Proceedings 4th World Rabbit Congress, 10-14 October 1988, Budapest Hungary, Vol. 1, 226-234

MICROCLIMATE IN INTENSIVE RABBIT BREEDING OF CENTRAL ITALY

Gualtieri M.*, Di Emidio B.**, Pedicone R.*, Semprini P.**, Salvatore S.**, Galassi D.**, Ambrosii L.**

* Dipartimento di Scienze Zootecniche, Università di Firenze, Via delle Cascine, 5 - 50144 Firenze, Italy

** Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale", Via Campo Boario - 64100 Teramo, Italy

INTRODUCTION

Rabbit breeding has gained a very great importance in the range of the different zootechnical activities during the last decade.

In Central and Southern Italy the increasing proliferation of intensive breedings is also stimulated by State revenues only if climatization systems are adopted.

Unfortunately, the use of such systems is rather limited in that both management and maintenance costs are deemed a too heavy financial burden for small and medium sized breedings since they are often a subsidiary activity in farms. Yet, in regions where climate is temperate climatization systems are considered redundant.

In order to verify any interference of the adopted ventilation systems with the productive and sanitary trend of the farm a research has been carried out in some rabbit breedings and microclimatic parameters have been checked on a

periodical basis, according to a previously described methodology (Di Rocco et al., 1984).

MATERIALS AND METHODS

Within the territory of Teramo province four intensive breedings have been chosen. Two had dynamic ventilation while in the left ones it was natural (see Table 1).

BREEDING	LOCATION	VENTILATION	ANIMAL No.
1	300 m a.s.l.	Dynamic	350 does 2500 at fattening
2	150 m a.s.l.	Dynamic	750 does 4500 at fattening
3	250 m a.s.l.	Natural	70 does 350 at fattening
4	150 m a.s.l.	Natural	80 does 400 at fattening

Tab. 1 - General features of the controlled breedings.

The dynamically ventilated breedings were premises with a good insulation where climatization could be arranged by means of a small electronic system.

The number of air changes within 24 hrs was proportional to the inner temperature. Droppings were removed weekly.

The reproductive cycle was semi-intensive (mating 10 to 12 days after parturition). Each mother had nearly 2.1 m^3 space; at fattening the ratio was nearly 0.25 m^3/kg l.w..

In naturally ventilated premises air changes were possible by the opening of the windows. The removal of droppings was carried out daily. The reproductive cycle was semi-intensive (mating at 12 to 15 days after parturition). Each doe had 3.2m^3

and at fattening the ratio was nearly 0.3 m /kg l.w..

In each breeding controls of microclimatic factors were carried out weekly for 24 months and were as follows (Marschang, 1971):

- Temperature (in °C) and relative humidity (%): thermo-hygrometer recording the curve of the continuous variations on graph for 7 days;
- Air speed (m/s): Hill's catathermometer. Air speed was deducted from a predetermined scale and was in connection with the cooling time of the catathermometer and the environmental temperature.
- Ammonia, carbon dioxide, hydrogen sulphide: Dräger detector 21/31.

RESULTS AND DISCUSSION

The values of the controls carried out can be seen in Table 2. They are expressed as seasonal average of the 2 years and of the two breedings with different ventilation systems. Maximum range within 24 hrs for both temperature and relative humidity is also reported.

Worth noticing that in the four controlled breedings carbon dioxide and hydrogen sulphide always remained below the minimum level detectable instrumentally. As it can be seen in Table 2, in breedings with controlled climatization both temperature and humidity were slightly influenced by seasonal macroclimatic changes in that the lowest average temperature was 17.4 °C in winter and the highest 25.8 °C in summer with a peak range of 4 °C within 24 hrs in summer; the lowest mean relative humidity reached 66.1% in spring while in winter its peak was 74.6% with highest ranges of 20% in summer within 24 hrs.

In winter heating systems were never operated while

humidifiers were deemed as unnecessary. Sudden ranges never took place as a rule.

Air speed always remained at low values. Ammonia percent reached its highest values in coldest seasons in that the lack of heating involved a reduced number of air changes. This to prevent the inner temperature of the premises from falling.

	Controlled climat. $\bar{x}\pm$s.d.	Rate 24h	Natural climat. $\bar{x}\pm$s.d.	Rate 24h
Spring				
Temp. (°C)	19.4 ± 2.1	1.9	12.9 ± 7.6	8.6
Rel. humid. (%)	66.1 ±11	14.4	70.5 ±22.1	29.9
Air speed (m/s)	0.1 ± 0.04		0.39± 0.1	
Ammonia (p.p.m.)	16.5 ± 1.5		7.5 ± 1.5	
Summer				
Temp. (°C)	25.8 ± 3.4	4.0	23.3 ± 7.3	10.9
Rel. humid. (%)	70.4 ±18	20.0	74.6 ±24	34.0
Air speed (m/s)	0.15± 0.12		0.13± 0.05	
Ammonia (p.p.m.)	7.0 ± 2.75		9.3 ± 1.3	
Autumn				
Temp. (°C)	21.6 ± 2.9	3.4	13.5 ± 7.5	7.6
Rel. humid. (%)	72.9 ±12.2	12.8	67 ±26	34.4
Air speed (m/s)	0.1 ± 0.06		0.2 ± 0.12	
Ammonia (p.p.m.)	12.1 ± 1.15		10.5 ± 2.0	
Winter				
Temp. (°C)	17.4 ± 2.5	1.8	8.9 ± 4.6	4.2
Rel. humid. (%)	74.6 ± 9.4	7.5	82.13±10.3	15.0
Air speed (m/s)	0.08± 0.4		0.24± 0.1	
Ammonia (p.p.m.)	14.4 ± 2.2		13.3 ± 3.3	

Tab. 2 - Seasonal mean changes of observed parameters.

In breedings with natural climatization the values of both temperature and humidity have been directly influenced by the seasonal macroclimate with ranges often exceeding the limits thought as acceptable: the lowest mean temperature was 8.9% in winter and the highest 23.3 °C in summer, with highest range of 10.9 °C in summer within 24 hrs; the lowest mean relative humidity was 67% in autumn and the highest 82.1% in winter

with highest range of 34.4% in autumn within 24 hrs (see also fig. 1).

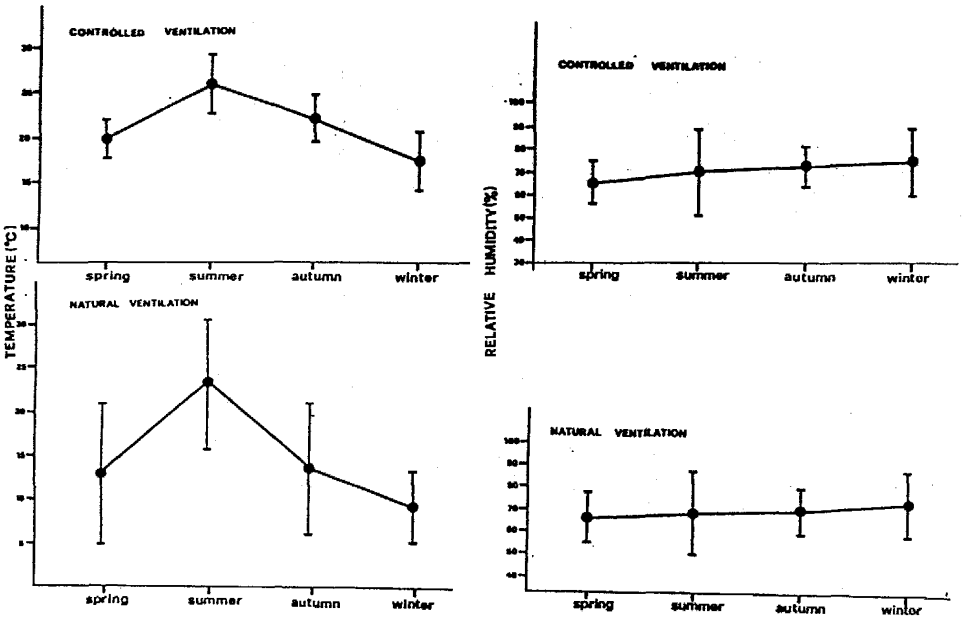

Figure 1 - Average temperature and relative humidity, and relative standard deviations, checked in farms with controlled or natural ventilation.

Air speed was directly influenced by the rate of seasonal winds. Ammonia was found at relatively low rates. In such breedings the macroclimatic parameters that had not been devoted good controls were, therefore, temperature and humidity. The ascertained values shift from those deemed as optimal and approach the critical ones during the year (Adrien, 1978; Auxilia and Masoero, 1977; Morisse, 1986). Even in dynamic ventilation systems microclimatic seasonal changes occurred. They would interfere with a productive good trend (Gardini, 1979; Samoggia, 1987).

In the controlled breedings all possible slight falls in reproductive activity never induced negative consequences on

the economic outcome.

Average production in these breedings was 0.95 rabbits sold/week/doe while in breedings where ventilation was natural production was markedly lower, i.e. 0.5 rabbits sold/week/doe. The reasons for such a drop were major reproductive difficulties in critical periods and reduced managerial commitment.

From a sanitary viewpoint, problems ascribable to microclimatic factors neve occurred in the four controlled breedings.

CONCLUSIONS

In the territory object of this investigation, like in the Italian mainland at heights never exceeding 500 m above sea level, the climate is temperate and the seasonal and daily ranges have no influence on the microclimate of the rabbit premises (Guerrieri and Giannobile, 1982).

If these can rely on satisfactorily insulated walls and on air flows capable of reducing temperature rise in summer and gases stagnation, heating and cooling systems might result redundant. Besides, such systems are really too expensive if related to their installation, operation. and maintenance costs.

After a 2-year observation of medium sized breedings it has come to believe that a proper management might turn unsophisticated into particularly fit premises while in smaller breedings the choice of location and building materials would be advisable.

REFERENCES

ADRIEN C., (1978) Climatization des locaux d'élevage cunicole. Recens. in Selez. Suinavicunicola, 5, (19), 23-25

AUXILIA M.T., MASOERO G., (1977) Fattori ambientali ed allevamento industriale del coniglio. Selez. Suinavicunicola 4 (22), inserto.

BORDI A., (1986) Aspetti fisioclimatici dell'allevamento del coniglio. Atti della 2ª Mostra Mercato del coniglio e del Congr. Scientifico, Varcaturo 31.5-1.6 pp. 29-37.

DI ROCCO A., DI EMIDIO B., GUERRIERI O., PAGANICO G., GALASSI D., (1984) Notes on the microclimate in intensive rabbit breeding in Central Italy. Proceed. III World Rabbit Congr. 1, 56-63.

GARDINI S., (1979), Il condizionamento ambientale dei cuniricoveri. Sel. Vet. 20, 256-275.

GUERRIERI O., GIANNOBILE D., (1982), Macroclima della collina abruzzese in rapporto alle esigenze climatiche degli animali da reddito. Atti SISVET 36, 470-473.

MARSCHANG von F., (1971), Stallklima: Seine Bedeutung fur die Leistungsbereitschaft der Haustiere in der industriemässigen Zucht und Haltung. Deutsch. Tierärztl. Wschr. 78, 533-556; 593-616.

MORISSE J.P., (1986), Ecopatologia dell'allevamento cunicolo. Atti delle giornate di studio in coniglicoltura, Ediz. Fondaz. Iniziative Zooprofilattiche e Zootecniche, Brescia, pp. 119-140.

SAMOGGIA G., (1987), Esigenze fisioclimatiche dei conigli nell'allevamento intensivo. Rivista di Coniglicoltura, 24, 16-20.

SUMMARY

Aim of the 2-year research carried out in Central Italy was the weekly check of the main microclimatic parameters such as temperature, humidity, air speed, environmental gases in farms where ventilation was forced or natural. The results have often shown that the main microclimatic factors differed from the

optimal data temperature and level of environmental gases had the most relevant changes that occured at ample cycles, directly depending on seasonal changes. Since no health or productive problems occurred it can be stated that microclimatic factors do not exert any influence on rabbit farms. Namely no sudden changes in different parameters were seen, this due to the presence of a temperate macroclimate. The installation of sophisticated and costly equipments for small and medium sized farms (<500 does) is deemed superfluous.

RIASSUNTO

L'indagine, condotta in allevamenti dell'Italia Centrale, ha avuto lo scopo di controllare settimanalmente, per due anni consecutivi, i principali parametri microclimatici (temperatura, umidità, velocità dell'aria, gas ambientali), in allevamenti campione climatizzati artificialmente o naturalmente.

I rilievi hanno spesso evidenziato uno scostamento dei principali fattori microclimatici dai dati ritenuti ottimali. Le variazioni più importanti sono state riscontrate nella temperature e nel tasso dei gas ambientali. Tuttavia tal variazioni non si verificano bruscamente ma ad ampi cicli, in rapporto diretto con le variazioni stagionali. Poichè non sono stati contemporaneamente riscontrati problemi sanitari o produttivi, si può dedurre che, nelle Regioni controllate, i fattori microclimatici non destano particolari preoccupazioni per gli allevamenti di conigli. In particolare, per la presenza di un macroclima temperato, non si notano brusche variazioni dei vari parametri. In queste Regioni non riteniamo opportuna, per allevamenti medio-piccoli (<500 fattrici), l'installazione di strutture di condizionamento sofisticate che, d'altra parte, non sono economicamente accettabili.

Proceedings 4th World Rabbit Congress, 10-14 October 1988, Budapest Hungary, Vol. 1, 226-234

RILIEVI MICROCLIMATICI IN ALLEVAMENTI INTENSIVI DI CONIGLI NELL'ITALIA CENTRALE

Gualtieri M.*, Di Emidio B.**, Pedicone R.*, Semprini P.**, Salvatore S.**, Galassi D.**, Ambrosii L.**

* Dipartimento Scienze Zootecniche, Università di Firenze, - I 50100 Firenze. Italia
** Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" - I 64100 Teramo. Italia

L'indagine, condotta in allevamenti dell'Italia Centrale, ha avuto lo scopo di controllare settimanalmente, per due anni consecutivi, i principali parametri microclimatici (temperatura, umidità, velocità dell'aria, gas ambientali), in allevamenti campione climatizzati artificialmente o naturalmente. I rilievi hanno spesso evidenziato uno scostamento dei principali fattori microclimatici dai dati ritenuti ottimali. Le variazioni più importanti sono state riscontrate nella temperatura e nel tasso dei gas ambientali. Tuttavia tali variazioni non si verificano bruscamente ma ad ampi cicli, in rapporto diretto con le variazioni stagionali. Poichè non sono stati contemporaneamente riscontrati problemi sanitari o produttivi, si può dedurre che, nelle Regioni controllate, i fattori microclimatici non destano particolari preoccupazioni per gli allevamenti di conigli. In particolare, per la presenza di un macroclima temperato, non si notano brusche variazioni dei vari parametri. In queste Regioni non riteniamo opportuna, per allevamenti medio-piccoli (< 500 fattrici), l'installazione di strutture di condizionamento sofisticate che, d'altra parte, non sono economicamente accettabili.

MICROCLIMATE IN INTENSIVE RABBIT FARMING OF CENTRAL ITALY

Gualtieri M.*, Di Emidio B.**, Pedicone R.*, Semprini P.** Salvatore S.**, Galassi D.**, Ambrosii L.**

* Dipartimento Scienze Zootecniche, Università di Firenze, - I 50100 Firenze. Italy
** Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" - I 64100 Teramo. Italy

Aim of the 2-year research carried out in Central Italy was the weekly check of the main microclimatic parameters such as temperature, humidity, air speed, environmental gases in farms where ventilation was forced or natural. The result have often shown that the main microclimatic factors differed from the optimal data. Temperature and level of environmental gases had the most relevant changes that occurred at ample cycles, directly depending on seasonal changes. Since no health or productive problems occurred it can be stated that microclimatic factors do not exert any influence on rabbit farms. Namely, no sudden changes in different parameters were seen, this due to the presence of a temperature macroclimate. The installation of sophisticated and costly equipments for small and medium sized farms (< 500 brood-females) is deemed superfluous.