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RABBIT DOES BEHAVIOUR IN CHOOSING LIVING AREA IN THE UNDERGROUND CELL SYSTEM

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ABSTRACT

A trial was performed to study preferences of does when choosing where to stay in the 3 sections of an underground cell system (cage, underground cell, connection tube). The time spent by does was automatically registered from late autumn throughout all winter and was related to season and to parturition period. An 8 days period referred to season, two 7 days periods (*pre partum* and *post partum*, respectively) and a last 8 days period again referred to season were registered successively, after a 5 days adaptation period. Three does were tested. All subjects stayed longer in the cage in the open air, notwithstanding the cold season with observed means of minima below 0°C. No significant differences were observed among season and *pre* or *post partum* periods. On the contrary all the subjects showed differences between the first and the last registration, recorded after a 15 days interval ($P<0.01$). In two subjects this changing of behaviour was manifested in very similar climatic conditions. This result shows that rabbits can freely change the time spent in each of the sections of the shelter, according to their momentary ethological preferences. The underground cell unit appears as an housing system very suitable for animal welfare, allowing rabbits to satisfy and to modify their ethological needs inside a structurally articulated living environment.

INTRODUCTION

A system of housing rabbits in a shelter formed by an underground cell, connected with an external cage, has been developed since the late eighties to favour production in tropical countries. It allowed a low cost improvement of microclimatic conditions (FINZI, 1987). The technology was later introduced in rural breedings in Italy, as a modular, no building, low capital system, particularly adapted to produce organic meat. It appeared also as a very suitable structure, simulating natural conditions for animal welfare (DE LAZZER AND FINZI, 1992).

The underground shelter was always preferred by the animals in the hot hours of the day in tropical countries and the effect on reducing body temperature has been demonstrated (FINZI et al., 1992a; 1992b), but rabbit behaviour has not yet analysed in temperate climates. It was then projected a trial to enlighten better the ethological aspects connected with the use of the system.

MATERIAL AND METHODS

The investigation was performed in a single prototype of underground cell system by the experimental Centre in Viterbo. The cell had the shape of an empty cube of cement and contained the nest. It was covered by a movable zinc-tin lid insulated by 2 cm polystyrene. The cell was connected with an external cage by a tube. Measures are shown in figure 1.

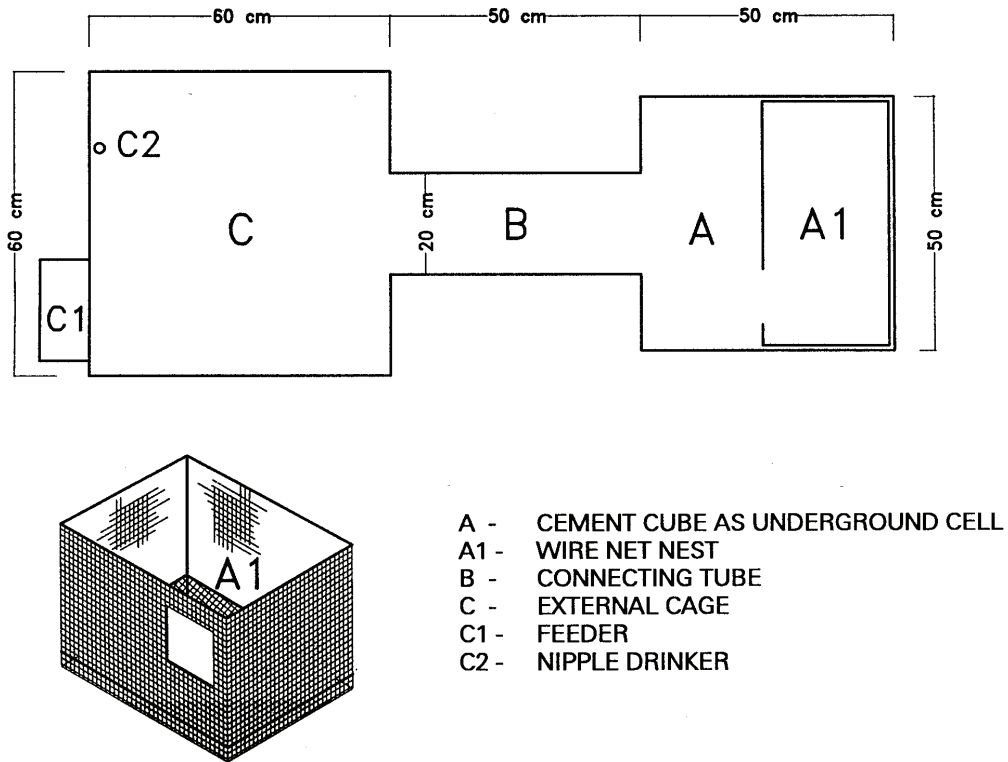


Fig. 1. Scheme of the structure of the underground cell system.

The model is one of the most used in the field (figure2).

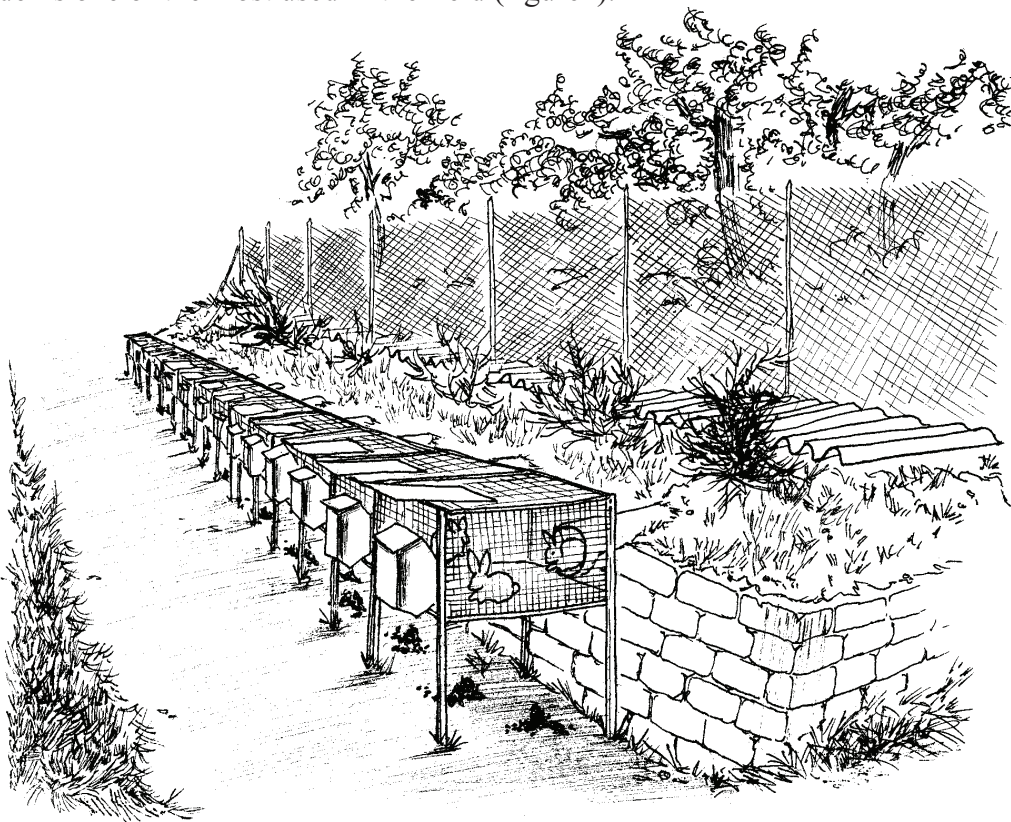


Fig. 2. A common prototype of underground cell system.

The unit was furnished with two micro-switch sensors which were activated by pressure when the doe was present. Sensors were placed under the cage floor and under a platform placed

inside the cell. Registration was continuous for 24 hours each day. The time spent in the cell and in the cage was automatically recorded. The time spent in the tube was calculated by difference.

Three nulliparous does were tested successively. They were introduced in the unit 11 days after mating. After a 5 day adaptation period, data began to be recorded till 15 days after parturition. The 30 days recorded period was divided in four sections. First 8 days were referred to season. Then there were two 7 days periods reported as *pre partum* and *post partum* respectively. The last 8 days period was again reported as referred to season. The trial began in late autumn so that all registrations where in winter, except the first 8 days period of the first doe.

Differences among subjects and among time spent in the different sections by the same subject were tested by variance analysis, after angular transformation of percentages (SAS, 1996).

RESULTS AND DISCUSSION

Recorded data are reported in table 1. The time spent in the cage was ranging between 72% and 97%. The time spent in the cell and in the tube ranged from 3% to 39% and from 0.3% to 9.7% respectively. Differences among periods spent in the different sections of the housing system were significant ($P<0.01$).

Table 1. Behaviour of does with relationship to experimental conditions (mean±SD).

CONDITIONS	Does	Time spent (%)			Ambient temp. °c	
		Cage	Cell	Tube	Max	Min
AUTUMN	1	72.8±5.8	17.4±5.7	9.7±4.8	27.0±2.5	15.2±2.0
WINTER	1	84.1±9.2	11.3±6.8	7.0±7.0	17.0±3.1	3.5±1.8
	2	96.9±4.2	2.8±4.1	0.3±0.3	14.1±2.9	1.8±1.2
	2	88.5±4.0	10.7±5.2	1.0±1.9	18.6±1.4	5.1±1.8
	3	73.3±12.6	25.6±11.9	1.1±2.7	9.4±3.4	2.0±3.2
PRE PARTUM (WINTER)	3	90.7±6.4	9.0±6.0	0.3±0.7	9.4±2.6	-2.0±1.6
	1	72.3±6.8	19.7±7.4	7.3±4.0	26.4±2.7	14.4±1.9
	2	86.6±13.5	11.1±11.0	2.3±3.1	13.3±2.3	1.9±2.3
POST PARTUM (WINTER)	3	78.2±10.9	19.9±10.2	1.9±1.8	9.9±2.1	-0.3±1.3
	1	57.6±8.6	39.1±7.5	3.3±3.1	17.3±2.6	5.4±1.4
	2	90.5±4.9	7.9±8.9	1.4±1.5	15.8±2.5	3.0±1.9
	3	85.2±7.3	14.0±7.0	1.0±1.8	13.0±0.8	2.0±1.3

Does showed a clear preference to stay outside in the cage, notwithstanding the cold season, also when means of minima were lower then 0°C. Individual differences of behaviour overlap in the observation periods reported in the table, so that differences among seasons and *pre* or *post partum* periods were not significant.

When subjects 2 and 3, both tested in winter time, were considered, an unexpected individual behaviour was observed. When data were recorded with an interval of 15 days, in similar climatic conditions, with reference to ambient temperature reported in the table, each subject showed a different behaviour. Subject 2 decreased the time spent in the cage from 96.9% to 88.5% and inversely increased the time spent in the cell from 2.8% to 10.7%: Both differences were significant ($P < 0.01$). The opposite behaviour was shown by subject 3, which increased the presence in the cage from 73.3% to 90.7% and decreased the presence in the cell from 25.6% to 9.0%. Differences were again significant ($P < 0.01$). Similar differences were observed in subject 1, but climatic conditions were not comparable in the two recording periods.

Data show that, when rabbits are not compelled to seek a fresher environment inside the cell, during the hot season of tropical countries (FINZI, 1990; FINZI et al., 1992b), they choose freely were to stay and can vary their behaviour, also in a significant manner. Cold weather does not appear as a limiting factor, at least in temperate climates.

The underground cell unit looks as an housing system very suitable for animal welfare, allowing rabbits to satisfy and to modify their momentary ethological needs inside a structurally articulated living environment.

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