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COMPARISON OF FATTENING PERFORMANCES OF RABBITS HOUSED IN PARKS OR ENRICHED CAGES

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ABSTRACT

During four consecutive fattening cycles; the production performances of weaned rabbits housed in parks or in enriched cages were studied. Park systems measured 20 000 cm² and were equipped with an elevated platform of 6 000 cm² and floored with slatted plastic (P-parks) or with wire partly covered with plastic footrests (WF-parks). In the enriched cages (3 800 cm² + platform of 1 000 cm²) 7 weanlings were housed while in parks 32 weanlings were housed. Additionally, in the park housing the effect of the presence of supplementary enrichment was evaluated (pressed straw cylinders or plastic tubes). In total 2183 hybrid weanlings were used for the fattening trials (32-69 days). Due to an outbreak of ERE, performances in the 3rd and 4th cycle (batch) were significantly ($P < 0.001$) lower. Under good sanitary conditions (cycle 1 and 2; $< 2\%$ mortality), daily weight gain (DWG) amounted 45.8g, 46.8g and 47.8 in WF-parks, P-parks and cages, respectively. The difference between WF-parks and cages was significant. Under bad sanitary conditions, no difference in DWG was observed between housing systems. Even under bad health situation (cycle 3 and 4) mortality and unmarketable rabbits were not higher in park systems than in cage fattening. The floor or the additional enrichment (pressed straw or tubes) did not have a pronounced effect on the performances or losses during the fattening period

Key words: Housing; Fatteners; Performances, Park systems, Enriched cages, Floor, Enrichment

INTRODUCTION

Group housing of social livestock is, in the EC, increasingly considered as an essential development towards sustainable animal farming. Under commercial production circumstances, fatteners are mainly housed in small groups (4 -8) but the cage system does not allow large locomotion possibilities (EFSA, 2005). Many efforts have been done to house fatteners in larger pens or the so called park systems (see review Szendrő and Dalle Zotte, 2011). According to them, when group size is above a maximum of four to five rabbits per cage, the disadvantages (higher risk of contamination and related disease and mortality, higher rates of aggressiveness and injured rabbits) outnumber the advantages (greater locomotion possibility and more social contact). However last years, in some countries (Belgium, The Netherlands, Germany) a quick shift to parks housing systems has taken place and actually over 50% of the fatteners are no longer housed in the traditional small cages (Maertens and Rommers, 2016).

Moreover, efforts have been done to enrich the housing systems for fatteners. An elevated platform is considered as an adequate environmental enrichment for growing rabbits housed in group (Lang and Hoy, 2011). Also foot-related materials that increase chewing activity are appreciated by rabbits and helpful to avoid inappropriate behavior (Rommers et al., 2014).

Recently a legislation was published in Belgium in which small cages are banned and park systems encouraged (Belgian Royal Decree, 2014). Besides a minimal width of 1.8 m, parks have to be roofless and with a comfortable floor. If a wire floor is used at least 80% has to be covered with plastic footrests and moreover elevated areas (25-40% of the floor area) are requested.

In our trials with part-time group housing of does (Maertens and Buijs, 2016), double purpose parks were used. As control group enriched cages were available. In this paper, the comparative fattening performances are presented in the same housing systems.

MATERIALS AND METHODS

Two identical rooms of an experimental house were used for the trial. They were both equipped with 24 enriched cages and 12 polyvalent park systems each. Cages used as control group and the experimental parks were homogeneously distributed in both rooms and aligned in two double rows. Each individual flat deck cage (Meneghin s. r. l., Italy) had a floor area of 38 x 100 cm and an elevated platform of 38 x 30 cm. The floor and platform were made of 2.5 mm wide metal wires spaced 13 mm apart. A plastic foot rest (Meneghin s. r. l., Povegliano, Italy) of 25 x 40 cm was mounted on the wire floor in the middle of the cage. At weaning 7 weanlings/cage were ad random selected and stayed in their cage for the fattening trial. An all- in all out management was used with complete cleaning and disinfection after each cycle. Because does were transferred from room at weaning, both rooms were also alternately used for the fattening trial.

The park housing system (Van der Vinne, The Netherlands) measured 100 x 200 cm. In addition, a plastic slatted platform of 200 x 30 cm was available. Parks were roofless. Half of the parks were equipped with a wire floor and foot rests (WF-parks) as in the individual cages (4 foot rests per park). The other parks had a specific plastic floor developed for rabbits with 18 mm wide slats separated by 11 mm wide slats (P-parks). At weaning 4 x 8 weanlings were ad random selected and stayed in their park.

The comparison between the cages and both park system was performed during 4 successive cycles (batches). Per cycle, 24 cages and 2 x 6 parks were used. Young were always weaned at 32 days of age, however because of work organization young weight was determined at d 28. A feed restriction (80% of *ad libitum* intake) was applied till day 56 while the fattening trial continued till 69 days of age. All rabbits received the same commercial diet (17% CP; 16.5% CF) with a coccidiostatic. No antibiotic treatments were used.

Moreover at 56 days of age, additionally a comparison of extra enrichment was performed in the park systems. Three groups were compared: no extra enrichment vs two cylinders of pressed straw per park or 2 plastic tubes of 30 cm long and 16 cm of diameter per park.

Performance data were analyzed using the ANOVA procedure. A linear model including the effects of treatment, enrichment and batch and the interactions was used. Differences between means were tested by the least significant difference test. Mortality rate was compared using Pearson's Chi-square test.

RESULTS AND DISCUSSION

The production performances in the park housing systems according to the extra enrichment are presented in Table 1. Final weight and mortality were not affected by the floor of the park (plastic slatted vs wire + foot rests). Enrichment with tubes showed a slight tendency to increased mortality ($P < 0.063$). However the effect of the batch number was for all parameters very pronounced. The reason was that during the 3rd and 4th batch an infection with E. Coli and Epizootic Rabbit Enteropathy (ERE) occurred which resulted in a significant batch effect ($P < 0.001$) both for the performances as for mortality.

Due to these health problems in batch 3 and 4, the comparison between parks and cages are presented separately for the first two batches (Table 2) and the following 2 batches (Table 3).

Table 1. Performances in parks with different floor or enrichment

	Enrichment			Effects			
	No	Straw	Tubes	Enrichment	Park type	Batch	Interaction Enr. x park
Weight, d 29, g	597	593	617	0.085	0.140	<0.001	NS
Weight, d 69, g	2353	2313	2343	0.493	0.328	<0.001	NS
Mortality, n	28	18	25	0.258	0.468	<0.001	-
Unmarketable*, n	10	13	22	0.063	0.859	<0.001	-
Total losses, %	7,9	6,2	9,6	0.130	0.678	<0.001	-

* Wounded, a to low weight (<1.8 kg) or sick

Due to these health problems in batch 3 and 4, the comparison between parks and cages are presented separately for the first two batches (Table 2) and the following 2 batches (Table 3).

Under good health conditions, weight of fatteners was significantly ($P < 0.01$) higher at 69 d of age when housed in enriched cages. Part of this difference can be attributed to the higher ($P < 0.01$) weight already at 29 days of age. However also daily weight gain was higher (significant compared with WF-parks). The difference in favour of cages was 3-4% and in line with our earlier results (Maertens and Van Oeckel, 2001). Mortality was very low (overall < 2.0%) and did not differ between housing systems.

Table 2. Performances of fatteners in parks compared with cages (batches 1 and 2).

Housing	Park "wire" floor	Park plastic floor	Cage	SEM	P
Rabbits, n	384	384	336	-	-
Weight, d 29, g	586 b	597 b	665 a	8	<0.001
Weight, d 69, g	2437 b	2489 b	2614 a	16	<0.001
Daily weight gain, g	45.8 b	46.8 ab	47.8 a	0.3	0.018
Mortality, n	8	2	3	-	0.111
Unmarketable, n	3	2	1	-	0.678
Total losses, %	2,9	1,1	1,1	-	0.104

^{a,b} Means in a row with different letter differ for $P < 0.05$

Under bad sanitary conditions, performances were much lower. Instead of a DWG of 45-47 g (Batch 1 and 2), DWG was on average only 39.5g. In contrast with the first two batches, differences between housing systems were no longer observed. Also mortality or the total losses were not higher in cages, on the contrary. However, in other experiments a tendency to higher mortality was found using large pens (Szendrő and Dalle Zotte, 2011).

Table 3. Performances of fatteners in parks compared with cages (batches 3 and 4).

Housing	Park "wire" floor	Park plastic floor	Cage	SEM	P
Rabbits, n	384	384	311	-	-
Weight, d 29, g	586	600	613	8	0.411
Weight, d 69, g	2214	2216	2238	15	0.781
Daily weight gain, g	39.7	39.4	39.6	0.4	0.997
Mortality, n	24	37	34	-	0.067
Unmarketable, n	20	20	20	-	0.618
Total losses, %	11.3	14.7	17.4	-	0.071

Although feed restriction is well know as a management technique to reduce the losses of ERE (Gidenne, et al., 2009), it failed under our experimental conditions. The reason can be related to the methodology used for feed restriction. Because manual feeding was applied, rabbits received a daily quantity of feed depending of the number present in the cage or park. However no restriction of feeding time was possible. When mortality occurred, the feed quantity was adapted for each cage or park. However, in case one or more rabbits had a reduced or no feed intake, the remaining rabbits were no longer restricted as intended. Probably this was the reason why we could not control ERE.

CONCLUSIONS

In our double purpose park systems of 20000 cm² equipped with a platform, only a small reduction (3-4%) in daily weight gain was observed compared with fattening cage. Moreover, this difference was only observed under good sanitary conditions. The floor or the additional enrichment (pressed straw or tubes) did not have a pronounced effect on the performances or losses during the fattening period.

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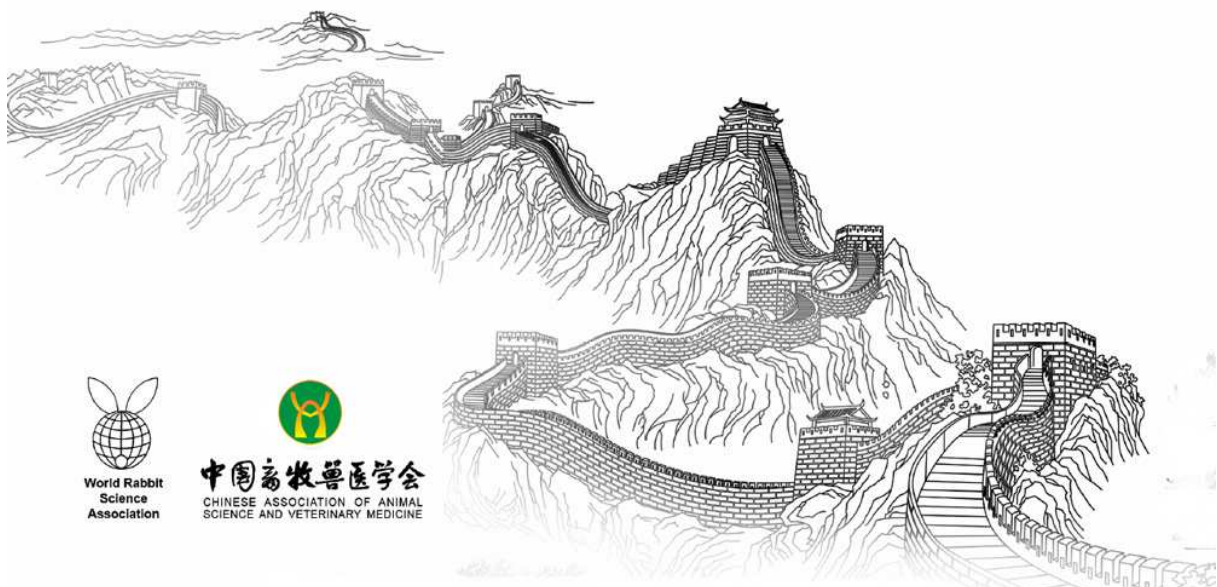
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