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PERFORMANCE OF RABBITS IN HOT CLIMATE: AN HOUSING "COOLING SYSTEM" FOR HEAT STRESS REDUCTION.

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SUMMARY

Observations were made of relative external and internal humidity and temperature. The life statistics of an intensive breeding unit in the Governorship of Sharqya (a joint Italian-Egyptian project-dairy cattle and rabbit) were studied.
The microclimatic conditions with and without the use of a "Cooling system" were compared, and presented here are the resulting data (number of live births, monthly fertility and mortality rates).

Key words: rabbit, hot climates, "Cooling system", production.

INTRODUCTION

Rabbit meat is competitive with any other type of meat both qualitatively and nutritionally. (5) Moreover the raw materials required for feed preparation of this animal are different from those required for human consumption.
For these reasons the development of intensive rabbit rearing in the North African Countries of the Mediterranean Area is to be welcomed, especially where are no opposing factors of a social, cultural or religious nature regarding the breeding technology. One of the main problems with these species is their sensitivity to high temperatures, which lead to this study on how to perfect the microclimatic conditions of housing.
In this research a "Cooling system" was tested in a large farm (dairy cattle and rabbit) in the Governorship of Sharqya (Egypt), to check production efficiency in rabbit rearing.
There are many studies undertaken in Italy on farms which use such technology, (1,2,3) but these have never been carried out in extreme temperatures. The "Cooling system" used in Italy has always produced good results, but the continental climate is very different from that of this study. On the other hand, it is a system with relatively contained energy consumption, which could enable productive rabbit rearing in these areas to be carried out even during the climatically less favourable months.

MATERIALS AND METHODS

The breeding house measured 76.80m by 14.40m with a height of 3.5m, and was equipped with 20 extraction fans along the lateral walls and 4 intake fans which brought in external air through vaporisation of the water and subsequent lowering of the temperature for the reduction of high temperatures. The air was then released into the atmosphere through pierced nylon tubes, ensuring a uniform distribution throughout the length of the breeding house.
The collection and disposal of faeces was carried out using a mechanical scraper along a "V" shaped chute situated under the cages. These could then be stored and used for agricultural purposes.
The breeding house consisted of 4 rows of standard galvanised flat-deck cages with feeders and automatic nipple drinkers for the rabbits at all productive phases (400 cages for the does, 56 for the males, 4500 places for fattening and replacement). The does' cages had permanent wire nest boxes, full of straw and wood shavings.
Probes were installed to monitor the temperature and relative humidity inside the breeding house (mod. LSI/BSU 106) at the following points:

- ➔ outside the breeding house;
- ➔ inside the "adiabatic" tank;
- ➔ in the first third of the breeding house;
- ➔ in the middle of the breeding house, near the check probes;
- ➔ in the last third of the breeding house.

These probes were connected to a data analyser with solid state memory (mod. LSI/BABUC/M), programmed for input every 30 minutes, and once a month these data were put into the computer using the relevant software.
Checks to detect the presence of harmful gases such as NH_3, H_2S (using Dräger tubes), as well as the air speed at animal level were carried out.
On the environmental side, the farm technicians have provided the following monthly data averages:

- ➔ n° of bucks;
- ➔ n° of does;
- ➔ n° of fertilizations;
- ➔ n° of live births;
- ➔ n° of fattened;
- ➔ n° of dead from born to slaughtering.

RESULTS AND CONCLUSIONS

At the sampling points inside the breeding house the were not found significant differences of temperature and relative humidity; thus confirming the efficacy of the ventilation system installed.
It is interesting to see how the cooling system directly influenced the keeping high summer temperatures.
Graphs 1 and 2 show the levels of temperatures and relative humidity both inside and outside the breeding house on 2 days in July (24 hours), but on one of these, because of technical problems, the "Cooling system" was not working. Thus, it can be noted that during the hottest

part of the day (10 a.m.-7 p.m.) the "Cooling system" kept temperatures below those outside the breeding house, while, without the "Cooling system", there was a build up of heat causing higher temperatures inside than outside. This can be put down to the thermical inertia of the walls and the roof of the breeding house, which causes a slowing down of temperature increase.

The use of the fans in such climates means that in no season are there present levels of NH_3 and H_2S that could harm animals; in fact, even in mid-winter, with external temperatures little above 0°C, levels of NH_3 below 5ppm and of H_2S below 0,5ppm were recorded.

In the summer the running of the fans necessary to provide adequate air change inside the breeding house did not disturb the animals and remained within the tolerance levels set by ITAVI (<0,5 m/s) (4).

As we can see from the data collected, when the "Cooling system" was not operating, high temperatures negatively influenced animal productivity (particularly in July), whereas when the system was operating the lowering of the internal temperature enabled a reasonable productivity to be achieved, above the levels normally obtainable in the area where the tests took place.

Analysis of vital statistics was seriously hindered due to missing data caused by internal organizational problems.

The number of live births (graph 3) shows the reasonable average figures for the first 6 months of the test period, with a high point in February (7.73); while a worsening trend shows up, peaking in July, in the second 6 months period. This situation is not however connected with, or is so only slightly, the housing conditions; it must be noted that in July some dairy cattle arrived from Italy and the subsequent setting up of the cowhouse drew attention away from the rabbit rearing.

Graph 4, on fertility and mortality rates, indicates that production was more influenced by breeding house management, than by climate.

For a more accurate check on the running of such a breeding system it would be interesting to examine the productive and reproductive efficiency of indigenous species, provided, however, that at the same time, the professional level of the staff was raised.

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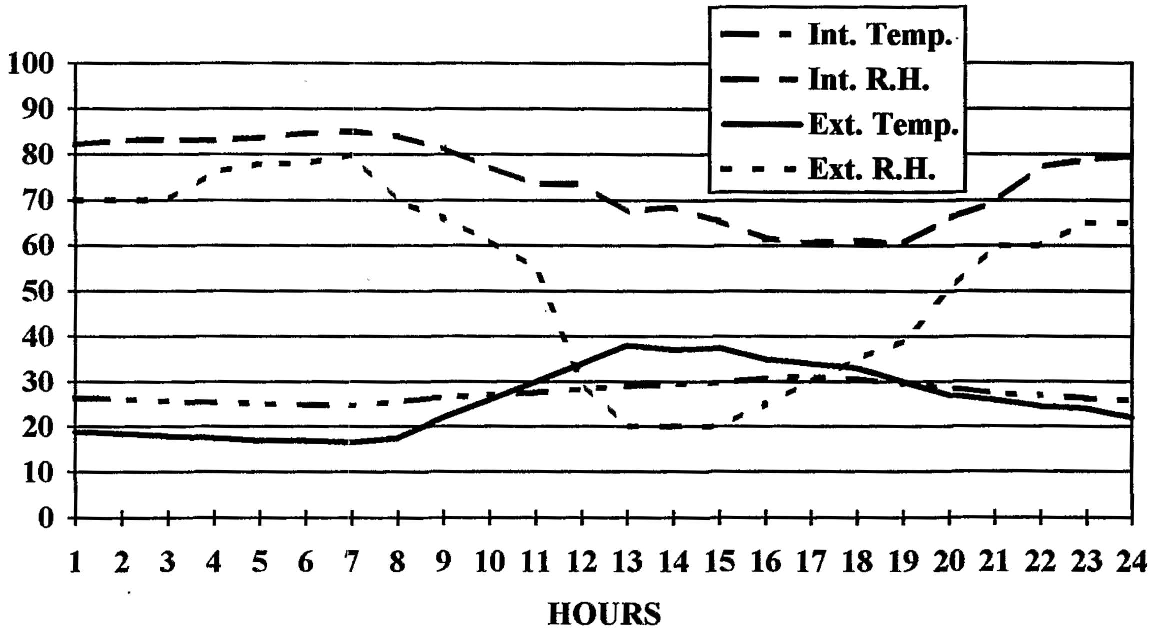
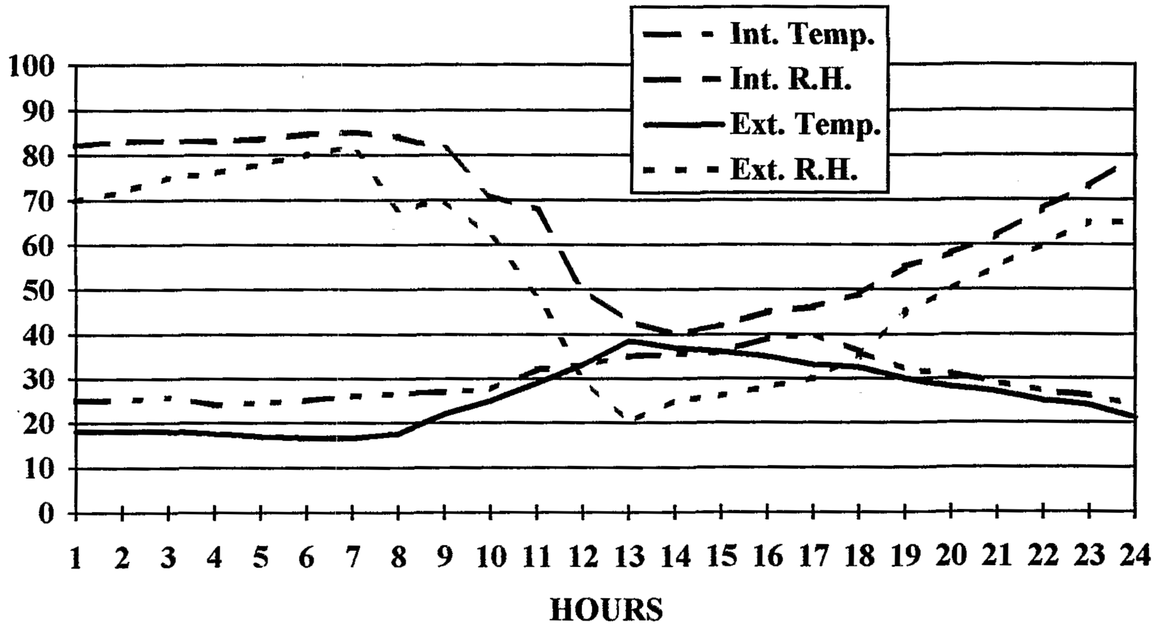
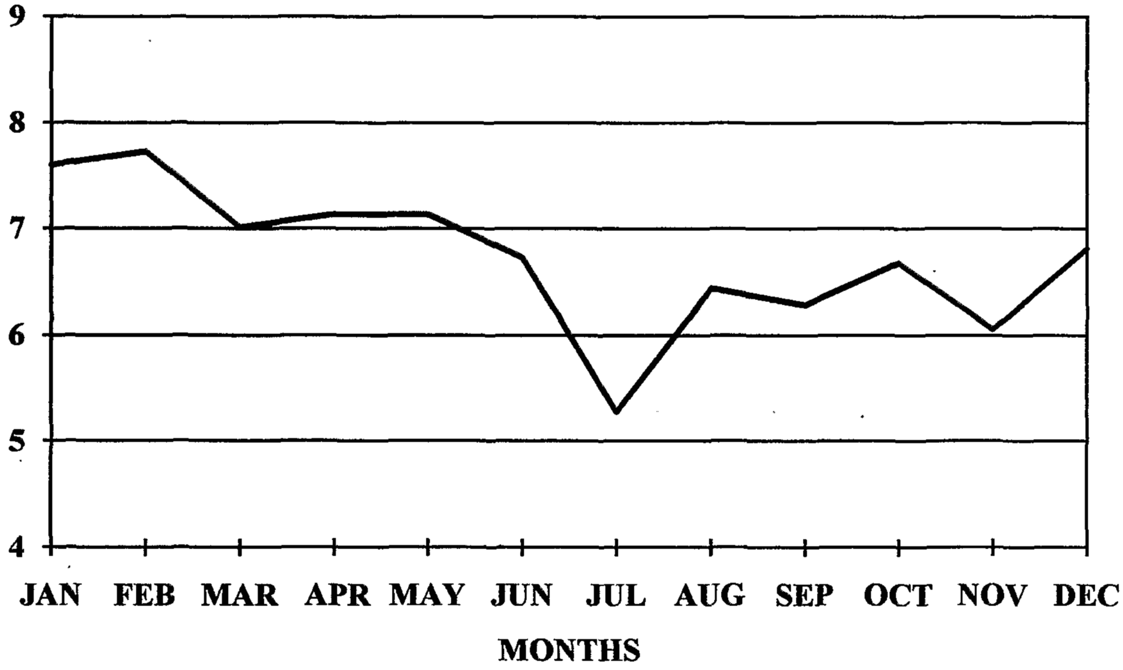
GRAPH 1 - Temperature (°C) and Relative Humidity (%) trend with the Cooling System (93.07.28)



GRAPH 2 - Temperature (°C) and Relative Humidity (%) trend without the Cooling System (93.07.30)



GRAPH 3 - Live births number (monthly mean)



GRAPH 4 - Fertility rate (N° births/N° fertilized does) and mortality rate between live births and slaughtering number