

## FREE CHOICE OF RABBIT DOES BETWEEN CAGES OF DIFFERENT SIZES

Mikó A.<sup>1\*</sup>, Szendrő Zs.<sup>1</sup>, Matics Zs.<sup>1</sup>, Radnai I.<sup>1</sup>, Odermatt M.<sup>2</sup>, Nagy I.<sup>1</sup>, Gerencsér Zs.<sup>1</sup>

<sup>1</sup>Kaposvár University, Faculty of Animal Science, 7401 Kaposvár, POBox 16, Hungary

<sup>2</sup>Olivia Ltd, 6050 Lajosmizse, Mizse 94, Hungary

\*Corresponding author: miko.annamaria@ke.hu

### ABSTRACT

The aim of this study was to observe the location preference of non-pregnant, pregnant and lactating rabbit does between cages of different sizes. Ten non-pregnant and 9 pregnant and lactating does were observed. The does could move freely between a small (57.5 x 38 x 30 cm) and a large cage (57.5 cm x 76 x 30 cm), through swing doors. The two cages were separated by a wire net wall, while the cage-blocks were separated with non-transparent plate walls, excluding any visual contact between the does which could influence their cage choice. Using infrared cameras, 24-hour recordings were performed. 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 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. 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. The data of non-pregnant does was evaluated according the different day parts (23:00-05:00, 05:00-11:00, 11:00-17:00, and 17:00-23:00). For the pregnant and lactating does the observation was started from the day of parturition. 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 (63%) and pregnant rabbit does (74.1%) spent significantly ( $P < 0.001$ ) more time in the large cage than in the small cage (37 and 25.9%, respectively). 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 frequencies (33.3% and 66.6% for the smaller and larger cages, respectively). In the group of the non-pregnant does part of the day influenced the preference of rabbits. In the active period (23:00-5:00), they spent substantially more time (72.2%) in the large cage and less time in the small one (27.8%) than in other times of the day ( $P < 0.001$ ). Although, parturition and lactation influenced the does' location preference, the effect of place of kindling was the largest on the cage choice. Compared to the expected frequencies (33.3% and 66.6%) the observed cage choices were 14.3 and 85.7% and 29.7 and 70.3% if kindlings 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:** Cage size, Rabbit does, Ethology, Welfare, Housing

### INTRODUCTION

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 x 60 x 30 cm and 100 x 60 x 30 cm) and height (50 x 60 x 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 3 different cage size (3420 cm<sup>2</sup>, 4508 cm<sup>2</sup> and 5880 cm<sup>2</sup>) 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 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.

## MATERIALS AND METHODS

### 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 a 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 larger (57.5 x 76 x 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 x 38 cm). The floor of the cages was wire-net. 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. 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. Ten non-pregnant and 9 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 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. The data of non-pregnant does was evaluated according 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.

### Statistical Analysis

Statistical analysis was performed by chi-square test using SAS 9.1 software package.

## RESULTS AND DISCUSSION

The non-pregnant rabbit does spent 37 % and 63 % of their time in small and large cages, respectively (Table 1). They spent significantly more time in the larger large cage every day ( $P < 0.001$ ). 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).

**Table 1.** Preference (%) of non-pregnant rabbit does (n=10) between the cages with different size.

Cage types	Days of observation					1-5
	1	2	3	4	5	
Small	42.7 <sup>a*</sup>	34.6 <sup>b</sup>	34.0 <sup>b</sup>	32.5 <sup>b</sup>	41.0 <sup>a*</sup>	<b>37.0*</b>
Large	57.3 <sup>a*</sup>	65.4 <sup>b</sup>	66.0 <sup>b</sup>	67.5 <sup>b</sup>	59.0 <sup>a*</sup>	<b>63.0*</b>

<sup>a, b</sup> Means with different letters on the same row differ significantly (P<0.001)

\* Means are significantly differ from the hypothetical location possibility (33.3 % in the small, 66.6% in the large cage) of the rabbit does in accordance with the floor space of the cage, at P< 0.05 level.

Small cage 57.5 x 38 cm; Large cage: 57.5 x 76 cm

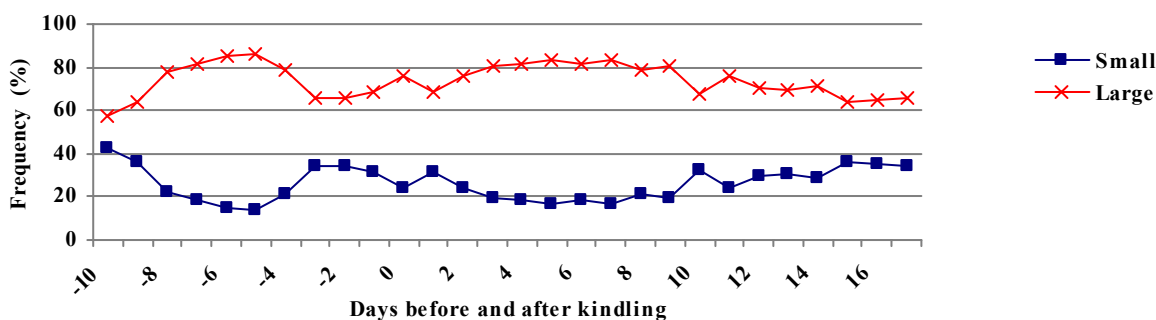
Part of the day had an effect on the location preference of rabbit does (Table 2). Cage preference was only proportional to the cage sizes (33.3% and 66.6%) during the period 17:00-23:00. In the active period (23:00-5:00) rabbits spent significantly more time in the large cage and less time in the small cage compared to the other parts of the day. The cage choice was more balanced between 11:00 and 17:00, when the difference in preference between the two cages was the smallest.

**Table 2.** Location preference (%) of non-pregnant rabbit does (n=10) in different parts of the day.

Cage types	Periods of the days			
	23:00-5:00	05:00-11:00	11:00-17:00	17:00-23:00
Small	27.8 <sup>b*</sup>	40.2 <sup>a*</sup>	42.3 <sup>a*</sup>	37.5 <sup>a</sup>
Large	72.2 <sup>b*</sup>	59.8 <sup>a*</sup>	57.7 <sup>a*</sup>	62.5 <sup>a</sup>

<sup>a, b</sup> and \* means the same, mint a Table 1. Small cage: 57.5 x 38 cm; Large cage: 57.5 x 76 cm

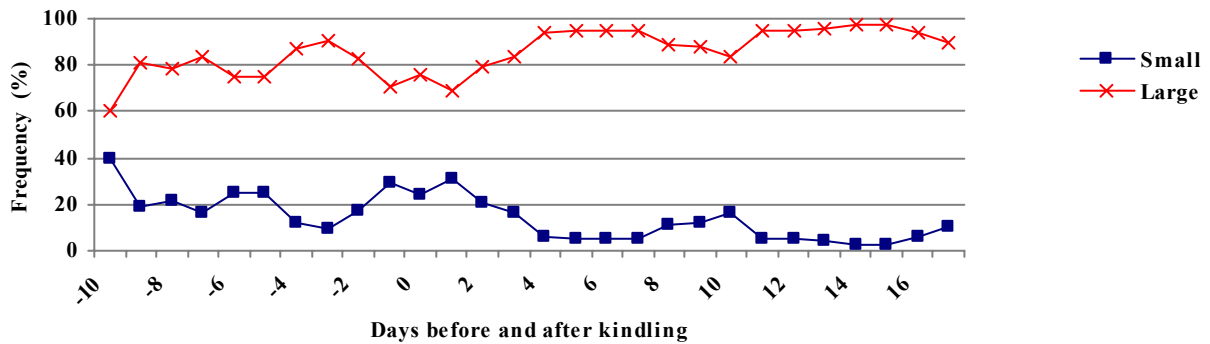
The pregnant and lactating rabbit does spent majority of their time (74.1%) in the large cage (P<0.05), independently of the place of kindling (Figure 1). Difference between cage preference was larger 4-7 days prior to or 4-10 days after kindling than immediately before parturition or after day 10-15 of lactation.



0 = the day of parturition

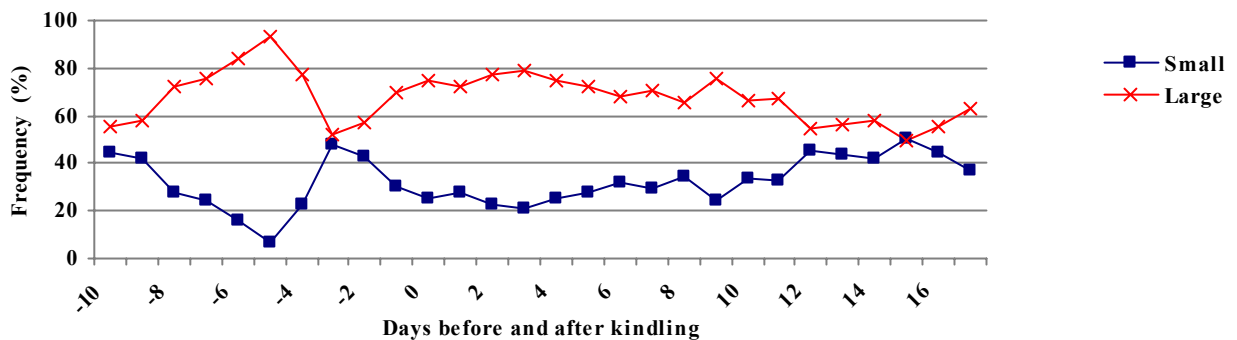
**Figure 1:** Location preference (%) of pregnant and lactating rabbit does (n=9) between the small and large cages independently of the place of kindling

Kindling of 6 and 3 does was registered in the large and in the small cages, respectively. Location preference was affected by the cage (nest-box) where the kindling took place (Figure 2 and 3). 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 14.3 and 85.7%, and 29.7 and 70.3%, respectively. Thus, the location preference of rabbit does was significantly different (P<0.001) from the expected frequencies (33.3% in the small, 66.6% in the large cage). These observations suggest that rabbit does prefer staying in the larger cages, but when the parturition took place there the preference became lower.



0 = the day of parturition

**Figure 2:** Location preference (%) of pregnant or lactating rabbit does (n=3), which kindled to the nest box of small cage



0 = the day of parturition

**Figure 3:** Location preference (%) of pregnant or lactating rabbit does (n=6), which kindled to the nest box of large cage

When the kindling took place in the small cage, highest preference of the small cage was found at the day of kindling and during the preceding and subsequent days (31%). This finding can be associated with the nest making behaviour and with the parturition. On the contrary, this tendency could not be observed when the does kindling took place in the large cage. From day 12 of lactation the does visited both cages with a similar frequency. At this time the kits activity is increasing (leaving the nest box), thus the does visited to small cage more frequently to avoid the contact of the kits. The location preference showed large individual variation, that requires further analysis.

## CONCLUSIONS

The cage preference of the non-pregnant rabbits 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 to the expected frequencies (33.3% and 66.6%) and the does preferred more frequently the other cage than that of the place of kindling.

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