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CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

THERMAL STRESS AND ENVIRONMENTAL INFLUENCE ON PHYSIOLOGICAL RESPONSE AND FEED CONSUMPTION IN RABBITS NEW ZEALAND

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Abstract: Objetivou-se avaliar a influencia do estresse térmico do ambiente de criação sobre os parâmetros fisiológicos e o consumo de ração em coelhos da raça Nova Zelândia em fase de crescimento. O experimento ocorreu no Módulo Didático-Produtivo de Cunicultura do Colégio Técnico de Bom Jesus, *Campus* Professora Cinobelina Elvas, em Bom Jesus - PI, com seis láparos com 45 dias. Os dados foram obtidos nos períodos noturno e diurno durante 15 dias. Coletaram-se os dados de Frequência Cardíaca, Frequência Respiratória, Temperatura Retal e consumo de ração. Avaliou-se o desempenho dos animais através do consumo de ração. Para as análises foi utilizado um modelo linear misto no delineamento em blocos casualizado. As análises estatísticas foram realizadas pelos procedimentos MIXED e CORR. A temperatura retal não apresentou diferença significativa ($P>0,05$) quanto ao turno, mas se mostrou com diferença significativa ao estresse térmico ($P<0,05$). A alta temperatura ambiental acelera a respiração e possibilita uma elevação na temperatura corporal (r = -0,60), consequentemente, o consumo reduz, visto ser um fator que influencia diretamente no metabolismo do animal. Constatou-se que consumo de ração é afetado pelas condições de estresse térmico que o animal é submetido. O estresse térmico provoca alterações na temperatura retal dos animais.

Keywords: confort zone, cuniculture**,** feed ingestion, *Oryctolagus cuniculus*

Introduction

There is little information about the thermal comfort zone for rabbit breeding (Ferreira et al., 2017), this is, a suitable temperature range for the animals. Rabbits show good performance when exposed to temperatures between 15 to 25 ° C. Above this range, the most likely consequences are: decrease in feed consumption and increase in water consumption. The decrease in consuption is brought about mainly due to a decrease in the production of metabolic heat to maintain homeothermia (Jaruche et al., 2012).

Knowing the effects of the environment on the behavior and organic responses of rabbits makes it possible to evaluate the performance variables as consumption, and consequently the weight gain, in growing rabbits. It was objectified, so, with this research to evaluate the influence of thermal stress of the breeding environment on physiological parameters and feed intake in New Zealand rabbits in the growing phase.

Material and methods

The experiment was carried out in the Didactic-Productive Module of Cunicultura of the Colégio tecnico de Bom Jesus, Campus Professora Cinobelina Elvas in Bom Jesus, in Piauí, with New Zealand laparos with 45 days of life, in September of the year 2017. This research was approved and has authorization from the Committee of Ethics in Animal Experimentation at the Federal University of Piauí, under process registered with No. 328/17.

Six female animals were used, born from the same matrix, born on the same day and weaned at 30 days of age. After weaning, the animals were created in individual galvanized iron cages, equipped with a feeder and drinking fountain. The animals were submitted to the same sanitary management. In addition, water was supplied at will and 150g / shift / pelleted commercial rabbit.

The data were obtained in the night and day periods, in 15 consecutive days. It were collected: Heart Rate (HR), Respiratory Rate (RR) and Rectal Temperature (RT) and feed intake. The performance of the animals was evaluated through the feed consumption, calculated by the difference between the consumptions of the day and night periods.

The climatic data of ambient temperature in ° C (TA) and relative humidity in% (RH) were obtained by digital thermohygrometer (Incoterm, Brazil). The calculation of the temperature and humidity index (THI) was performed according to the formula proposed by Marai, Ayyat and Abd El-Monem (2001) adapted for rabbits:

$$THI = TA - [(0{,}31 - 0{,}31\ RH)\ (TA - 14{,}4)]$$

where, TA is the ambient temperature in degrees Celsius and RH is equal to relative humidity in percentage. The THI was used to measure the level of thermal comfort inside the installation.

A mixed linear model was used for the analyzes in a randomized block design. In addition, all statistical analyzes were performed using the MIXED and CORR procedures. In all analyzes the significance was declared at $P < 0.05$.

Results and discussion

It was observed that between the first and second week, when the THI was above 30, the rabbits also presented a high consumption, even the index indicating very severe thermal stress (Figure 1). This can be explained by virtue of these animals, when subjected to high temperature environments, possibly develop metabolic mechanisms to suit the adverse environment in which they are (Asemota et al., 2017).

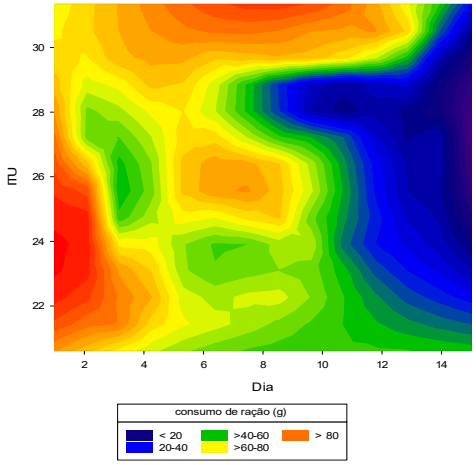

Figure 1: Ingestive behavior of feed on different days as a function of temperature and humidity index (THI) for New Zealand rabbits.

The rectal temperature did not present a significant difference (P> 0.05) for the shift, but showed a significant difference to the thermal stress (P <0.05). In addition, the coefficients of variation indicate that the homogeneous data, since the values are less than 10% (Table 1).

Table 1- Adjusted means of the physiological parameters and consumption as a function of the shift and thermal stress of New Zealand rabbits

Sources of variation	Shifts	Physiological parameters		
		HR	RR	RT
Period	Night	231,99 a	67,00 b	37,50 a
	Day	197,99 b	85,41 a	38,10 a
Stress	Stress absence	193,54 a	76,40 a	36,91 b
	Moderate stress	224,21 a	72,02 a	37,66 a
	Severe Stress	219,54 a	77,89 a	37,87 a
	Very Severe Stress	222,68 a	78,42 a	38,85 a
Coefficient of variation (%)		9,73	9,55	1,99

HR - heart rate; RR - respiratory rate; RT - rectal temperature; a - averages followed by the same letter in the column, by source of variation, do not differ by the Fisher minimum squared test.

The RF exceeded the normal limit (50 to 60 mov / min), as the increase in internal temperature causes acceleration of breathing in an attempt to dissipate too

much heat and maintain the body's thermal equilibrium. In the study, it was observed that HR decreased between the periods, however it is within the range (135 to 325 heart beats / min) considered by some authors (Vale et al., 2010).

The high ambient temperature accelerates respiration and allows a rise in body temperature (r = -0.60), consequently consumption is reduced, since it is a factor that directly influences the metabolism of the animal (table 2).

Table 2 - Pearson correlation between environmental variables, physiological parameters and feed intake in New Zealand rabbits

Variables	HR	RR	RT	Consumption
THI	-0,16*	0,67*	0,81*	-0,60*
TA	-0,15*	0,70*	0,83*	-0,62*
RH	0,07^{ns}	-0,72*	-0,72*	0,63*

THI- temperature and humidity index; TA - ambient temperature; RH - relative humidity; HR - heart rate; RR - respiratory rate; RT - rectal temperature; * significant at 5%; ns not significant.

Conclusion

Feed consumption is affected by the thermal stress conditions that the animal undergoes. In addition, thermal stress causes changes in the animals' rectal temperature.

References

Marai,I.; Habeed, A.; Gad, A. 2002. Rabbits productive and physiological Performance traits as affected by heat stress: a review. Livestock Production Science 78:71-90.