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LOCATION PREFERENCE OF RABBIT DOES BETWEEN COMMON SIZED AND DOUBLE SIZED CAGES

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ABSTRACT

The aim of this study was to observe the location preference of non-pregnant (n = 44), pregnant and lactating rabbit does (n = 19) between cages of different sizes. In each cage block does were housed individually and could move freely between a small (57.5 × 38 × 30 cm) and a large cage (57.5 cm × 76 × 30 cm), through swing door. The cage-blocks were separated with non-transparent plate walls, excluding any visual contact. Using infrared cameras, 24-hour recordings were performed. The actual location of the does was registered at each half hour (48 times a day). The data of non-pregnant does were evaluated according the different day parts (23:00–05:00, 05:00–11:00, 11:00–17:00, and 17:00–23:00). Location preference was first evaluated independently of the place of kindling (in the small or large cage), and its influence on the does' location preference was also analyzed. Non-pregnant (65%) and pregnant rabbit does (73.1%) spent significantly ($P < 0.001$) more time in the large cage than in the small cage. Cage preference seemed to be proportional to the cage sizes (1/3 and 2/3) thus cage choice may be considered as random. The difference of location preference was tested between the observed and expected frequencies (33.3% and 66.6% for the smaller and larger cages, respectively). The small and large cage blocks were chosen with a frequency of 23 and 77% and 29.2 and 70.8% when kindling took place in the small and large cages, respectively. Based on the results the rabbit does show higher preference for large cages but this preference was lower when the kindling took place there.

Key words: rabbits / rabbit does / ethology / animal behaviour / animal welfare / housing / cage size

1 INTRODUCTION

Under intensive production in most cases rabbit does are housed individually. There is a generalization that the cage size of rabbit does is too small, thus it is uncomfortable for the animals moreover rabbit does cannot adequately carry out locomotory behaviour. The effects of group size and stocking density on the production and behaviour of growing rabbits were analyzed by several authors (Maertens and De Groote, 1984; Aubret and Duperray, 1992; Eiben *et al.*, 2001; Matics *et al.*, 2002; Szendrő and Dalle Zotte, 2011). However, so far, only few authors evaluated the effect of cage size on production of rabbit does. Rommers and Meijerhof (1998) analyzed the production and behaviour of the does on cages of different size (50 × 60 × 30 cm and 100 × 60 × 30 cm) and height (50 × 60 × 50 cm). The cage size did not have a significant effect on fertility rate and behaviour of rabbit does. Mirabito *et al.* (2005) evaluated the rabbit does' production and behaviour using three different cage size (3420 cm^2, 4508 cm^2 and 5880 cm^2) in combination with two kinds of enrichment (a platform in types 1 and 2 and a plastic tunnel in type 3). No differences were observed in production. Time budgets showed, there were no differences between the six treatments except in cages with platforms, where does spent 4 to 15% of their time stretched out, and 10 to 25% of their time in other cages. Selzer *et al.* (2004) analyzed the effect of cage size on nursing behaviour. Based on their results, in smaller

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cages the multiple nursing events (twice or three times per day) were more frequent.

By means of preference test the most favourable housing conditions can be determined. This method was applied in different studies using growing rabbits (Matics *et al.,* 2003; Orova *et al*., 2004; Princz *et al.,* 2008; Dalle Zotte *et al*., 2009) or rabbit does (Gerencsér *et al*., 2011). The aim of the experiment was to observe the location preference of non-pregnant, pregnant and lactating rabbit does between cages of different size.

2 MATERIALS AND METHODS

2.1 ANIMALS AND EXPERIMENTAL DESIGN

The experiment was conducted at the experimental rabbit farm of Kaposvár University. The temperature ranged between 15 and 17 °C, and the lighting schedule was 16 hours light (06:00–22:00) and 8 hours dark (22:00–06:00). The animals consumed commercial pellet *ad libitum* (digestible energy: 11.1 MJ/kg, crude protein: 18.0%, crude fibre: 15.0%). Water was also available *ad libitum* from nipple drinkers.

Each cage-block consisted of two wire-net cages. The length, width and height of the smaller cage were 57.5, 38 and 30 cm, respectively. The basic area of the large cage was twice as large (57.5 × 76 × 30 cm) than that of the small cage. Each cage was equipped with a 20 cm wide feeder, nipple drinker and nest box (28.5 × 38 cm). The two cages were separated with a wire-net wall, while the cage-blocks were separated with non-transparent plate walls, to prevent any visual contact between the does which could influence their cage choice. At the beginning of the experiment half of the does were put into the small and the other half into the large cage. The does could move freely between the two cages through a swing door. Using infrared cameras (placed above the cages), 24-hour recordings were performed. A total of 44 non-pregnant and 19 pregnant and lactating multiparous does were observed. After one-day adaptation period, the preference of non-pregnant does was recorded for 5 days. The pregnant and lactating does were placed to the cages 7 days prior to the expected kindling date. The observed days of lactation were co-ordinated to the real kindling date. The nest boxes were opened 3 days prior to the estimated kindling. The location preferences of the pregnant and lactating does were continuously monitored until the kits reached the age of 3 weeks. The litter size was standardized to ten at birth.

By analyzing the video recordings, the actual location of the does was registered at each half hour (48 times a day). A total of observations were 10,560 for non-lactating does (44 does × 5 days × 48 per day) and 20,064 for lactating does (19 does × 22 days × 48 per day). The data of non-pregnant does was evaluated according to the different day parts (23:00–05:00, 05:00–11:00, 11:00–17:00, and 17:00–23:00). In the group of pregnant and lactating does, day of observation was started from parturition (before and after kindling). Location preference was first evaluated independently of the place of parturition (in the small or large cage), and its influence on the does' location preference was also analyzed.

2.2 STATISTICAL ANALYSIS

Based on the actual location of the does which was registered at each half hour, the observed frequencies were determined according to the days of observation and according to the different day parts. It was supposed that the does choose randomly between the two cage parts and also that the choice is proportional to the basic area of the different cage parts. Thus the expected frequencies were 33.3% and 66.6% respectively. Test of the difference between the observed and expected frequencies were carried out by chi-square test using SAS 9.1 software package.

3 RESULTS AND DISCUSSION

The average time spending of non-pregnant rabbit does was 35% and 65% in small and large cages, respectively. They spent significantly more time in the larger cage every day ($P < 0.05$). Cage preference seemed to be proportional to the cage sizes (1/3 and 2/3), thus cage choice may be considered as random. Therefore the difference of location preference was also tested between the observed and expected (33.3% and 66.6% for the smaller and larger cages, respectively) frequencies (Table 1). Considering the hypothetical location possibility, the does have spent more time in the small cage during only

Table 1: *Preference (%) of non-pregnant rabbit does (n = 44) between the cages with different size*

	Days of observation				
Cage types	1	2	3	4	5
Small	$37.5^{b\star}$	33.9^{a}	34.2^{a}	33.7^{a}	35.9^{ab}
Large	$62.5^{b\star}$	66.1^{a}	65.8^{a}	66.3^{a}	64.1^{ab}

[a, b] Means with different letters on the same row differ significantly ($P < 0.05$); * Means are significantly differ from the hypothetical location possibility (33.3% in the small, 66.6% in the large cage) of the rabbit does at $P< 0.05$ level; Small cage 57.5 × 38 cm; Large cage: 57.5 × 76 cm

Table 2: *Location preference (%) of non-pregnant rabbit does (n = 44) in different parts of the day*

	Periods of the days			
Cage types	23:00–5:00	05:00–11:00	11:00–17:00	17:00–23:00
Small	31.8[a]	38.3[c*]	36.4[b*]	34.7[b]
Large	68.2[a]	61.7[c*]	63.6[b*]	65.3[b]

[a, b] and * means the same, as in Table 1. Small cage: 57.5 × 38 cm; Large cage: 57.5 × 76 cm

the first day compared to the remaining observed days. It can be explained by their exploring behaviour. Their cage choice was more balanced afterwards.

Part of the day had an effect on the location preference of rabbit does (Table 2). The cage choice showed the highest difference between the two cages between 23:00 and 5:00. It was the dark time period which was their active period. During the 05:00–11:00 period, the cage choice of rabbit does most differed from expected frequencies. During the resting period (11:00–17:00) and between 17:00 and 23:00 their location preferences were more balanced than the other parts of the day.

The pregnant and lactating rabbit does spent most of their time (73.1%) in the large cage ($P < 0.001$), analysed independently of the place of kindling. Difference between cage preferences was larger 1–4 days prior to kindling than immediately before parturition or after day 12–14 of lactation.

Kindling of 7 and 12 does was registered in the small and in the large cages, respectively. Location preference was affected by the cage (nest-box) where the kindling took place. When parturition took place in the nest box of the small or in the large cage, compared to the expected values (33.3% and 66.6%), the cage preferences were 23 and 77%, and 29.2 and 70.8%, respectively. Thus, the location preference of rabbit does was significantly different ($P < 0.001$) from the expected frequencies.

During the later days of lactation the lactating does preferred more frequently the t cage without nest box (Fig. 1). When the kits activity was increasing (leaving the nest box first), the does tried to avoid the contact with them. This behaviour of does is valid in both cages s. The preference of does for large cage, which gave birth to the small cage increased after day 4 of lactation. The does which kindled into the nest box of large cage preferred to stay in the larger cage less frequently after day 7 of lactation, thus their large cage preference was lowest. The preference during days before parturition can be associated with the nest making behaviour and their might have been trying to find the optional place for giving birth. In addition based on preference of large area before parturition the does which chose the small cage' nest box for kindling spent in average less time (76.7%) in large cage before parturition compared the does, which chose the nest box of large cage for kindling place (87.9%).

4 CONCLUSIONS

The cage preference of non-pregnant rabbit does was proportional to the basic area of the two cages. Although, parturition and lactation influenced the does' location preference, the effect of place (cage) of kindling was the largest on the cage choice. In this case the cage preference was different from the expected frequencies (33.3% and 66.6%) and the does preferred more frequently the other cage than that of the place of kindling. The location preference showed large individual variation, that requires further analysis.

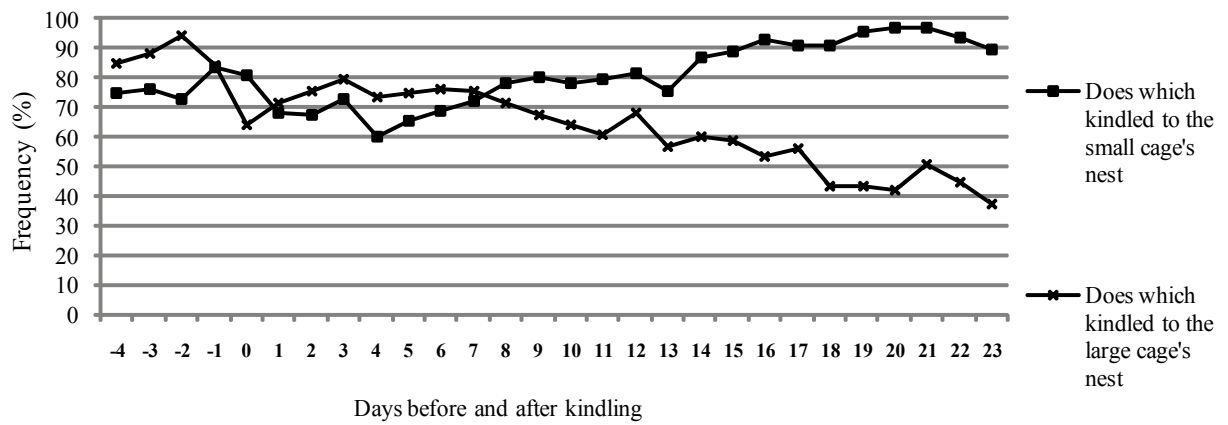

Figure 1: *The does large cage preference which kindled to the nest box of small cage (n = 7) or which kindled to the nest box of large cage (n = 12); 0 = the day of parturition*

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