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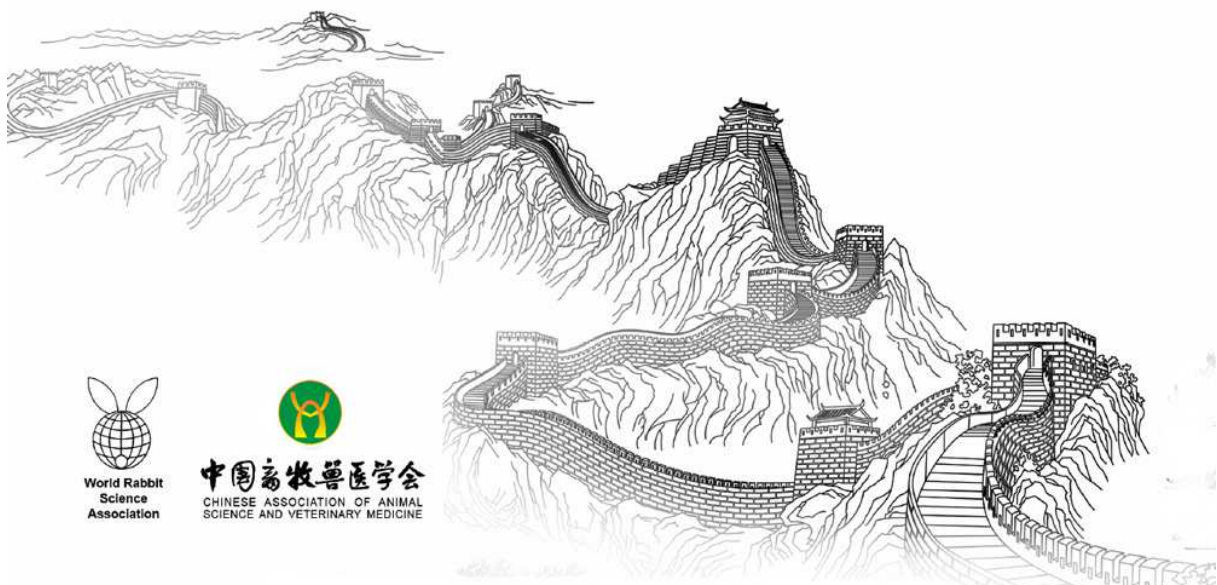
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PERFORMANCE OF RABBIT KITS ORIGINATING FROM COLLECTIVE AND INDIVIDUAL CAGES

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ABSTRACT

Animal welfare is a subject of great interest and the housing of rabbit does in collective pens has been proposed, but there is a lack of information on the effect on productive performance of kits originating from these systems. A total of 276 crossbred kits (18 days) from collective pens and individual cages were allocated into fattening cages, being nine kits per cage, maintaining the original litter (kits from the same litter were marked at 18 days). Production traits were evaluated and the occurrence of injuries on body noted. Before weaning, a higher feed intake (does with their kits) was observed in collective pens, which resulted in better growth rate (28 vs. 24 g/d; $P < 0.001$) and weight at 28 days (559 vs. 505g; $P < 0.05$). The same trend was observed in individual feed intake after weaning (118 vs. 114 g DM /d; $P < 0.05$) and body weight at 56 days of age (1875 vs. 1821 g; $P < 0.05$), but the average daily gain between 28 to 56 days was similar for the two housing systems (47 g/d), so the kits from collective pens achieved worse feed efficiency (2.76 vs. 2.69; $P < 0.05$). There were no serious injuries in the body of kits. Thus, further studies are needed to better understand the effect of housing condition before weaning on the productive performance of kits, and different possibilities for collective systems after weaning can still be considered.

Key words: Rabbit, Animal welfare, Production, Group-housing, Lesions

INTRODUCTION

Domestication of the rabbit was completed several years ago, and in nature the wild rabbit lives in society due to the benefits of cooperation and protection (EFSA, 2005; Szendro and Dalle Zotte, 2011). Considering the conditions on commercial farms, there is no regulation for the rabbits, the benefit for animals living in large groups being questionable. Under the traditional farm cage housing, the occurrence of stereotyped behaviours is very high (Rommers *et al.*, 2006). The social contact between rabbits is more frequent when collective pens are used (group housing) and could also be important in improving the welfare. However, in the collective pens there is still lack of information and research results for better understanding and determination of the best conditions to be adopted on farms (Szendro and Dalle Zotte, 2011; Xicatto *et al.*, 2013).

Szendro and Dalle Zotte (2011) suggested using a density of 16-18 animals/m² and 40-45 kg rabbit/m² at the end of the fattening period, these being very close to those recommendations made by EFSA (2005). This latter document adds that the maintenance of littermates in groups of 7 to 9 animals may be advantageous. As there is little information available about the use of collective pens for rabbit does with their kits, this study aimed to evaluate the productive performance of kits before and after weaning, using two housing systems before weaning, and keeping the originality of the litter.

MATERIALS AND METHODS

Animals and experimental design

The trial took place from October to December, with temperatures between 14.2 and 19.9°C. A total of 31 crossbred litters (cross of the terminal line, R, with the parent females of two maternal lines H and LP, Polytechnic University of Valencia) were standardised with nine kits/litter at parturition and were allocated with their mothers into individual cages from birth to 18 days of age. The kits were individually identified at 18 days and 132 kits and their mothers (15 litters) were housed to collective pens (four to six litters and lactating does per pen, Figure 1), others 144 kits and their mothers (16 litters) remained in individual cages with elevated wire platform until weaning. After weaning the nine original kits at partum were housed into fattening cages with 50 x 80 cm of size until 56 days of age. The animals had *ad libitum* access to fresh water through automatic drinkers and two commercial pelleted feeds (a maternal diet with 18 % CP and 17% ADF before weaning, and a fattening diet with 16.6% CP and 22.1% ADF after weaning).

Performance evaluation

All kits were weighed at 18, 28 and 56 days of age (W18, W28 and W56) and the average daily gains (ADG) from 18 to 28 and 28 to 56 days were calculated. In each fattening cage, the dry matter feed intake (FI) was measured and the feed conversion ratio (FCR) was calculated. The occurrence of serious body injuries of kits were also checked.

Statistical Analysis

The data were analysed by ANOVA using the Statgraphics Centurion program and considering two different housing systems and three ages for body weight or two periods for ADG, each rabbit being an experimental unit. FI and FCR during fattening period were analysed considering the two housing system and each fattening cage as the experimental unit.



Figure 1 – The kits and their mothers in the collective pens

RESULTS AND DISCUSSION

There were no injuries on the ears or loins of kits. The aggression was common in some studies when more kits were housed in a cage, especially when the rabbits were older than in our experiment (Szendro *et al.*, 2009; Trocino *et al.*, 2015). We housed 22.5 rabbits/m² and an average of 41.6 kg/m² at the end of the experiment, at 56 days of age.

Significant interactions (P<0.05) were found in body weight, the kits from the collective pens were heavier at 28 and 56 days of age (Table 1). Between 18 and 28 days of age, when kits were together with their mothers, the feed intake in collective pens was higher (460g DM/ day) than in the individual cages (411g DM/ day). The greater supply of nutrients, resulted a greater W28 (P<0.001) and ADG (P<0.001) in this period. It should be emphasised that the differences found in W56 was in connection with the higher weight at 28 days, because there was no difference in ADG in the period between 28 and 56 days of age. These values were higher when compared to those obtained by Szendro *et al.* (2009) and Trocino *et al.* (2015) when using kits housed in different systems and densities. Thus, it is suggested that littermate animals can be housed within nine animals per cage (22.5 animals/m²) until 56 days of age. The findings of this study agree with the statement made by EFSA (2005) in favour of litter maintenance.

Table 1: Productive performance of rabbits from collective and individual housing systems

Traits	Collective	Individual	S.E.	P group	P day	P gxd
Body weight				<0.001	<0.001	0.039
At 18 days of age (g)	276	265	9.94			
At 28 days of age (g)	559 ^a	505 ^b	10.02			
At 56 days of age (g)	1875 ^a	1821 ^b	10.18			
Average daily gain				<0.001	<0.001	<0.001
18 – 28 days (g)	28.29 ^a	24.01 ^b	0.47			
28 – 56 days (g)	46.90	46.96	0.47			
Feed intake 28 – 56 days (g DM/d)	118 ^a	114 ^b	1.18	0.019		
Feed conversion ratio 28 – 56 days	2.76 ^a	2.69 ^b	0.023	0.049		

Means with different letters on the same row differ significantly at P<0.05

The kits from collective pens ingested a greater amount of feed during the fattening period (P<0.05) and, consequently, there was difference between the two groups in feed conversion ratio (P<0.05), kits from individual breeding cages were a little more efficient. The results were better than those observed by Szendro *et al.* (2009) and very similar to those reported by Xiccato *et al.* (2013) and Trocino *et al.* (2015), considering a similar period.

CONCLUSIONS

Housing rabbit does and their kits in collective pens before weaning provides higher feed intake (does and their kits together) between 18 and 28 days, and heavier kits at 28 and 56 days of age. Further studies are needed to investigate the effect of number of animals per cage and the benefits of maintaining littermates.

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