

THE EFFECT OF TEMPERAMENT OVER THE MATERNAL BEHAVIOR IN PRIMIPAROUS DAIRY SHEEP

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Abstract

PEEVA, Zh. H., 2009. The effect of temperament over the maternal behavior in primiparous dairy sheep. *Bulg. J. Agric. Sci.*, 15: 84-89

The aim of this study was to examine the maternal behaviour by means of separation of the lamb(s) from the dam through the test „Mother – young separation” in primiparous dairy sheep of different temperament. The test was carried out in the individual cage, where the dam and young(s) were normally reared until the 7th day after birth. The data of the following primiparous animals were used: 12 Calm (C), 12 Nervous (N) and 10 sheep of the group P1 (with not defined temperament) born in the year 2000; 27 C, 10 N and 7 sheep of the group P1, born in 2001. The number of animals in each temperament group was selected according to the following criterion: type of lambing (single, twins); date of lambing ± 10 days. The following parameters were recorded: Latency to approach the lambs to a distance of 1m(s); Latency to contact lamb(s); Latency to High – pitch bleats and Low pitch bleats, and their frequencies. Temperament was assessed in all 250 dairy ewes of the breed “Synthetic Bulgarian Dairy Population” from the experimental flock at the Research Institute of Agricultural Science (Stara Zagora), by different methods. The most typical animals of the C and N types were used. It was established that the temperament influenced the behavioral reactive abilities of the primiparous dairy sheep. The lambing stress at the first parity caused significant negative effect on the maternal behavior in the animals of the Nervous temperament. They showed a hesitation in joining the lamb after its separation aside, which was a sign of higher fear susceptibility compared to this of Calm temperament and group of ewes with not defined temperament (P1).

Key words: maternal behavior, temperament, primiparous dairy sheep

Introduction

The study of individual differences in maternal behavior has largely been in an attempt to identify the sources of variation in maternal care. Individual differences in maternal stiles have been shown to be consistent with successive parities in primates and sheep (Fairbanks, 1989; Berman, 1990; Dwyer and Lawrence, 2000; Dimitrov et al., 2002).

The reduced maternal responsiveness of primiparous mothers is a common phenomenon across species (e.g. rat: Molz and Robbins, 1965 sheep: O'Connor et al., 1992; macaques: Timmerman and Vossen, 1996; horses: Juarbe –Diaz, 1998; Dwyer and Lawrence, 2000).

In this study we looked only at those behaviors expressed in the immediate post partum period associated with the formation of an attachment between

mother and young.

Maternal behavior in the sheep is characterized by bonding period, immediately after birth of the young, when the ewe displays intensive licking or grooming behaviour towards the neonate, accompanied by frequent low-pitched vocalization (Hersher et al., 1963; Alexander, 1988; Dimitrov, 2001).

Consistency in maternal responses may be influenced by a stable social environment as well as an underlying consistency in temperament rooted in both genetics and early life experience (Fairbanks, 1989; Berman, 1990; Dimitrov et al., 2001).

Several studies are supportive of a link between temperament or emotional reactivity of mother and her maternal style suggesting controversial results (Maestripiery, 1993, 1994; Schino et al., 1995; Dimitrov, 2001).

Extended studies have been carried out to establish the level of emotional reactivity and temperament in dairy sheep (Dimitrov et al., 1993a, b; 2005; Boissy et al., 2007).

Little is known about the role of temperament in the maternal behavior in primiparous sheep.

The aim of this study was to investigate the effect of temperament over the maternal behavior in primiparous dairy sheep.

Methods

Temperament was assessed in 250 dairy ewes of the breed "Synthetic Bulgarian Dairy Population" from the experimental flock at the Research Institute of Agricultural Science (Stara Zagora). The following methods were used: 1) Assessment of temperament in the milking parlour (Dimitrov et al., 1993a, b; Dimitrov et al., 1996;); 2) A system of fear inducing and learning tests (Dimitrov, 1998; Dimitrov et al., 1999a, b); 3) Lankin fear inducing tests (Lankin, 1997).

On the base of a complex score (CS) three temperaments distinguishing significantly ($p < 0.001$) in the behavioural trait adjectives, were established: Calm (Fearsustainable, reacting adequately towards learning tests), Nervous (Fearsusceptable, reacting

nonadequately towards learning tests) and intermediate type ewes.

With a view to investigate the effect of temperament over the maternal behaviour, the most typical animals of the C and N types were used. The animals having no data on the lactation following the birth (without lactation developed and machine milking tests) were analysed in a separate group called P1.

The data of the maternal behavior in the following primiparous sheep were used: 24 sheep (12C and 12N) and 10 sheep of the group P1 born in the year 2000; 37 animals (27C and 10N) and 7 sheep of the group P1, born in 2001. The number of animals in each temperament group was selected according to the following criterion: type of lambing (single, twins); date of lambing ± 10 days.

All ewes give their first birth at the age of two years. Data from individual ewes were used only if, for all parturitions, only 1 or 2 lambs were born, length of labour was not excessively long or abnormal and the lambs survived the recording period at least 3 days after birth. The ewes gave birth in the same premises. After the birth the dams and youngs had been removed in individual boxes (2x1.5m), where they have remained for 7 days. After this period, they were housed in pens (7x7m) in groups of approximately 10 ewes.

With a view to follow up relations between the level of fearsusceptibility and maternal behaviour, and the mother – young bond establishment, the following test was used (Dimitrov et al., 2008):

Test „Mother – young separation I” (visual and tactile contact allowed)

The aim of this test is to examine the confrontation between maternal cares and separation of the lamb(s) by human. The test was carried out in the individual cage, where the dam and young(s) were normally reared until the 7th day after birth. The experimenter put the lamb(s) outside of the cage so as to allow visual and tactile contact. The test was done for two minutes. Even so, the lambs were not totally separated the fear reaction towards human was testified.

The following parameters were recorded: Latency to approach the lambs to a distance of 1m(s); La-

tency to contact lamb(s); Latency to High–pitch bleats and Low pitch bleats, and their frequencies.

Statistical analysis

The results of the test were presented as means \pm SE. Between-groups differences (C versus N) were analyzed by one way ANOVA. Differences were considered as significant when p values were less than 0.05. Statistical analyses were performed using the Statistica Software (Statsoft, Inc., USA).

Results and Discussion

The effect of temperament over the maternal behavior of primiparous dairy sheep born in 2000 is presented in Table 1.

Sheep of Calm (C) temperament have approached the lamb up to 1m distance for 14.1 ± 9.7 s, respectively those of Nervous (N) temperament for 57.7 ± 16.3 s and the group of primiparous ewes with not defined temperament (P1) – 60.4 ± 17.4 s. The P1 animals were separated in different group because of

the lack of experimental data during machine milking and problems with lactation development. A statistical difference between C/N, ($P < 0.05$), and C/P1 ($P < 0.05$) was found. No difference was found between N and P1. The results of this parameter show that sheep of N temperament reveal a hesitation in joining the lamb, which is explained by the higher level of fear susceptibility of these animals. The results of the P1 animals were worse than these of N temperament when joining the young. The stress of lambing and the higher level of fear susceptibility is the likely reason for this. Sheep of Calm (C) temperament demonstrated stable maternal behavior expressed by the behavior of following and joining the lamb immediately after lamb's removal.

The average latency to contact the lamb was 12.5 ± 9.8 s in C temperament, 60.8 ± 17.8 s in N and 66.8 ± 18.1 s in P1. Contrasts between C/N and C/P1 were significant, $P < 0.05$. No significance was found between N/P1. These results confirm the tendency of higher emotional reactivity in N and P1 animals. The latency to commence the low pitch bleats in C sheep

Table 1

Mean \pm SE of the test „Mother – young separation I’ in primiparous dairy ewes of different temperaments (born in 2000)

Temperament	n	Approach-	Contact	Latency	Frequency	Latency	Frequency
		1m, s x \pm Sx	latency,s x \pm Sx	LPB, s x \pm Sx	LPB x \pm Sx	HPB, s x \pm Sx	HPB x \pm Sx
Calm (C)	12	14.1 \pm 9.7	12.5 \pm 9.8	2.7 \pm 0.8	13.4 \pm 4.6	10.3 \pm 6.0	4.3 \pm 2.0
Nervous (N)	12	57.7 \pm 16.3	60.8 \pm 17.8	9.3 \pm 5.7	5.8 \pm 3.9	2.8 \pm 1.7	3.5 \pm 1.5
Not defined temperament (P1)	10	60.4 \pm 17.4	66.8 \pm 18.1	2.6 \pm 1.0	6.3 \pm 3.0	3.3 \pm 1.4	6.2 \pm 2.9
td		C/N*	C/N*				
		C/P1*	C/P1*				

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$;

Key of behaviors:

Approach, 1m, s - Latency to approach the lambs to a distance of 1m(s);

Contact latency – Latency to contact the lambs(s);

Latency LPB, s - Latency to commence the low pitch bleats(s);

Frequency LPB - Frequency of the low pitch bleats during the test;

Latency HPB, s - Latency to commence the high pitch bleats(s);

Frequency HPB - Frequency of the high pitch bleats during the test.

was one of the lowest - 2.7 ± 0.8 s. Similar results were found in P1. Contrastingly, the same parameter was much higher in N - 9.3 ± 5.7 s but there was no statistical difference between groups. The frequency of the high pitch bleats during the test had highest values in C temperament - 13.4 ± 4.6 and the lowest in N sheep - 5.8 ± 3.9 as the P1 animals had intermediate results. However, all results concerning vocalization had no statistical difference between groups. Nevertheless, these results support the tendency of different level of fear susceptibility between temperaments and groups.

Table 2 shows mean \pm SE of the test „**Mother – young separation I**” in primiparous dairy ewes of different temperaments, born in 2001.

The latency to approach the lamb was 5.0 ± 2.1 s in the ewes of the Calm (C) temperament, in N temperament - 46.0 ± 16.5 s and in P1 animals - 3.7 ± 0.91 s. The statistical significance between groups was as follows: C/N – $P < 0.01$, N/P1 – $P < 0.001$ and C/P1 – no significance. The results show that the N temperament demonstrated the most contrast hesitation when joining the lamb. They were the most fearful

animals. Calm animals revealed stable mother cares.

The contact between mother and young was done after 4.6 ± 1.5 s in C temperament, 51.7 ± 15.6 s in N temperament and 3.9 ± 1.2 s in P1 animals. Statistical differences were found between C/N - $P < 0.001$ and N/P1 - $P < 0.001$. No difference was found between C/P1.

The latency to commence the low pitch bleats in C sheep was - 5.3 ± 1.3 s. Similar results were found in N (4.3 ± 1.4 s) and P1 (5.7 ± 1.4 s) groups. There was no statistical difference between the three groups.

The frequencies of the low and high pitch bleats during the test had highest values in P1 temperament and the lowest in N sheep, as the C animals had intermediate results. All results concerning vocalization behaviors had no statistical difference between groups.

In general, behavioral results from the primiparous ewes have born in 2001 support the tendency of different level of fear susceptibility between temperaments and groups. The sheep of C temperament demonstrated stable maternal behavior toward their lambs. Nervous temperament was more fearful than C.

Table 2

Mean \pm SE of the test „Mother – young separation I” in primiparous dairy ewes of different temperaments (born in 2001)

Temperament	n	Approach-	Contact	Latency	Frequency	Latency	Frequency
		1m, s	latency,s	LPB, s	LPB	HPB,s	HPB
		$\bar{x} \pm S_x$					
Calm	27	5.0 ± 2.1	4.6 ± 1.5	5.3 ± 1.3	12.7 ± 3.0	4.6 ± 4.6	2.9 ± 2.3
Nervous	10	46.0 ± 16.5	51.7 ± 15.6	4.3 ± 1.4	7.0 ± 2.7	13.8 ± 9.2	1.7 ± 1.3
Not defined temperament (P1)	7	3.7 ± 0.91	3.9 ± 1.2	5.7 ± 1.4	15.6 ± 4.1	11.2 ± 4.1	4.3 ± 1.2
td		C/N**	C/N***				
		N/P1***	N/P1***				

* $P < 0.05$; ** $P < 0,01$; *** $P < 0.001$;

Key of behaviors :

Approach, 1m, s - Latency to approach the lambs to a distance of 1m(s);

Contact latency – Latency to contact the lambs(s);

Latency LPB, s - Latency to commence the low pitch bleats(s);

Frequency LPB - Frequency of the low pitch bleats during the test;

Latency HPB, s - Latency to commence the high pitch bleats(s);

Frequency HPB - Frequency of the high pitch bleats during the test.

Conclusions

The temperament influenced the behavioral reactive abilities of the primiparous dairy sheep. The lambing stress at the first parity caused significant negative effect on the maternal behavior in the animals of the Nervous temperament (N). They showed a hesitation in joining the lamb after its separation aside, which was a sign of higher fear susceptibility compared to this of Calm temperament (C) and group of ewes with not defined temperament (P1).

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Received June, 29, 2008; accepted for printing December, 2, 2008.