Effect of light intensity on performance of rabbit does

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ABSTRACT: The aim of the study was to compare the reproductive performance of rabbit does housed in two different light intensities. The experiment was conducted at the experimental rabbit farm of the Kaposvár University. Rabbit does (n=108) were randomly housed in two identical rooms which only differed in the light intensity (HL group: 150-200 lux; LL group: 10-20 lux). In both rooms 16L:8D lighting schedule was applied. Rabbit does were first inseminated at 16.5 weeks of age. Forty-two d reproductive rhythm and single batch system was applied. Productive data of the first 3 consecutive reproductive cycles were evaluated. The light intensity did not influence the kindling rate and the body weight of the does at kindling. The litter size of HL group was higher compared to LL rabbits (born total: 10.69 *vs*. 9.91, n.s.; born alive: 10.21 *vs*. 9.29, P=0.032; litter size at 21 day: 8.66 *vs*. 8.26, P=0.028, respectively). The litter- and individual weight at 21d, and suckling mortality did not differ in the two light intensities. Calculating the productivity index, the number of kits born alive per 100 artificial insemination (AI) was higher in the HL than in the LL group (769 *vs*. 712 kits, respectively), but the two groups did not differ for the total weight of the 21 d kits per 100 AI (HL: 229 kg; LL: 223 kg).

Key words: Rabbit does, Light intensity, Reproductive performance.

INTRODUCTION – Lighting is an important environmental factor from the viewpoint of the production and welfare of the rabbits. In rabbit does, a sufficient level of light intensity is between 30-40 lux (Lebas *et al.*, 1997; Schlolaut, 1998) or at least 50 lux (EFSA, 2005). It allows the rabbits to have visual contact, to investigate their environment visually and to have normal level of activity (EFSA, 2005). The minimum standard of light intensity is 20 lux according to the guidelines in Germany (Hoy, 2012). Using two levels of cages it can be significant difference between the light intensity in the upper and lower located cages. A lower light intensity (5 to 10 lux) can be used for young rabbits (Lebas *et al.*, 1997). Not any information can be found in the literature about the connection between the reproductive performance of breeding rabbits and the light intensity, except Besenfelder *et al.* (2004), who examined the effect of light intensity on quality of spermatozoa in bucks. Wild and domesticated rabbits are active during the dark period. From this viewpoint, using a lower light intensity may be better for the welfare and the performance of the rabbit does and it can be less expensive as well.

The aim of the experiment was to compare the reproductive performance of rabbit does reared under two different light intensities.

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, under the same housing conditions in wire-net cages. Commercial pellet and drinking water from nipple drinkers were available *ad libitum*. The temperature varied between 14-28^{o}C, depending on the season.
The two rooms only differed in the light intensity (the light intensity was measured on the level of the animals): **Higher lux (HL)** group: 150-200 lux light intensity (n=54 does), **Lower lux (LL)** group: 10-20 lux light intensity (n=54 does). In both rooms 16L:8D lighting schedule was applied.
Rabbit does were first inseminated at 16.5 weeks of age. Artificial insemination (AI) was applied 11 days *post partum* (42 d reproductive rhythm, single batch system). Cross-fostering was applied within groups with a max. 8 kits/litter at first kindling and max. 10 kits/litter at following parities. Rabbit does could nurse their kits freely.
Data of the first 3 consecutive reproductive cycles were evaluated. Body weight of does at kindling and reproductive performance (kindling rate, litter size /total, alive, at 21 days of age/, litter and individual body weight of kits at 21 days of age, suckling mortality between 0-21 days) were examined. Productivity index (number of kits born alive per 100 AI) based on the 3 parturitions was calculated on the basis of recommendation by IRRG (2005).
The reproductive traits were compared by T-test, the kindling rate and mortality by chi-square test using SPSS 10.0 software package.

RESULTS AND CONCLUSIONS – Contrary to the recommendations of some authors (Lebas *et al.*, 1977; Schlolaut, 1998), the 10-20 lux light intensity did not influence the kindling rate negatively (Table 1).

Table 1 – Reproductive performance of rabbit does housed in different light intensities

	HL[1]	LL[2]	SE	*P-value*
n (kindled/total)	113/150	118/154		
Kindling rate, %	75.3	76.6	---	0.793
Body weight of the does at kindling, g	4085	4121	34.7	0.610
Litter size				
- born total	10.69	9.91	0.20	0.052
- born alive	10.21	9.29	0.21	0.032
- stillborn	0.49	0.62	0.08	0.411
- after equalisation	9.15	8.98	0.07	0.196
- at 21d	8.66	8.26	0.09	0.028
Litter weight at 21d, g	3038	2915	44.5	0.166
Individual body weight at 21d, g	351	353	3.47	0.736
Mortality (0-21d), %	5.4	6.1	---	0.460

[1]HL: light intensity 150-200 lux; [2]LL: light intensity 10-20 lux

The body weight of the does at kindling was independent from the light intensity. The litter size of HL group was higher compared to LL rabbits (born total: + 7.9 % n.s. and born alive: + 9.9% P=0.032, respectively). There was only a slight difference in the litter size after equalization but as a result of the little lower suckling mortality of the HL group, the litter size at 21 day was also higher in HL group than that of the LL rabbits (+ 4.8%, P=0.028).
There was not difference between the litter- and individual weight of the two groups; presumably the milk yield of the does was not influenced by the light intensity.
The productivity index was higher (+8.0%) in the HL group compared to the LL group (Table 2). Considering the body weight of the kits, the two groups did not differ for the total weight of the 21days kits per 100 AI.

Table 2 – Calculated productivity index in the different light intensities

	HL	LL
Number of kits born alive per 100 AI	769	712
Total weight of the 21days kits per 100 AI, kg	229	223

HL, LL: see in Table 1

Contrary to the above mentioned literature data, a very low light intensity did not determine a lower kindling rate, even if the litter size of born alive and at 21 days were significantly lower than that of the rabbits housed under higher light intensity. The milk yield of the does and the suckling mortality was not influenced by the light intensity. On the basis of these results, it would be interesting to better investigate the effect of light intensity on reproductive performance of rabbit does.

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