THE BEHAVIOUR OF FARM RABBITS IN THE DAY OF PARTURITION

SOLAR A., FERNÁNDEZ-CARMONA J., CERVERA C., PASCUAL J. J.

Unidad de Alimentación Animal. Departamento de Ciencia Animal.
Universidad Politécnica de Valencia, Valencia 46071, Spain.
jfernandez@dca.upv.es

ABSTRACT

A total of 7 multiparous pregnant rabbit does were observed around parturition in order to study the pattern of behaviour and to try to establish some common pattern of their activities under farm conditions. A video covering the complete day when parturition of each doe took place was recorded, using an infrared lamp during the night and subsequently digitalised. Starting and ending time were registered for different female activities: feeding, caecotrophy, chewing, resting, grooming and nesting. For the analyse of frequency and time spent on each activity, a model considering the hour in relation to parturition (12 hours pre and post-partum), the light presence (day or night) and their interaction was used. As it was expected, a general tendency to decrease main activities recorded around parturition was observed, with the exception of time spent in the nest. Taking into account the relevance of the light presence on the rabbit behaviour, lighting level at parturition increased the variability between the animals, being required its inclusion in the model and conditioning the number of animals required for this type of experiments. Feeding time was about 9% of the total time (126 min per day), and it took place mainly during the night, showing some distortion and increasing after parturition independently of the light. Conversely, 78% of the time spent in caecotrophy practice was recorded during the day in a somehow irregular pattern. The frequency of grooming was more linked to the hour in relation to parturition than to the light presence, and the time spent in the nest was steadily low before parturition increasing afterwards, but no significant differences were detected. The frequency of chewing, much higher during the night, decreased after -4 hour to the levels observed during the day, and this pattern had as a consequence the significant interaction found between the hour and light in the analysis. The results confirmed the general idea that rabbit does largely prefer the night for most activities even around parturition, and conversely resting time was higher during the day.

Key words: behaviour, parturition, rabbit does.

INTRODUCTION

Many aspects of parturition behaviour in caged females are widely known: after approximately 31 days of pregnancy the does prepare a nest with some straw or any

other available material, having the ability of loosening the fur to pluck it out. The parturition usually occurs in the morning and it usually ends after a few minutes.

A review of the literature since 1976 (CAB International) reveals that most works deal with the building of nest, newborn kits, frequency and time of nursing, effect of stressors, and physiology or description of the parturition itself, but no specific work on the behaviour of doe around parturition has been so far examined. Very few of these works have used a continuous video recording scheme (ALTMANN, 1974) and many have considered an insufficient number of animals.
In the present work, rabbit does were observed in the hours around parturition in order to study the pattern of behaviour and to try to establish some common pattern of their activities. We could anticipate the difficulty of comparing our results with those already published, considering the great variation on the measures and the lack of ethograms in that specific day.

MATERIAL AND METHODS

A total of 7 multiparous pregnant rabbit does (New Zealand x Californian), about 4 kg live weight and controlled during 2 periods in our experimental farm, were used. At the 20th day of pregnancy, does were allocated in 49x72x32 cm cages in an isolated room and visually in contact with other does under similar conditions. A nest-cage 40x25.7x23.5 cm was installed at the beginning of the 4th week of pregnancy and coarse wool was provided. Ambient temperatures varied between 17-20^{o}C and the interval day/night was 15/9 hours (artificial light from 06.00 to 21.00 hours, and a complete darkness for the remainder). Only a minimal-distant watchfulness work was carried out in the days when parturition occurred.

The video covering the complete day when parturition of each doe took place, was recorded and digitalised, using an infrared lamp during the night. Data of recorded behaviour were used to examine the activities of the does during 12 hours before and after parturition in periods of 2 hours; it means that in the figures, hour (H) includes the activities observed between H and (H-*2*) hours. They did not include *"0-hour"*, which was considered to be the period in which parturition took place.

Starting and ending time (hh:mm:ss) were registered for the following activities:

+ *Feeding:* the doe approximates and apparently contacts the hopper. It includes the time with the head into the feeder, masticating and throwing, but does not include time drinking.
+ *Caecotrophy*: the rabbit touches the anus with its mouth.
+ *Chewing*: gnawing, biting, pulling, nibbling the bars, corners, food hopper, and water nipple.
+ *Resting*: sitting or lying.
+ *Grooming*: licking, scratching or nibbling the body or the hair.
+ *Nesting*: time spent in the nest.

Statistical analyses of data were carried out with SAS (STATISTICAL ANALYSIS SYSTEM INSTITUTE, 1990). Data were analysed using a mixed procedure (PROC MIXED) and according to a repeated measure design that takes into account the variation between animals and co-variation within them. For the analyse of frequency and time spent on each activity, a model considering the hour in relation to parturition (12 hours pre and post-partum), the light presence (day or night) and their interaction as main factors was used.

RESULTS AND DISCUSSION

Table 1 shows the effect of the hour in respect to parturition and the light in the main activities developed by the reproductive rabbit doe. The time in respect to parturition only significantly affected caecotrophy's re-ingestion (P<0.05), grooming (P<0.05) and resting (P<0.001) frequencies. As it was expected, a general tendency to decrease main activities recorded around parturition was observed, with the exception of time spent on the nest. This tendency, which can be better appreciated in the Figure 1, could have been assumed in agreement to the physiological stage of the doe. Female ceases almost entirely the rest of activities when starts to deliver the kits.

Table1: Effect of the hour in relation to parturition and light presence on the frequency (F; no/2hours) and time (T; sec/2hours) spent for the different activities.

	Feeding		Caecotrophy		Chewing		Resting		Grooming		Nesting	
	F	T	F	T	F	T	F	T	F	T	F	T
Hour												
Mean	4	630	1	20	15	40	32	3780	19	870	11	990
s.e.	0.5	85	0.2	4	1.2	67	2.0	207	1.2	79	1.2	191
Significance	NS	NS	*	NS	NS	NS	***	NS	*	NS	NS	NS
Light												
Day	3	401	2	32	11	309	25	4270	16	831	8	800
Night	5	860	1	9	20	511	39	3290	21	910	13	1180
s.e.	0.8	133	0.3	6.2	1.8	107	2.4	312	1.7	137	2.1	316
Significance	+	**	+	**	***	NS	***	*	*	NS	+	NS
Hour*Light												
Significance	NS	NS	NS	NS	*	NS	**	NS	NS	NS	NS	NS

+ p>0.1, *p<0.05, **p<0.01, ***p<0.001, NS non significant

Rabbits are usually considered to be animals with nocturnal habits and many reports locate parturition in the first hours of the morning. However, three out of seven does' parturition occurred during the day at different hours and the other 4 during the night. Taking into account the relevance of the light of the rabbit behaviour, these differences

increased the variability between the animals, being required its inclusion in the model and conditioning the number of animals required for this type of experiments. Therefore, the frequency or time spent in feed intake (+3.6 min/2 hours; P<0.01), chewing, grooming and nesting was higher during the dark period, while the time destined to caecotrophy practice and to rest was higher during the light period.

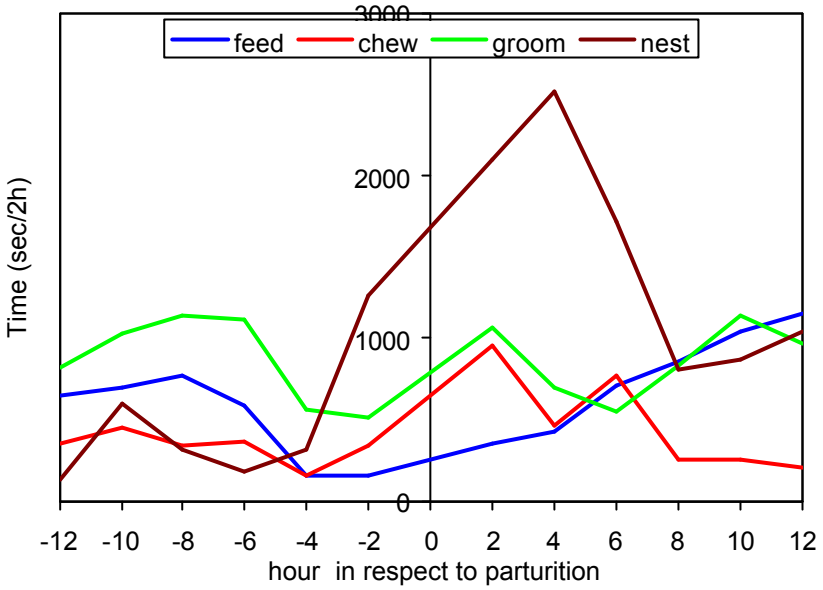

Figure 1: Dynamics of the time spent in some activities before and after parturition.

Feeding time was about 9% of the total time (126 min per day), similar figure to those reported by GUNN and MORTON (1995) and KRAFT (1978). It took place mainly during the night, showing some distortion and increasing after parturition independently from light. Farmers know well that does lick the kits and leave them for food shortly after delivering. Conversely, caecotrophy should be inversely related to feeding behaviour, showing Table 1 that it was greatly affected by light. So, 78% of the time spent in this activity was recorded during the day in a somehow irregular pattern. It was not significantly affected by hour, but almost no records appeared in the 2 hours prior to "hour 0". In both activities a high correlation (R^2>0.70) was found.

The frequency of grooming was linked to the hour in respect to parturition than to the light. Does devoted to this activity 12% of the time, somewhat lower to the 16 and 23% reported by GUNN and MORTON (1995) and PODBERSCEK *et al.* (1991), respectively.

Nest time was steadily low before parturition increasing afterwards, but no significant differences were detected. Nest was defined as the time that the doe spent in the cage for parturition, in which obviously is included the time building the nest. It may explain that does spend 13.7% of the time in the nest, which cannot be compared to the

conclusions of most authors, who estimate that females go into the nest 1 to 3 times daily, and 2-3 minutes each time (MATICS *et al*., 2001; HOY, 2002). Probably our records registered all visits in that particular day of parturition, whereas the rest of the studies seem to describe the suckling behaviour, and it also should explain the low correlation (R^2=0.48) between the frequency and the time when doe was inside the nest.

The frequency of chewing, much higher during the night, decreased after -4 hour to the levels observed during the day, and this pattern had as a consequence the significant interaction (P=0.02) found between the hour and light in the analysis. Finally, an interaction between the hour and light was also observed for the frequency of resting. This different behaviour seems to be related to the parturition time in the same lighting period, e.g. feeding behaviour is completely different at the beginning and end of the dark period.

The results confirmed the general idea that rabbit does largely prefer the night for most activities even around parturition, and conversely resting time was higher during the day. The resting time was about 50% of the total time not far from the results reported elsewhere in different physiological states (SELZER *et al.,* 2001; VASTRADE, 1984; PODBERSCEK *et al.,* 1991).

ACKNOWLEDGEMENTS

The present work was supported by a grant from the Spanish Minister of Science and Technology (project AGL2000-0595-C03-03).

REFERENCES

ALTMANN, J. 1974. Observational study of behaviour: sampling methods. *Behaviour,* **49**: 227-265.

GUNN D., MORTON D.B. 1995. Inventory of the behaviour of New Zealand White rabbits in laboratory cages. *Applied Animal Behaviour Science,* **45**: 277-292.

HOY, ST. 2002. Nursing behaviour in wild and domestic rabbits. *World Rabbit Science,* **10**: 174.

KRAFT R. 1978. Beobachtungen zur Tagesperiodik von Wild- und Hauskaninchen. *Z. Säugetierkunde*, **43**: 155-166.

MATICS Z., SZENDRO ZS., HOY ST., RADNAI I., BIRÓ-NÉMET E., NAGY I., GOYVAI M. 2001. Some observation on behaviour of nursing does. Abstracts of the *12th Symposium on housing and diseases of rabbits, forbearing animals and pet animals in Celle, Germany*. *World Rabbit Science,* **9**: 127.

PODBERSCEK A.L., BLACKSHAW J.K., BEATTIE A.W. 1991. The behaviour of group penned and individually caged laboratory rabbits. *Applied Animal Behaviour Science,* **28**: 353-363.

SELZER D., LANGE K., HOY ST. 2001. Resting and activity behaviour in domestic rabbits in dependence on keeping conditions and day time. Abstracts of the *12th Symposium*

on housing and diseases of rabbits, forbearing animals and pet animals in Celle, Germany. World Rabbit Science **9**: 127.

STATISTICAL ANALYSIS SYSTEMS INSTITUTE. 1990. User's guide statistics. *Statistical Analysis System Institute Inc., Cary, NC.*

VASTRADE F.M.J. 1984. Ethologie du lapin domestique *Oryctolagus cuniculus*. I.L'ethogramme. *Cuni-Sciences,* **3**: 15-21.