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EVALUATION OF HEAT STRESS IN RABBITS UNDER FIELD CONDITIONS *

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ABSTRACT

The use of simple non instrumental means of evaluating heat stress in rabbits was studied with the aim of developing practical guide-lines for extension workers. The research was performed in Egypt during the hot season.

The results of the research indicated that ear colour, posture and behaviour of the animals were useful indicators of heath stress.

Ear colour was easy to judge and was correlated to ear temperature ($r = 0.63$; $P<0.05$). The posture of the animals also differed statistically according to the breeding system. More than 80% of the animals bred in cages lay in a stretched position during the hottest hours of the day in comparison with less than 40% in the local huts or in the partly underground housing system ($P<0.01$).

In the case of the partly underground housing the percentages of animals which stayed outside in the cage area or remained inside the underground part allowed to judge which part of the system had the better cooling efficiency. The proportion of animals which remained inside the underground area during the middle of the day was above 75% ($P<0.01$).

INTRODUCTION

The negative effect of hot climates on rabbit growth and reproduction is well established. In developing countries it would be very useful to have easy means of evaluating breeding conditions in relation to animal heat stress.

To get information for practical purposes under field conditions the points described below were studied:

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a) ear colour in relation to body and ear temperature;

b) body posture and behaviour of the animals in different housing conditions;

c) heat tolerance of different breeds under condition of heat stress.

MATERIAL AND METHODS

The observations were made in Egypt in the month of August during the hottest hours of the early afternoon when the ambient temperature was 35.3 - 35.5°C in the shade.

Body and ear temperature were recorded and ear colour, which varied from white to red, was evaluated by a point scale from 1 to 5. The posture of the animals was adopted as a method of comparing cage with local small adobe huts and a partly underground housing in relation to heat stressing conditions.

The latter system has already been described (Finzi,1987; Morera et al., 1989; 1990); it is formed by a concrete or clay cell covered with earth communicating with an external cage through a short pipe. A second cell, utilized as nest, represents an evolution of the former technology (fig. 1).

The postures of the animals were classified into normal, stretched or active as shown in figure 2.

The animals were young N.Z.W. and Californian does about 14 weeks old; 10 were bred in cages, 10 in the partly underground system and 12 in local adobe huts.

It was also possible to test the body temperature of 10 N.Z.W. does in comparison with 15 does of the Egyptian Baladi breed when both were bred in cages.

The observations were repeated from 1 to 4 times to get statistically significant results.

RESULTS AND DISCUSSION

In table 1 it is shown that, as a consequence of exposure to high environmental temperatures, the does bred in cages showed a significantly higher body and ear temperature, and a redder ear colour due to an increased blood flux to the peripheral circulatory system. Thus, in field conditions, to judge by ear colour can be an useful and practical method to evaluate the relative efficiency of different rabbit housing systems in reducing heat stress.

Ear colour was correlated to ear temperature ($r = 0.63$; $P<0.05$) but ear and body temperature showed a lower ($r = 0.30$) and not significant correlation. This was already observed in experimental conditions (Finzi et al., 1986) and it may be due to the fact that

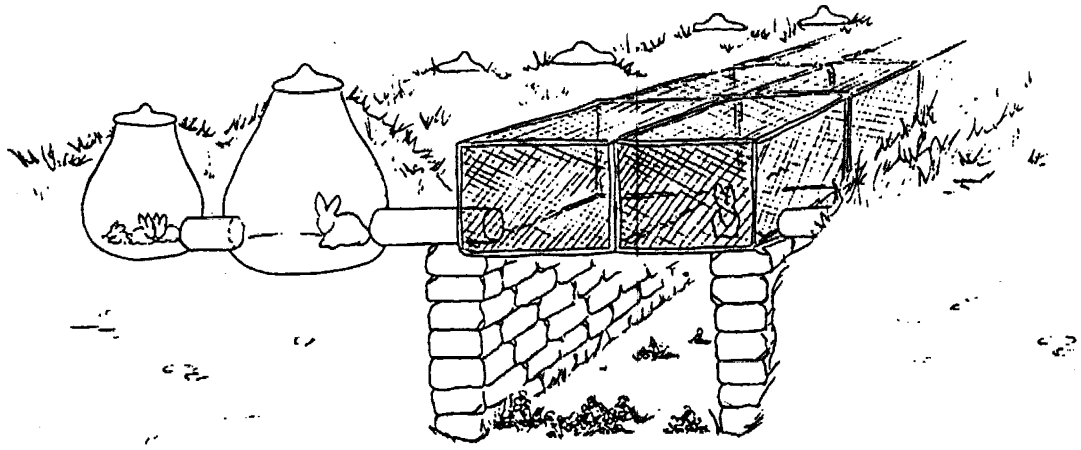

Fig. 1 - A partly underground rabbit breeding system.

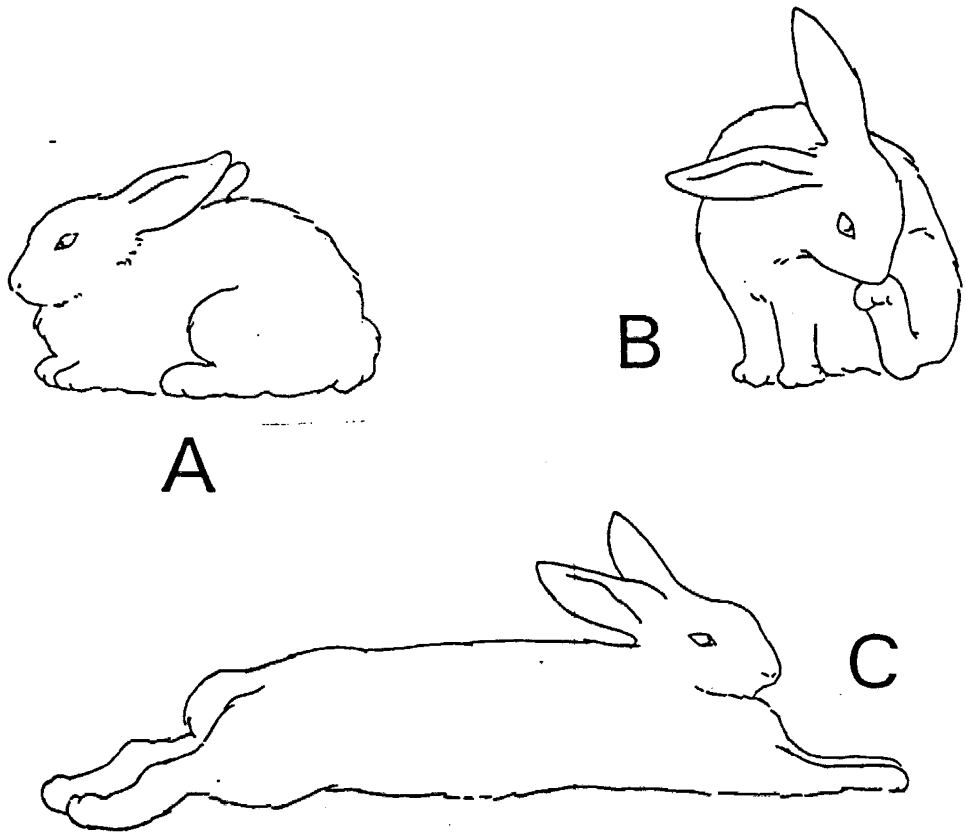

Fig. 2 - Rabbit postures: A, normal; B, active; C, stretched.

dispersion of sensitive heat from ear surface is only a minor cooling factor in comparison with the increase in breathing rate.

Table 1 - Ear colour, and ear and body temperature in cages and in partly underground housing (time, 14.00; ambient temperature, 35.5°C).

	CAGE	UNDERGROUND	DIFF.
Body temp. °C	39.76 ± 0.24	39.11 ± 0.13	0.65**
Ear temp. °C	37.20 ± 0.60	35.60 ± 0.65	1.60**
Ear colour (1 to 5)	1.8 ± 1.1	0.6 ± 0.7	1.2*

* P<0.05; ** P<0.01

In extension work, when more accurate measuring devices are not available, to observe the posture of the animals (fig. 2) can also be an useful method of judging the effectiveness of housing systems in reducing heat stress. As shown in figure 3, during the hot hours of the day more than 80% of the does bred in cages took a stretched position, while in the partly underground system 20% were active. Rabbits bred in local huts showed an intermediate condition with many of them resting in a normal position typical of not stressed animals. The differences in behaviour were statistically significant ($P<0.01$).

In figure 4 it is shown how rabbits prefer to sit inside during the hottest hours of the day. The comparison between animals present outside or inside in the partly underground system was also useful to judge the efficiency of the underground cell in reducing heat stress. In the middle of the day the number of animals inside was over 75%. The difference to other periods was obviously significant ($P<0.01$).

The comparison between N.Z.W. and Baladi does bred in the same cage conditions showed that the Baladi were more successful in maintaining thermoregulation (fig. 5) and the mean difference (-0.29°C) was statistically significant ($P<0.01$). The result indicates that local breeds should be used when artificial environmental control is impossible, as in rural conditions, particularly if animals are bred in cages.

In conclusion, to observe animal posture and behaviour and ear colour can be an useful tool for field extension workers to evaluate the level of heat stress in rabbits and to compare different breeding systems. The use of local breeds should be considered in areas where the climate is hot for long periods, where animals are bred in cages or where it is impossible to control the environmental temperature.

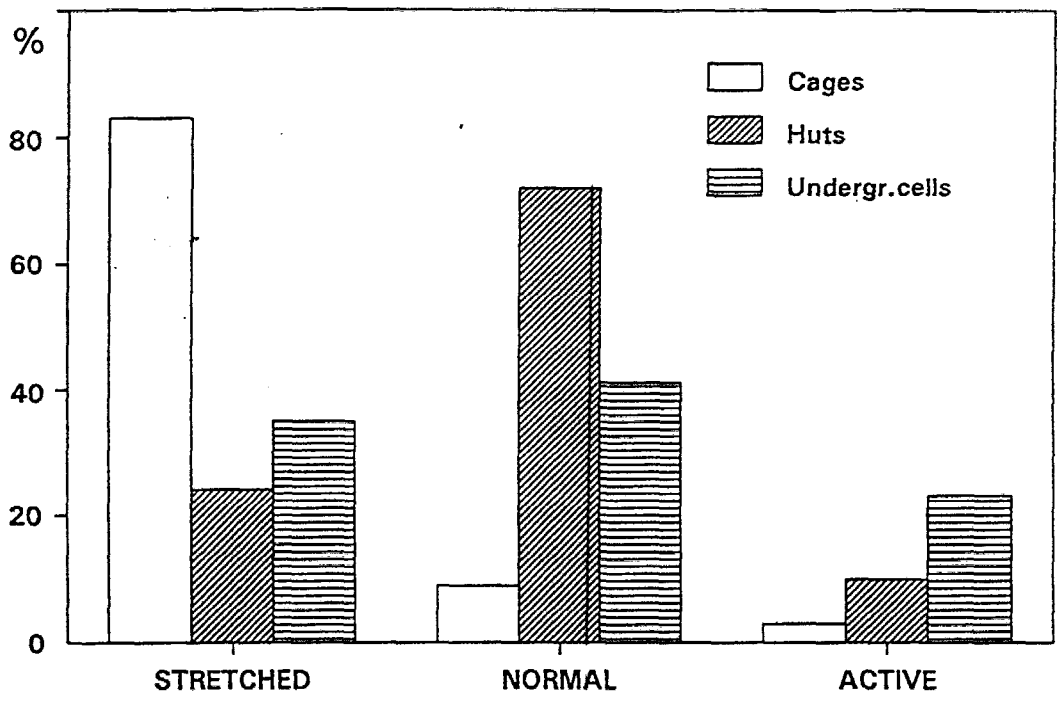

Fig. 3 - Rabbit posture observed from 11.30 AM to 4.00 PM.

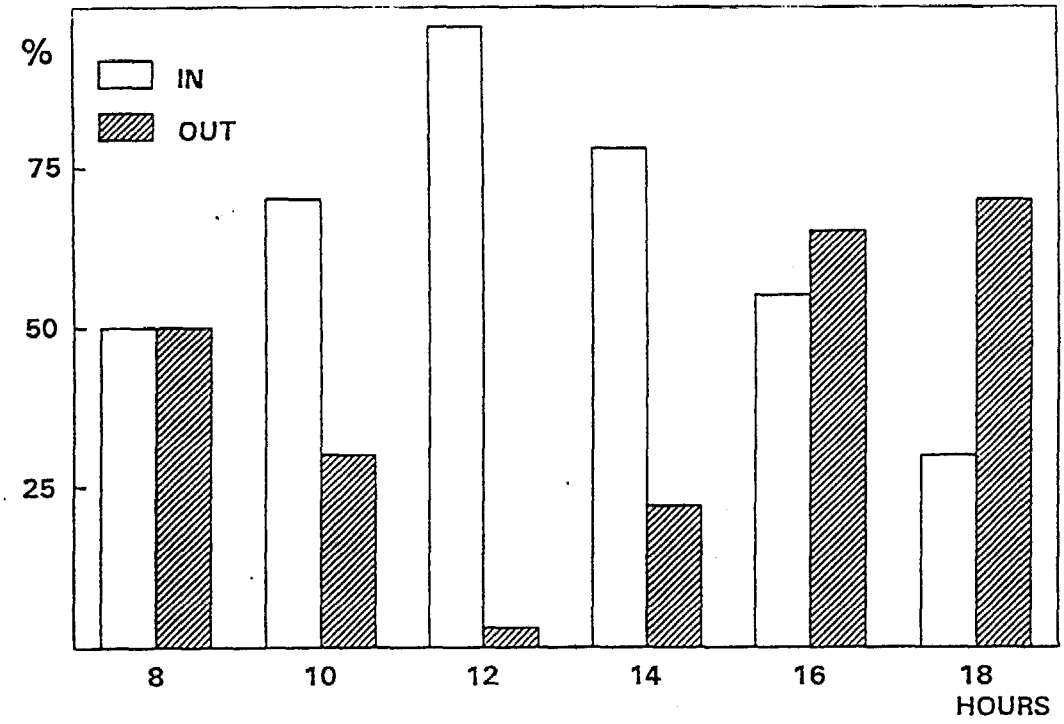

Fig. 4 - Proportion of does inside or outside in the partly underground system during the day.

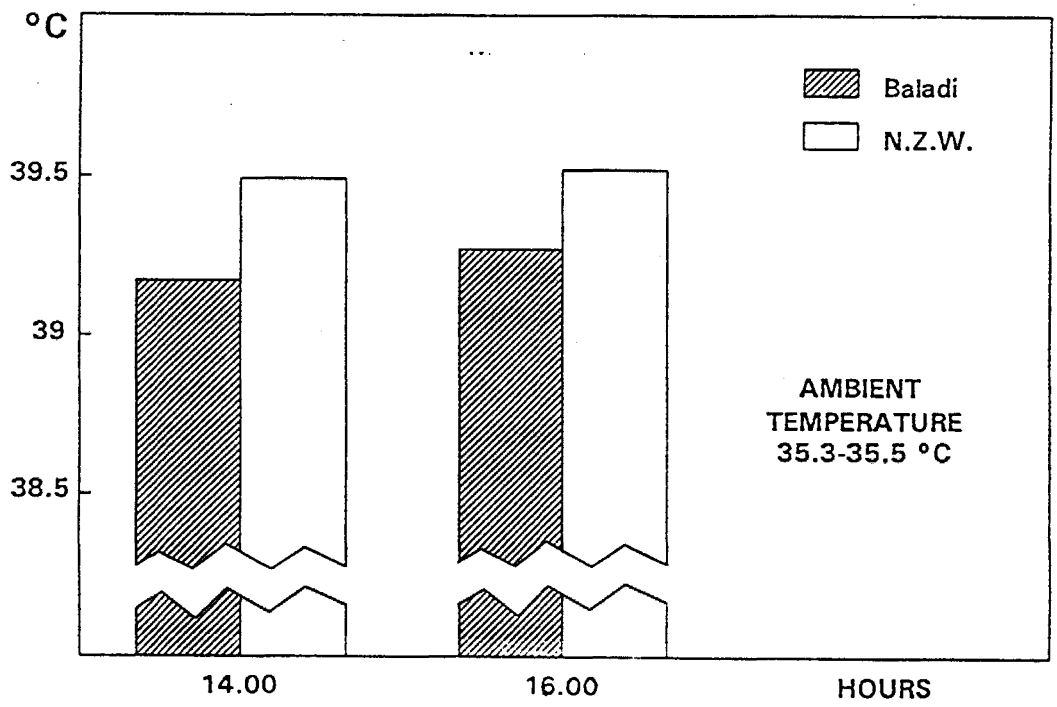

Fig. 5 - Body temperature of N.Z.W. and Baladi does in hot environmental conditions.

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