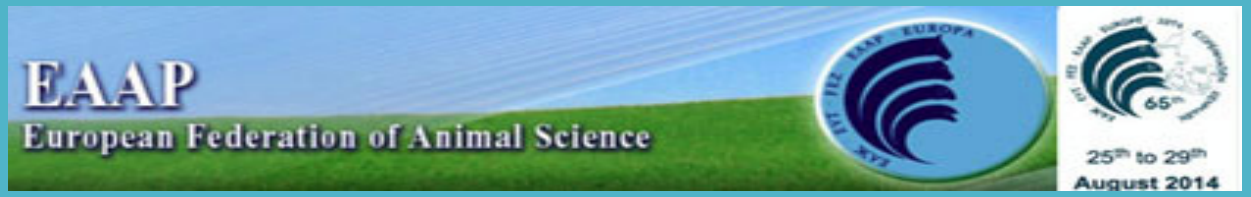

Effect of breed and litter size on the display of maternal and offspring postnatal behaviour in sheep

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Introduction (1)

- Precocial species, such as sheep, are characterized by a small litter of fully developed young capable of following the mother shortly after birth.

- Ewe behaviour associated with the birth and care of the neonatal lambs:

1. facilitates the transition of the lamb from prenatal to postnatal life and

2. forms a bond between the ewe and her lamb/s that allows her to restrict maternal care exclusively toward her own offspring

Introduction (2)

- Within a few minutes after parturition, the ewe licks intensively the neonate and the fetal fluids that are spilled on the ground
- Grooming, consisted of licking and nibbling movements directed towards the lamb, usually starts at the head, as failure to remove the fetal membranes from the face could lead to suffocation
- Removal of the birth fluids may also stimulate activity and respiration, dry the coat of the neonate and reduce heat loss

Introduction (3)

- Grooming the lamb may account for up to 80% of the ewe's behaviour in the first hour after lamb birth, followed by a gradual decline with time
- As the behaviour of the lamb develops to standing and udder-seeking, the ewe spends more time grooming the anogenital region of the lamb and adopts a suckling posture, which raises the teats and makes them more prominent
- Ewes showing a **poorer** quality of maternal behaviour at parturition form a **weaker** bond with their lambs than ewes which display high levels of grooming

Display of maternal behaviour in sheep

- Increase in intensification and selection for production characteristics → Decrease in the expression of maternal behaviour components (survivability)

- Breeds selected for high production (i.e. Suffolk) often show inferior maternal behaviour compared to more extensively kept unselected breeds (i.e. Blackface)

- Sheep milking production systems in Greece → ewe oestrus synchronization → parturitions within a specific time period → in case of poor maternal behaviour → high lamb mortality rates

Objective of the study

- The rapid development of inter-individual recognition and exclusive care is of vital importance, since neonates are entirely dependent upon the protection, guidance and resources provided by their mother

- The objective of the present study was therefore **the examination of the genotype and litter size effects on the expression of ewe maternal and lambs neonatal behaviour in 3 Greek breeds**

Material and Methods (1)

- Animal observations were carried out on 21 multiparous ewes, during an hour before parturition and the first hour after the birth of each lamb:

✓ 7 Orini Epirus (4 singles and 3 twins) (highland)

✓ 7 Karagouniko (3 singles and 4 twins) (lowland)

✓ 7 Chios (4 singles and 3 twins) (high milk production)

Material and Methods (2)

- Ewes give birth to lambs in December

- Behavioural components were recorded using video cameras with infrared lighting (TX-1430OA, Turbo-X). Each camera was placed in a fixed position in order to record behavioural patterns in each pen (2m x 4m).

- The recorded data were stored in a digital video recorder equipped with a hard disk (TX168, Telexper Inc, USA)

Statistical analysis

- Data were subjected to analysis of variance with breed (Orini Epirus, Karagouniko, Chios) and lamb (single, twin first, twin second) as fixed effects using the SPSS 13.0 software

- Differences were tested at 0.05 significance level by Kruskal-Wallis tests and results are presented as medians and lower - upper quartiles, Q1 - Q3

Results (1)

Parameters	Breed			Significance
	Orini Epirou	Karagouniko	Chios	
Overall labour (min)	45.0 (32.33, 52.67)	34.0 (28.43, 46.71)	39.0 (27.46, 56.54)	NS
Lamb stands (attempts)	8.5 (4.82, 23.43)	9.0 (7.88, 10.84)	13.0 (8.10, 17.90)	NS
Latency for lamb to stand (min from birth)	27 (11.37, 59.38)	19 (12.99, 39.01)	26.5 (10.11, 66.89)	NS
Latency for lamb to walk (min from birth)	31.5 (12.4, 72.3)	25 (15.08, 43.65)	34.5 (14.91, 74.09)	NS
Latency for lamb to reach udder (min from birth)	34 (15.38, 74.62)	26 (18.10, 46.44)	48.5 (26.23, 87.52)	NS *(P=0.120)*
Time standing during the first hour after birth (min)	31 (14.22, 36.03)ab	36 (22.23, 40.13)a	12.5 (2.28, 27.47)b	*
Latency to groom lamb (min from birth)	0.38 (0.17, 1.95)	0.50 (0.34, 0.62)	0.25 (0.19, 0.75)	NS
Grooming (min during the first hour after birth)	32.5 (25.87, 40.38)^{ab}	29 (24.19, 33.63)^{a}	46 (31.80, 49.45)^{b}	*
Grooming (min during the first half after birth)	21 (15.17, 23.83)	19 (12.80, 21.02)	24.5 (18.38, 27.12)	NS *(P=0.120)*
Grooming (min during the second half after birth)	12 (9.71, 17.54)	12 (9.43, 14.57)	21 (13.03, 22.72)	NS

Results (2)

Parameters		Breed			Significance
		Orini Epirou	Karagouniko	Chios	
Grooming directed at “head-neck” during the first half after birth	min	8.5 (5.87, 10.38)	8 (5.82, 9.01)	12 (7.37, 13.88)	NS
Grooming directed at “forelegs & flank” during the first half after birth	min	7.5 (5.92, 9.58)	7.6 (4.83, 8.74)	9.5 (7.9, 11.84)	NS
Grooming directed at “hindquarters” during the first half after birth	min	3.5 (2.02, 5.23)	3 (1.37, 4.05)	1.5 (0.72, 3.78)	NS
Grooming directed at “head-neck” during the second half after birth	min	3.5 (2.35, 5.15)	3 (2.29, 4.07)	4 (4.01, 5.49)	NS (P=0.120)
Grooming directed at “forelegs & flank” during the second half after birth	min	3.5 (2.91, 5.34)	4 (2.63, 4.46)	6 (3.28, 7.47)	NS
Grooming directed at “hindquarters” during the second half after birth	min	5 (4.22, 7.28)	5 (4.19, 6.36)	9.5 (5.90, 10.60)	NS (P=0.055)

Results (3)

Parameters	Lamb			Significance
	Single	Twin - First	Twin - Second	
Overall labour (min)	44.0 (39.40, 51.87)	30.0 (25.96, 41.04)	-	**
Lamb stands (attempts)	11 (7.31, 20.32)	9 (7.77, 14.98)	8 (6.11, 13.14)	NS
Latency for lamb to stand (min from birth)	21 (13.65, 60.71)	32.5 (17.03, 52.47)	19.5 (9.23, 38.27)	NS
Latency for lamb to walk (min from birth)	25 (16.63, 71.37)	33.5 (20.43, 57.82)	25.5 (12.92, 42.08)	NS
Latency for lamb to reach udder (min from birth)	40 (22.41, 78.87)	42 (25.68, 65.57)	26.5 (16.91, 45.09)	NS
Time standing during the first hour after birth (min)	23 (11.64, 32.36)	23 (8.60, 34.90)	34 (19.82, 41.93)	NS
Latency to groom lamb (min from birth)	0.25 (0.19, 0.90)	0.50 (0.08, 1.36)	0.50 (0.08, 1.36)	NS
Grooming (min during the first hour after birth)	42 (35.83, 45.81)a	33.5 (26.59, 39.41)a	24 (19.71, 29.04)b	*
Grooming (min during the first half after birth)	23 (20.91, 25.27)a	21.5 (17.00, 25.0)a	13 (9.24, 16.26)b	*
Grooming (min during the second half after birth)	20 (14.30, 21.15)a	11.5 (7.78, 16.22)ab	11 (9.84, 13.41)b	*

Results (4)

Parameters		Lamb			Significance
		Single	Twin - First	Twin - Second	
Grooming directed at “head-neck” during the first half after birth	min	10 (9.08, 12.48)a	9 (6.85, 10.89)a	5 (4.00, 6.49)b	***
Grooming directed at “forelegs & flank” during the first half after birth	min	8 (6.54, 10.12)ab	10.5 (7.73, 11.52)a	6 (3.96, 7.79)b	**
Grooming directed at “hindquarters” during the first half after birth	min	4 (2.94, 5.02)a	2 (0.60, 4.40)ab	1.5 (0.63, 2.62)b	*
Grooming directed at “head-neck” during the second half after birth	min	5 (3.54, 5.73)a	3 (1.91, 4.09)ab	3 (2.55, 3.45)b	*
Grooming directed at “forelegs & flank” during the second half after birth	min	5 (4.13, 6.78)	3 (1.90, 4.85)	3.5 (2.73, 4.27)	NS (P=0.093)
Grooming directed at “hindquarters” during the second half after birth	min	8 (5.88, 9.40)	5 (3.63, 7.62)	5 (4.30, 5.95)	NS

Discussion (1)

- Overall labour was not significantly different among the 3 breeds, although was shorter for first-born twin lambs compared to singletons ($P<0.01$)
- The time standing during the first hour after birth was significantly higher in Karagouniko compared to Chios lambs ($P<0.05$)
- Chios ewes devoted significantly more time grooming their lambs in the immediate postnatal period compared to the Karagouniko ewes ($P<0.05$)

Discussion (2)

- Second-born twin lambs received less grooming attention than singles and first-born twins ($P<0.05$)
- In general, the birth of lamb stimulated intensive grooming attention for the first 30 min, followed by a gradual decline in the next 30 min period ($P<0.05$)
- Latency for lamb to stand, walk and reach the udder was not influenced by litter size and breed, although Chios tended to reach the udder later than the other lambs ($P=0.120$)

Conclusion

- Only limited significant genotype differences were observed among the examined breeds in several aspects of both maternal and neonate behaviour
- Further experimentation is warranted to reach to reliable conclusions and elucidate the mechanisms that control maternal and neonatal behaviour in Greek sheep breeds

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