

EFFECT OF DIFFERENT LIGHTING SCHEDULES (16L:8D OR 12L:6D) ON NURSING BEHAVIOUR OF RABBIT DOES

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ABSTRACT

The objective of the experiment was to compare the nursing behaviour of rabbit does in a routine (16L:8D) and in a proportionally shorter (18h, 12L:6D) lighting schedule. The experiment was conducted at the Experimental rabbit farm of the Kaposvár University. Thirteen week old crossbred female rabbits were randomly housed in two identical rooms in flat deck cages. The two rooms only differed in the lighting schedule: 24h group: 16 hours light and 8 hours dark (n = 9 does), 18h group: 12 hours light and 6 hours dark (n = 8 does). 42 d reproductive rhythm and one batch system was applied. Number of kits/litter was equalised to ten, and rabbit does could nurse their kits freely. We examined the nursing behaviour of the does (duration, number of events per day, distribution of nursing events) at the second lactation, during a 144 hours period from the beginning of the lighting period on day 4th of lactation to the beginning of the lighting period on the 10th day. Infrared cameras were used for observation. 138 nursing events were evaluated during the examined period. The daily number of nursing events were not lower in group 18h compared to the group 24h (1.29 ± 0.35 and 1.41 ± 0.29 , respectively; $P=0.470$). In a 24 hours period, the percentage with ≥ 2 nursing was 41.5% and 27.1% in groups 24h and 18h, respectively. In routine lighting schedule (24h group, 16L:8D) 77.6% of the nursing events took place during the dark period and in the two hours after light switch on and does nurse their kits most frequently during the first two hours of the light period (28.9%). This tendency could not be observed in the 18h group. Only a small part of the nursing events was recorded during the dark period (19.4%) and in the two hours after light switch on (16.1%). Even if the rabbit does, who were born and grew up in 16L:8D (24h) lighting schedule, were housed in 12L:6D (18h) schedule their nursing events were still based on 24 hours intervals and lighting schedule. Contrary to our hypothesis, applying a “reduced day” (12L:6D = 18h) instead of the routine 16L:8D lighting schedule did not increase the number of nursing events per 24 hours. Based on the distribution of nursing events in 24 hours period, it seems, that 18h rabbit does nursed their kits according to the lighting schedule (16L:8D) which was applied during their growing period.

Key words: Rabbit does, lighting schedule, nursing behaviour

INTRODUCTION

The European wild rabbit is active during the dark period, yet the change of length of the light period has an effect on seasonal rhythm of the reproduction. In large rabbit farms, in order to eliminate the effects of seasonality, 16 h lighting schedule is applied during the whole year. The effects of the length of the lighting period and intermitted lighting on the rabbit does' nursing behaviour and production were analyzed in several experiments.

According to the observation of Lloyd and McCowan (1968) and Broekhuizen and Mulder (1983) the European wild rabbits nurse their kits during the dark period. Hoy and Selzer (2002) found that 85% of all nursing events both in wild and domestic rabbits, housed outdoors in free range, took place from dusk to dawn. High percent of nursing events occurred during the dark period even when does were kept under artificial lighting conditions (Seitz, 1997; Hoy *et al.*, 2000; Matics *et al.*, 2004). Most of the authors examined the behaviour in 24 hours repeated cycles. Using a 16L:8D lighting schedule 15-35% of the does nursed their kits twice or three times a day (Selzer and Hoy, 1999; Selzer *et al.*, 2004;

Matics *et al.*, 2004; Gerencsér *et al.*, 2008). Shorter periods were examined by few authors. Selzer *et al.* (2004) found that the changing period (from light to dark) acts as a “zeitgeber” (timer) towards nursing. According to Hoy and Selzer (2002), the 6L:6D:6L:6D lighting schedule increased the frequency of twice-a-day nursing. They supposed that it was caused by the two dark period per day, while Gerencsér *et al.* (2007) noted that the 8L:4D:8L:4D lighting schedule disturbs the does’ nursing behaviour.

Our hypothesis is that the shortened “18h day” (12L:6D) increases the number of nursing events per 24 hours. This can affect the milk yield of the does. The experiment was set according to this supposition. The objective of the experiment was to compare the nursing behaviour of rabbit does in a routine (16L:8D) and in a proportional shorter (18h, 12L:6D) lighting schedule.

MATERIALS AND METHODS

The experiment was conducted at the Experimental rabbit farm of the Kaposvár University. Thirteen week old crossbred female rabbits were randomly housed in two identical rooms. Rabbits were housed in flat deck cages (86 x 38 x 30 cm, included the nest box /28.5 x 38 cm/). Drinking water from nipple drinkers and commercial pellet were available *ad libitum*. The temperature was 18-20 °C during the observation period.

The two rooms differed only in the applied lighting schedule:

24h group: 16 hours light and 8 hours dark (n = 9 does),

18h group: 12 hours light and 6 hours dark (n = 8 does).

The rabbit does were first inseminated at 16.5 weeks of age. 42 d reproductive rhythm and one batch system was applied. Number of kits/litter was equalised to ten, and rabbit does could nurse their kits freely.

We examined the nursing behaviour of the does (n=17) (duration, number of events per day, distribution of nursing events) at the second lactation, during a 144 hours period from the beginning of the lighting period on day 4th of lactation to the beginning of the lighting period on the 10th day (Figure 1). So the beginning and the end of observation were the same moment in both groups. Infrared cameras were used for observation.

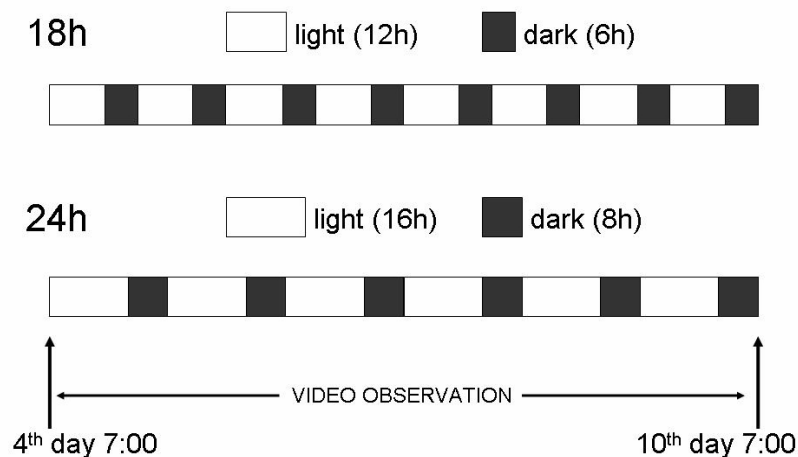


Figure 1: The observed period

We compared the average daily frequency and the duration of nursing events by t-test, and the distribution of the daily number of nursing events by chi-square test using SPSS 10.0 software package.

RESULTS AND DISCUSSION

Based on the whole observed period, the average frequency of daily nursing was 1.41 ± 0.29 in group 24h. This finding was in accordance with the results of Gerencsér *et al.* (2008) in case of 16L:8D (24h)

lighting schedule (1.43/day) and observation of Hoy *et al.* (2000) and Hoy and Selzer (2002) in European wild rabbits (1.28/day), but higher than they found in domesticated rabbits (1.12/day) housed outdoors in free range. The daily number of nursing events were not lower in group 18h (1.29 ± 0.35 ; $P=0.470$) compared to the group 24h. The highest frequency of nursing was 1.83 and 2.00 events per 24 hour and there were 1 and 3 does nursed their kits only once per 24 hour in groups 24h and 18h, respectively. In a 24 hours period, the percentage with ≥ 2 nursing was 41.5% and 27.1% in groups 24h and 18h, respectively ($P=0.130$; Figure 2).

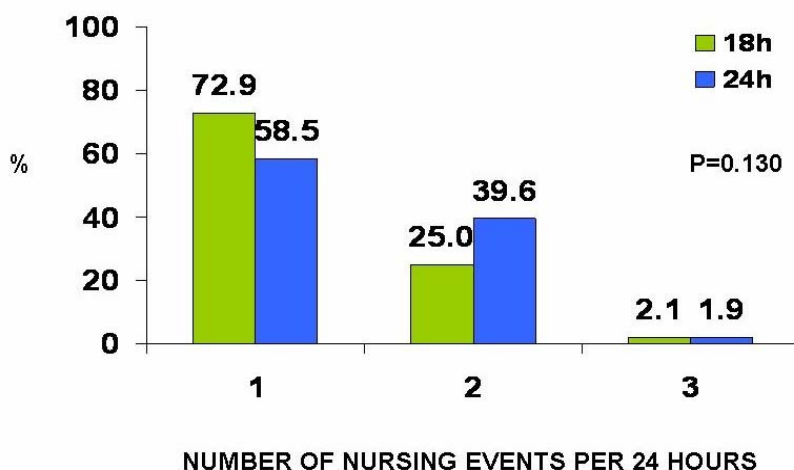


Figure 2: Distribution of number of nursing events per 24 hours in different lighting schedules

In routine lighting schedule (24h group, 16L:8D) 77.6% of the nursing events took place during the dark period and in the two hours after light switch on (Figure 3). This result is in accordance with the observation of Selzer *et al.* (2004) in natural lighting conditions. But, contrary to their findings the peak of nursing events did not take place during the first two hours of the dark period, does nurse their kits most frequently during the first two hours of the light period (28.9%).

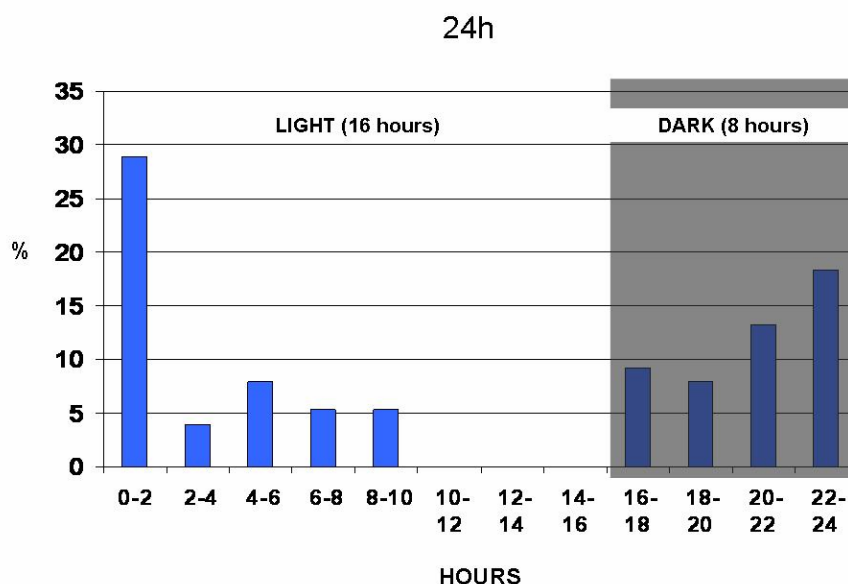


Figure 3: Distribution of nursing events (%) observed in 24h group in relation to hours of the day

We could not observe the same tendency in distribution of nursing events in 18h group (Figure 4). Only a small proportion of the nursing events were recorded during the dark period (19.4%) and in the two hours after light switch on (16.1%).

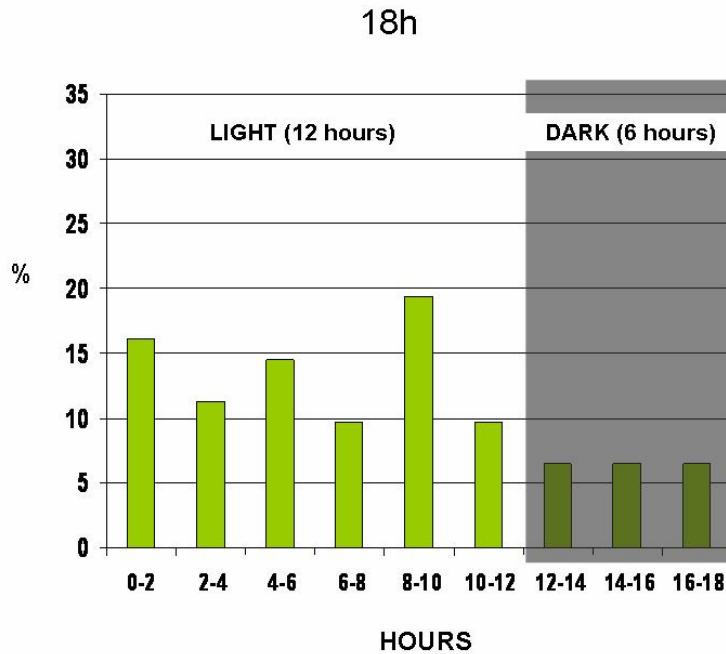


Figure 4: Distribution of nursing events (%) observed in 18h group in relation to hours of the lighting period

Even if the rabbit does, who were born and grew up in 16L:8D (24h) lighting schedule, were housed in 12L:6D (18h) schedule their nursing events were still based on 24 hours intervals and lighting schedule (Figure 5). It seems that rabbit does tried to pursue instinctively a 24 hours long circadian rhythm. They nursed their kits more frequently during the dark period and in the two hours after light switch on in the lighting schedule which was applied after their birth and which their biological clock was adapted. This finding is in accordance with the observation of Gerencsér *et al.* (2007), who observed nursing events during the whole 24 hours period of the day in 8L:4D:8L:4D lighting schedule but the most frequently in the dark period which was coincided with the 8 hours long dark period applied during the growing period. The nursing behaviour could be disturbed by the “short day” similar that it was found by Gerencsér *et al.* (2007) using 8L:4D:8L:4D lighting schedule, therefore nursing events were significantly longer in 18h group (24h: 189.5 ± 28.0 sec; 18h: 214.6 ± 29.5 sec; $P < 0.001$). Probably the circadian rhythm of the kits was not consistent with the rhythm of the does as it was by 16L:8D lighting schedule, and some kits were having a rest and sleeping “unready”, hidden in the bedding material of the nest when the doe jumped into the nest box to nurse. For this reason nursing appears to last longer in this case (Hudson and Distel, 1989).

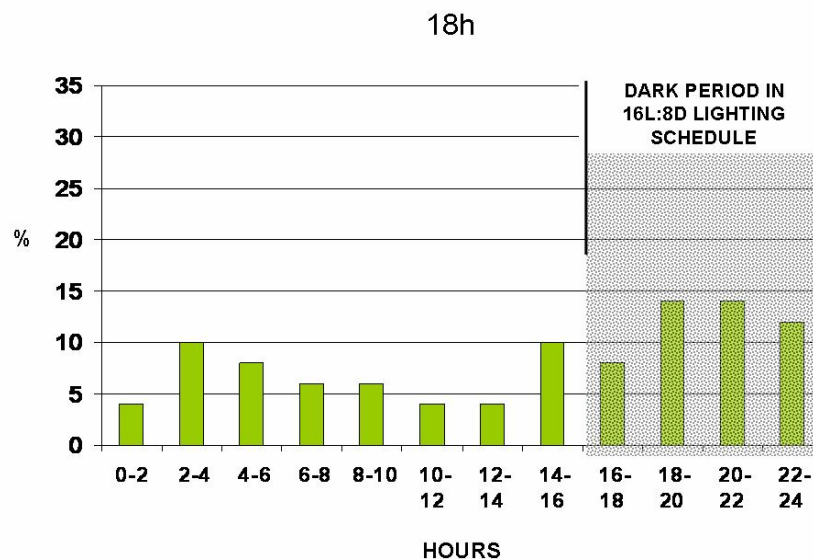


Figure 5: Distribution of nursing events (%) observed in 18h group in relation to 24 hours of the day

CONCLUSIONS

Contrary to our hypothesis, applying a “reduced day” (12L:6D = 18h) instead of the routine 16L:8D lighting schedule did not increase the number of nursing events per 24 hours. Based on the distribution of nursing events in 24 hours period, it seems, that 18h rabbit does nursed their kits according to the lighting schedule (16L:8D) which was applied during their growing period.

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