very low frequencies during the study period from parturition to the first successful suckling attempt. Investigation of the placenta and foetal fluids could not be identified because the membranes and fluid had the same colour as the bedding material.

A total of 2130 behaviours belonging to 22 behavioural categories were present in the repertoire of the sheep, during interactions with their lambs. On average, sheep and lambs showed 100 behaviours before suckling. All the lambs had their first suckling in up to two hours after parturition.

The most common behaviour in sheep was lamb licking. Most of the time, the sheep licked the lamb's head and the front parts of the body: 238 times (47.6%). Licking the lamb on the rump and back was observed 187 times (37.4%) and on the abdomen, 75 times (15%).

Some of the sheep sat down, preventing the lamb from suckling, more times than they got away from the lamb. Sheep showed little interest for the

food and stopped eating to lick and sniff the lambs.

Table 1. Behaviour patterns in ewes and lambs

Behaviour sequence	Minimum	Maximum	Mean
The sheep lick the lamb's head	2	25	13.5
The sheep lick the lamb's forelimbs	0	18	9
The sheep lick the lamb's hind limbs	5	16	10.5
The sheep lick the lamb's rump	1	16	8.5
The sheep lick the lamb's umbilical region	0	15	7.5
The sheep push the lamb	1	9	5
The lambs get up	1	13	7
The lambs are laying down	1	9	5
The ewe rejects the lamb	0	5	2.5
The sheep and the lamb walk away from each other	1	3	2
The lamb walks away from the sheep	0	4	2
The ewes are laying down	0	4	2
Sheep investigate the surrounding area	4	28	16
Lambs following the ewes	0	5	2.5
The ewe is eating	0	11	5.5
The ewe gets up	1	5	3
The sheep looks down	0	11	5.5
The sheep looks at her lamb	0	11	5.5
The lamb touches the sheep while they both sit	0	9	4.5
Other sheep come to the lamb	1	6	3.5
The lamb touches other sheep	0	16	8

The most frequently observed behaviour in lambs after they got up was to touch the sheep and look for the nipple, but the more fragile lambs frequently fell to the ground and got up with difficulty. In lambs, the raising up behaviour affects the frequency of suckling and the degree of attachment to the sheep.

The sheep licked the lamb's head and the front part of the body more often. The sheep also had a high frequency of licking the anterior and posterior regions of the lamb, while licking the back of the lamb. Then it was observed, at a lower frequency, licking from the head to the rump, and then coming back to the head or shoulders.

After the parturition, the lambs were covered with foetal fluids that the sheep began to lick, and the first activity of the lambs was an attempt to raise up. Thus, the fact that the sheep licked the front part of the lamb can be considered as a stimulus for it to rise. The lambs rose up and then fell, a phenomenon that was observed 91 times during the study period.

After the lambs raised up, they began to look for the nipple. Certain parts of the sheep's body were more often investigated by the lamb. Among these, the search for the nipple was the most common (but not exclusive). After the lamb began

to suckle, the sheep licked the lamb's head, front part of body, and abdomen. After the lambs began to suckle, the sheep moved more frequently. These behaviours helped the lambs to find and maintain the nipple. After the sheep removed the lamb, if the lamb did not continue to suckle, the sheep turned and licked the lamb's jaw.

Several sheep showed rudiments of seemingly aggressive behaviour toward their lambs when they were lying down. Subsequently, the sheep pushes the front of the lamb's body so that it returns with its back to its snout, followed by licking the area, a phenomenon interpreted as identifying the lamb.

When other sheep have tried to approach, on the next attempt the mother sheep blocks the approach of the foreign sheep or the movement of the lamb towards that sheep.

Sheep seemed to move less frequently to the feeding area, which could be interpreted now as an investigative behaviour.

We need to know which behaviours or sequences of behaviours are most frequently expressed by sheep that have a more developed maternal instinct. Behavioural data from this study indicate that lamb licking was the main behaviour observed in ewes.

Consistent with our results, Bareham [4] highlights a similar frequency of lamb licking behaviour, primarily directed towards the lamb's head. Licking the lamb immediately after parturition has several roles. In addition to the thermal benefits, our data suggest that by licking there is a tactile stimulation of the front of the head, which encourages the lamb to raise up and stand. A future approach could be the relationship between licking the shoulder area and the viability of the lamb. It is possible that by insistently licking this area, the lamb will get up faster, have a greater stability, which will speed up the first suckling.

Some sheep moved away from the lamb after licking its fur. However, although these sequences appeared, they were lower and probably of no biological significance.

After standing, the lambs searched for the nipple to suckle. These sheep were more cooperative to lamb suckling attempts by exposing the udder and directing the lamb toward it. In sheep that moved away from their lamb, suckling took place later. However, the lambs of these sheep will need assistance, as any delay in suckling could have consequences, especially in cold weather.

A big problem for sheep breeders is lambs that die after birth or in the first three days. In the United States, pre-weaning mortality losses account for 20-25% of the lambs [14-16], plus 70% deaths in the first five days postpartum. In Australia, the highest mortality occurs in the first days after parturition [1,4]. Failure to ensure the possibilities of achieving the maternal ewe-lamb bond or rejection of the lamb are the major factors of these losses. In a three-year study, it was found that 54% of lambs were lost due to non-acceptance by their mother, followed by the lack of milk [9].

4. Conclusions

The first maternal behaviour observed in sheep after parturition is lamb licking (grooming).

All the sheep got up immediately after parturition, searched and then sniffed and licked the lamb.

The licking behaviour of the mother sheep immediately after birth depends on the liveliness of the lamb. Through this behaviour the cutaneous blood circulation gets activated, the lamb's coat dries and the new-born is encouraged to get up and ingest the colostrum.

The mean time for the first licking after birth was 138.3 ± 15.39 seconds.

The ewes mainly licked the middle region of the lamb's body, followed by the hind region and the head.

References

1. Alexander, G., Peterson, J.E., Neonatal mortality in lambs. *Austr. Vet. J.*, 1961, 37, p, 371-381.
2. Athanasiadou, S., Houdijk, J., Kyriazakis, I. Exploiting synergisms and interactions in the nutritional approaches to parasite control in sheep production systems. *Small Ruminant Research*, 2008, 76, 1-2, 2-11, <http://dx.doi.org/10.1016/j.smallrumres.2007.12.016>
3. Avondo, M., Fasone, V., Pagano, I.R., Crescione, A., Galofaro, V., Effetto della percentuale di pascolo nella dieta sul contenuto di acido linoleico coniugato (CLA) nel latte ovino. in: *Proc. Società Italiana di Patologia ed Allevamento degli Ovini e dei Caprini (S.I.P.A.O.C)*, Cagliari, Italy. (Abstr. in Italian); 2002, 134
4. Bareham, J.R., The behaviour of lambs on the first day after birth. *Br. Vet. J.*, 1976, 132, 152-161.
5. Binns, S.H., Cox, I.J., Rizvi, S. Greena, L.E Risk factors for lamb mortality on UK sheep farms, 2002, 52, 3-4, 22 January, 287-303
6. Bøe, K. E., Ottosen A. M Andersen I.,L., Feed intake and competition in ewes on ad libitum or semi-restricted feeding of grass silage and hay. *J Anim Sci*, 2012, 90, 11, 4014-4019
7. Caroprese, M., Sheep housing and welfare, *Small Ruminant Research*, 2008, 76, 21-25.
8. Houpt Katherine, *Domestic animal behaviour for veterinarians and animal scientists*, Iowa State press, 1987
9. Kendrick KM, Sheep senses, social cognition and capacity for consciousness. In: Dwyer CM (ed) *The welfare of sheep*, *J Anim Sci*, 2008, 6915008—5016
10. Kilgour, R.J., Waterhouse, T., Dwyer, C.M., Ivanov, I.D., Farming systems for sheep production and their effect on welfare. In: *The Welfare of Sheep* (ed) C.M. Dwyer. Springer Science, 2008, 213-265.
11. Napolitano F, Giuseppe De Rosa, Valentina Ferrante, Fernando Grasso, Ada Braghieri, Monitoring the welfare of sheep in organic and conventional farms using an ANI 35L derived method. *Small Ruminant Research*, 2009, 01/2009, 83, 49-57.
12. Dwyer CM, Bornett HLI, Chronic stress in sheep: assessment tools and their use in different management conditions. *Animal Welfare*, 2004, 13, 293-304
13. Waiblinger, S., Boivin, X., Pedersen, V., Tosi, M-V., Janczak, A.M., Visser, E.K. and Jones, R.B., Assessing the human-animal relationship in farmed species: A critical review. *Applied Animal Behaviour Science*, 2006, 101, 185-242.

14. Sevi, A., Casamassima, D., Giuseppe Pulina, G., Pazzona, A., Factors of welfare reduction in dairy sheep and goats. *Italian Journal of Animal Science*, 2009, 8 (Suppl. 1), 81
15. Wemelsfelder, F; Farish, M. Qualitative categories for the interpretation of sheep welfare: a review. *Animal Welfare*, 2004, 13, 3, 261-268(8)
16. *** EFSA (European Food Safety Authority), Guidance on Risk Assessment for Animal Welfare Article Print on demand *EFSA Journal* 2012, 10(1), 2513 [30 pp.]. doi:10.2903/j.efsa.2012.2513