A PROTOTYPE OF COLONY CAGE FOR IMPROVING THE WELFARE OF RABBIT DOES: PRELIMINARY RESULTS

DAL BOSCO A.[1], MUGNAI C.[1], CASTELLINI C.[1], LAUDAZI S.[2]

[1] Department of Animal Science, University of Perugia, Borgo XX Giugno, 74 – 06121 Perugia, Italy
[2] Metac s.r.l. Ellebi, Fabriano (AN), Italy

ABSTRACT

The aim of the work was to ascertain if a collective cage matched the ethological needs of the doe and to define a reproductive management model for colony-breeding. Performance of animals was also evaluated. The colony cage dimension was 76W x 150L x 60H cm and it was equipped with four nest boxes (38 x 25 x 35 cm) at two heads of the cage. Twenty pluriparous New Zealand White does were artificially inseminated and the pregnant ones were transferred to colony cages (4 for each cage) or to single standard cages (38W x 60L x 34H cm). The housing system strongly affected the behaviour of animals. Does kept in colony cage performed the most of their natural repertoire, while those of the control group some stereotypes, which substituted for normal behaviour. Reproductive performance was not affected by the type of cage. In both groups the sexual receptivity of does was satisfactory as well as the number and the weight of weaned pups. The cage prototype seemed to satisfy ethological and physiological needs of animals, also allowing good performance.

Key words: rabbit doe welfare, colony cage.

INTRODUCTION

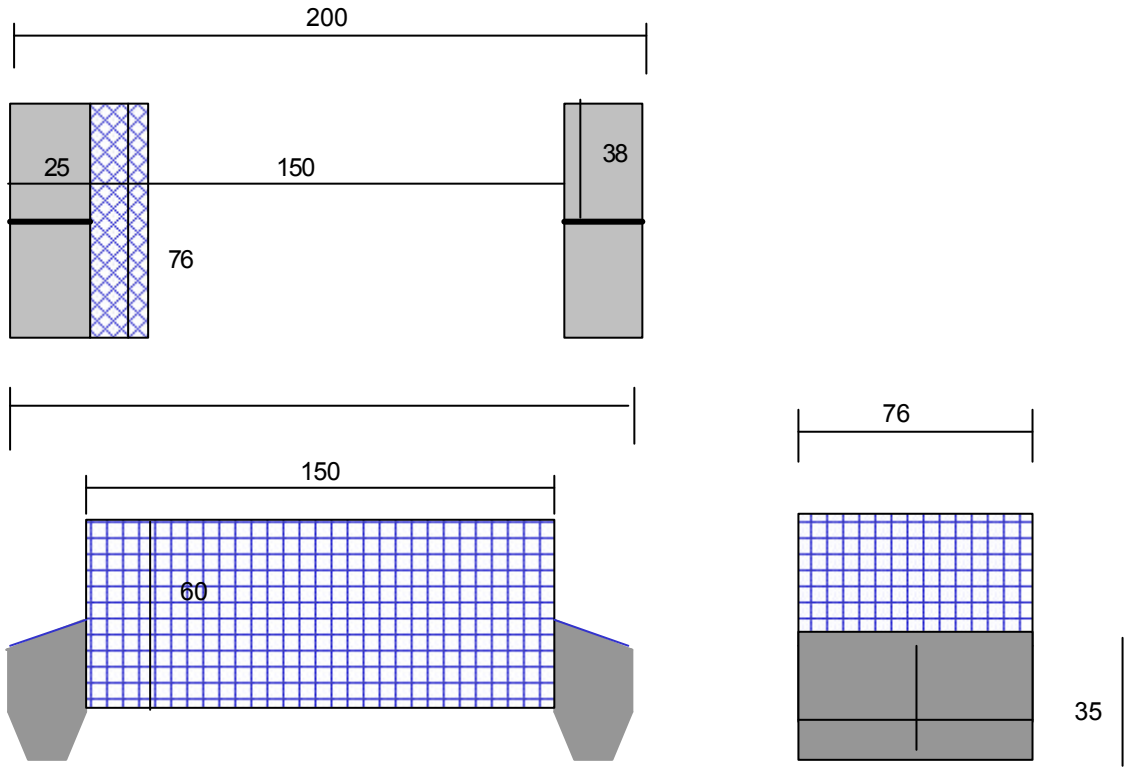
The most of the housing and management systems used in commercial rabbit farms are not consistent with the ethological needs of animals. Single caging isolates rabbits prevents from physical, visual contact and any social interaction, particularly in solid-walled cages (HULS *et al*., 1991; GUNN-DORE, 1994). Spatial restriction precludes the expression of some basic activities (GUNN-DORE and MORTON, 1993) which can lead to atypical behaviours, sign of frustration, anxiety or boredom (GUNN-DORE, 1994) and to skeletal anomalies too (DRESCHER, 1996).
For these reasons a greater attention has been reserved for developing alternative housing systems. Suitable solutions have been proposed for growing rabbits, whereas for does and pups only few studies have been carried out and the proposed rearing systems (breeding group pen, STAUFFACHER, 1992; double height cage and two-floor cage, FINZI *et al*., 1996) are not advisable under intensive conditions.
Thus, a preliminary study was performed with the aim of:

- verify if a collective cage matches the ethological needs of the doe;
- define a reproductive management model for colony-breeding alternative to the actual single cage housing system;
- evaluate the performance of animals under this system.

MATERIAL AND METHODS

The work was carried out on the experimental rabbitry of Animal Production Department (University of Perugia) where the temperature ranged from +15 to +20 °C, relative humidity from 65 to 70% and photoperiod was 16 h L.
The tested cage prototype was planned in collaboration with the Metac-Ellebi s.r.l. manufacturing (Fabriano, Italy). Its dimension was 76W x 150L x 60H cm and it was equipped with four nest boxes (38 x 25 x 35 cm) at two heads of the cage (Figure 1).

Figure 1 – Scheme of colony cage



Twenty pluriparous 12 months old New Zealand White does, were artificially inseminated and the 16 pregnant does were treated as following:
Five days before the kindling 8 does were transferred to 2 colony cages (group ”colony”) and the others were maintained in single standard cages (group ”control”, 38W x 60L x 34H cm).

During the first two days from the location in the colony cage, the does were trained to go into their own nest, putting the same doe (marked with a colour on the back) always in the same nest and holding in for 10 min.
Three days before kindling the holes were left open to permit the does to nest.
During the first 16 days after the birth, the controlled lactation was performed in both groups.
At the weaning (30 d), the does of both groups were moved in traditional single cages and artificially inseminated. In the following cycles the non pregnant does were replaced by other pregnant does.
To assess the behaviour of does immediately after the colony formation, the observation was focused on social interaction of animals (5 and 3 days before kindling).
After 5 days of settle down, behavioural observations were performed for three consecutive cycles starting from the transferring of does to mother-cages until the weaning. The behaviours were recorded by two operators in the morning (9-11 am) and in the afternoon (17-19 pm) and reported in sheets, calculating their frequency as percentage of all activities.
The observed activities were reported in Table 1.
Since no differences were found between the two periods of the day and cycles, all the data was pooled to obtain a mean value.
Reproductive traits were the following: sexual receptivity (based on the colour and turgescency of vulva), fertility rate (kindling/inseminations x 100), alive born pups.
Performance of the does was also registered for three consecutive cycles (Table 2).
Statistical analysis was done with a linear model (SAS/GLM, 1990) considering the effect of rearing system.

RESULTS AND DISCUSSION

The housing system strongly affected the behaviour of does (Table 1). In fact, does kept in colony cage performed social relationships and the sitting up, while those of the control group were often sitting in a hunched posture.
Furthermore the colony-females showed higher frequencies of moving, comfort, lying and standing up on hind legs. Time spent in other behaviours were lower than in single-caged does.
As regard nesting, the difference found was due to the fact that colony-does prepared the nests with their fur mainly during the night so that operators didn't observe such a behaviour; on the contrary the control does nested during the day.
The greater dimensions of the colony cage allowed does to perform a more intense motor activity and also to take on some positions such as lying, sitting and standing up on hind legs, in agreement with ROMMERS and MEIJERHOF (1997) .
The type of motor activity was also different: colony does walked mainly to explore the cage whereas the control ones jumped forward and backward in repetitive way without any clear reason. Besides, they showed a high frequency of standing alert.

Table 1. Behavioural patterns (% total activities)

		Control	Colony	c^2
Moving	%	22.3a	26.8b	7.5
Feeding and drinking	"	4.9b	3.5a	1.9
Biting bars	"	8.2b	1.4a	2.4
Comfort (licking and scratching)	"	7.5a	11.1b	3.4
Smelling	"	15.4b	9.1a	2.8
Lying down	"	6.2a	18.2b	4.0
Crouching	"	9.1b	3.8a	2.3
Sitting-up	"	0.0a	1.7b	0.7
Sitting in a hunched posture	"	4.2b	0a	
Staying	"	5.4	5.5	0.9
Standing alert	"	1.9b	0.6a	1.9
Standing up on hind legs	"	1.2a	8.6b	4.1
Nesting	"	12.5b	1.3a	3.4
Social relationship		0a	6.9b	2.5
Others (defecation, urination, caecotrophy)	"	1.2	1.7	0.5

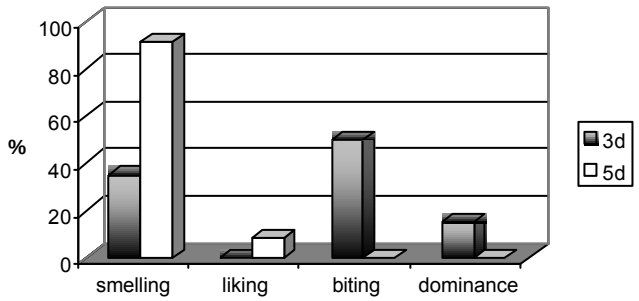
N°: 24 does/group. a, b: P<.05.

On the other hand, the animals housed in single-cages performed some sterotypies (LAWRENCE and RUSHEN, 1993) such as repetitive jumps forward and backward, smelling, standing alert, chewing, licking and biting the bars. Such disorders are indicators of troubles (PODERSCEK *et al.,* 1991) and substitute for normal behaviours which are inhibited by the lack of eliciting stimuli (GUNN-DORE and MORTON, 1993). According to GUNN-DORE (1997), the extreme boredom induces animal to over-eat as observed by us (DAL BOSCO *et al.,* 2002).

The higher frequency of the comfort activity in colony-animals was presumably due to the need of cleaning their fur from odours of co-specifics.

Concerning social relationships, initially they consisted of biting, smelling and dominance-subordination feature (15%), without apparent lesions (BIGLER and OESTER, 1996). Afterwards the interactions were smelling (91.7%) and licking (8.3%) conspecifics.

Figure 2. Initial social relationships



ALBONETTI and FARABOLLINI (1994) found a great reduction of the aggression frequency after the establishment of the hierarchy, and suggested that social interactions between does are above all friendly.
Reproductive performance was not affected by the type of cage. In both groups receptivity of does was satisfactory as well as the number and the weight of weaned pups.
Only one particular fact during the first day of trial was observed: one doe failed to recognize its litter, but after some minutes turning all the nests smelling the litters, nursed its own pups until the weaning.

Table 2 – Performance of does

		Control	Colony	DSE
Receptivity	%	80.9	79.8	8.7
Fertility	%	73.6	70.4	7.6
Doe weight at kindling	g	3850	3904	410
Doe weight at weaning	g	4176	4215	457
Alive-born	n	7.5	6.9	2.4
Born-dead	n	0.7	0.9	0.5
Milk production (16 d)	g	2321	2266	267
Milk/pup	g/d	19.3	20.5	3.5
DE intake (16 d)	$kJ/d/kg^{0.75}$	1268	1200	187
Weaned pups	n	6.8	6.2	5.7
Individual weight at weaning	g	575	601	50
Pre-weaning mortality	%	9.3	10.1	1.8

This preliminary research gave interesting information on the possibility of breeding does in group. In the colony-cage the establishment of a stable hierarchy occurred within 2-3 days without severe fight, probably due to the space availability.
The cage prototype seemed to satisfy ethological and physiological needs of animals, also allowing good performance.

CONCLUSIONS

Further studies and applicative trials are needed in order to verify the possibility of using this prototype cage in commercial situation.
The more relevant problem is the definition of reproductive rhythms that optimise the colony cage management and reduce the moving and the staying of does in single cages. Concurrently, it is important to verify also (CASTELLINI *et al*., 2004) the management of the young rabbits when moving in pen or in colony cage for fattening (e.g. after weaning, at 55 days of age, few days before the new kindling). Clearly, near the colony cages a number (to be better defined) of single or colony cage for the housing of non pregnant does should be provided. The maintenance of the group integrity during the reproductive carrier of does doesn't seem to represent a crucial problem, because the absence of aggressive behaviour at the insertion of animals in the colony cage.

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