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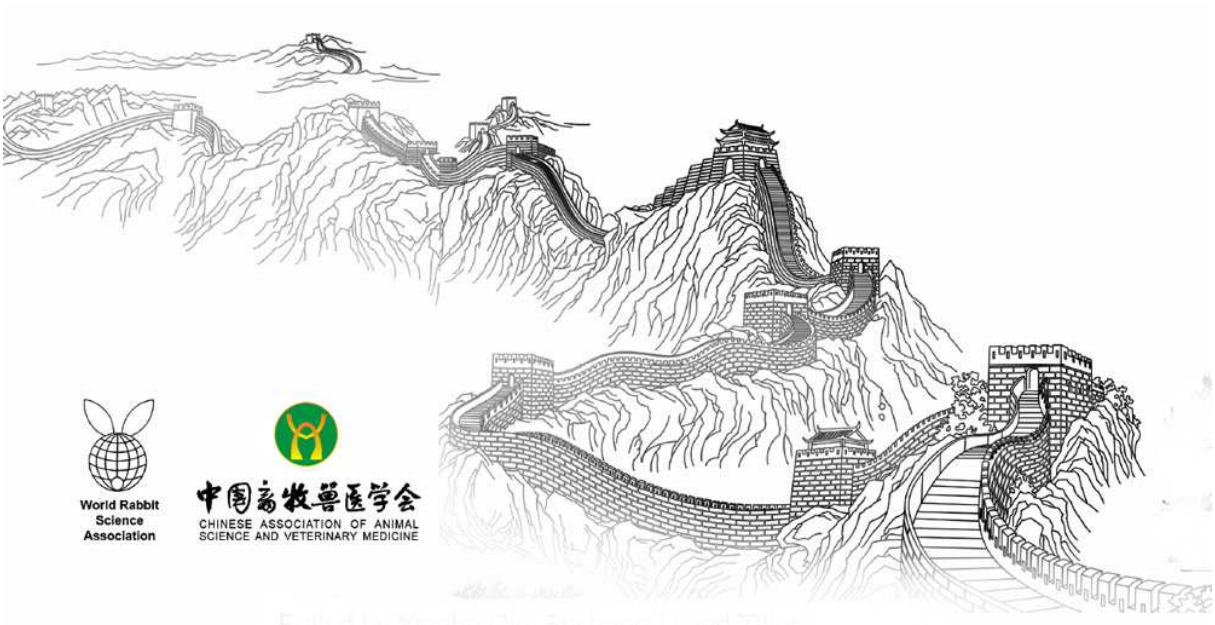

BEHAVIOUR OF LACTATING DOES UNDER ENVIRONMENTS WITHOUT OR WITH COOLING IN SUMMER AND WITHOUT HEATING IN WINTER

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ABSTRACT

The aim of the study was to examine the does' behaviour under different temperature. Twelve does at 15-days *postpartum* were housed in a closed rabbit house without or with cooling in summer, and without heating in winter. Both the time spent and frequency of behaviours such as eating, drinking, resting and moving were observed using infrared video cameras. In group of does without cooling in summer, the frequency of eating and resting were higher (P<0.05) and the duration of eating and resting were shorter (P<0.05) than in group of does with cooling in summer. Compared with group of does without heating in winter, does spent less time on eating (P<0.05), and the duration of eating and moving were shorter (P<0.05) in group of does with cooling in summer. The time spent of eating concentrated on the period between 18:00h and 4:00h in group of does without cooling in summer, while the feeding time in group of does with cooling in summer (between 8:00h and 12:00h, and 16:00h and 24:00h) and without heating in winter (between 8:00h and 10:00h, and 18:00h and 20:00h) were consistent. Thus, in rabbit farms, we should take appropriate cooling measures to reduce heat stress in hot summer, and adjust the feeding time to conform to the behaviour habits of the rabbits during evening.

Key words: Behaviour, Lactation, Temperature, Rabbit does

INTRODUCTION

The behaviour of rabbits is affected by many factors, such as the cage type (Olivas et al., 2013; Trocino et al., 2014), the cage floor material (Rashed et al., 2015; Gerencser et al., 2014), or group housing of does (Buijs et al., 2015). However, there are few reports on the effect of temperature on lactating does' behaviour. In the present work， the effect of temperature on the behaviour of lactating does was studied using continuous video recording. The aim of the study was to assess behaviour parameters as indicators of heat and cold stress on lactating does. It is expected to provide some suggestions for effective environmental control technology, feeding and management.

MATERIAL AND MET HODS

Animals and housing

The research work was carried out at a rabbit farm in Ningbo City of Zhejiang Province in China. Twelve does at 15-days *postpartum* were housed in a closed rabbit house (with windows) without or with cooling via an air-conditioner in summer, and without heating in winter. In the rabbit house without cooling, the windows were opened to provide cooling and natural ventilation. In the rabbit house with cooling, the air-conditioner was operated from 8:00 to 12:00, and the house was ventilated mechanically using a heat recovery ventilation system (HRV) from 10:00 to 12:00. In winter, 25% of the windows were opened and naturally ventilated from 8:00 to 19:00, and they were closed at night. Rabbits were fed *ad libitum* with a commercial pellet at 8:00 and 17:00 every day using hopper-type feeder, and water was available *ad libitum* from nipple drinkers. Rabbit does were housed individually in wire-mesh cages (40 width ×60 length ×35 height cm) with a plastic slat floor in June, August and December.

Environment measurement and behaviour recording

An Apresys 179-TH, temperature and humidity logger was used to collect data of the dry bulb temperature and relative humidity every ten minutes inside and outside of the rabbit houses. Images were captured by infrared

cameras (Sony SSC-CB565R) and stored on a digital hard disk video recorder (Haikang DS-8104HF-ST). Using video recording, it was possible to study both the time spent and the frequency of the does' behaviour all the day.

Activities

The following activities were considered (Fernández-Carmona et al., 2005):
- *Eating*: the doe approaches the hopper. This includes the time with the head in the feeder, masticating and swallowing.
- *Drinking*: the doe contacts the water nipple. It keeps its head motionless.
- *Resting*: sitting, lying and stretching positions, irrespective of whether the animal is alert or not.
- *Moving*: other activities such as grooming, jumping, standing and biting.

Statistical Analyses

Records were grouped and means were considered for each two hours, from 0:00 to 24:00. Data were analyzed using SPSS (Statistical Product and Service Solutions, version 19.0, IBM Corp., Armonk, NY, USA) and the results were presented as the Mean ± SD.

RESULTS AND DISCUSSION

The mean values of the thermal environmental and behavioural parameters observed under different temperature are shown in Table 1. Compared to group of does with cooling in summer, rabbits without cooling in summer performed higher frequency of eating and resting ($P<0.05$), and showed a trend of more time spent on eating, drinking and moving, and less time spent on resting ($P>0.05$). The results also showed that rabbits in a high temperature spent less time on eating, drinking and moving. This indicated that the group of does without cooling in summer might have decreased the time of active behavioural patterns to reduce their heat production.

Rabbits in building without cooling in summer spent longer time on resting ($P<0.05$), shorter time on eating ($P<0.05$), and showed a higher frequency of eating, resting and moving ($P<0.05$) compared with those in winter. There was significant difference in the time spent of eating between conditions with cooling in summer and without heating in winter ($P<0.05$). This suggested that rabbits in the low temperature conditions might increase their heat production by increasing the time spent on eating (consume more feed) and moving behaviours.

Table 1: The indoor environmental parameters, time spent and frequency per day of lactating does behaviours under different temperature.

Items		Temperature in summer		Temperature without heating in winter
		Without cooling	With cooling	
Indoor relative humidity (%)		92.1 ± 1.5^{a}	86.4 ± 6.2^{a}	72.5 ± 7.8^{b}
Indoor temperature and Humidity index (THI)		27.2 ± 1.0^{a}	26.6 ± 0.6^{a}	-
Indoor temperature (°C)	average	27.5 ± 1.0^{a}	27.1 ± 0.6^{a}	10.8 ± 2.5^{b}
	maximum	30.6 ± 2.1^{a}	29.9 ± 0.8^{a}	12.2 ± 2.3^{b}
	minimum	25.6 ± 1.2^{a}	24.2 ± 0.7^{a}	9.4 ± 2.8^{b}
Time spent per day (min/day)	eating	179 ± 26.6^{b}	199 ± 16.7^{b}	218 ± 28.7^{a}
	drinking	46.3 ± 6.1^{a}	49.3 ± 4.6^{a}	47.4 ± 7.1^{a}
	resting	1018 ± 77.6^{a}	981 ± 44.2^{ab}	947 ± 82.6^{b}
	moving	196 ± 57.1^{a}	205 ± 26.9^{a}	221 ± 75.9^{a}
Frequency per day (No./day)	eating	55.1 ± 10.0^{a}	46.4 ± 9.1^{b}	44.3 ± 7.7^{b}
	drinking	35.9 ± 3.9^{a}	32.8 ± 10.9^{a}	32.1 ± 12.6^{a}
	resting	96.3 ± 16.6^{a}	80.4 ± 10.4^{b}	77.8 ± 9.2^{b}
	moving	86.0 ± 20.9^{a}	71.9 ± 17.3^{ab}	61.8 ± 23.3^{b}
Duration time (min/event)	eating	3.3 ± 0.4^{c}	4.4 ± 0.8^{b}	5.0 ± 0.5^{a}
	drinking	1.3 ± 0.2^{a}	1.7 ± 0.6^{a}	1.7 ± 0.6^{a}
	resting	10.8 ± 1.7^{b}	12.4 ± 1.4^{a}	12.3 ± 1.5^{a}
	moving	2.3 ± 0.4^{b}	3.0 ± 0.9^{b}	3.9 ± 1.3^{a}

^{a,b,c}: Means within a row with different superscripts differ significantly ($P<0.05$).

The time spent and frequency of each activity occurring during one day is shown in Figure 1. In group of does without cooling in summer, the time spent and frequency of eating was concentrated in the period of day, before and during dark, between 18:00h and 4:00h when the temperature was lower, while the time spent of resting was concentrated between 12:00h and 16:00h when the temperature was higher.

However, the time spent of eating concentrated between 8:00h and 12:00h, and 16:00h and 24:00h in group of does with cooling in summer, and concentrated between 8:00h and 10:00h, and 18:00h and 20:00h in group of does without heating in winter, and does' eating behaviour were consistent with the feeding time. In these groups the eating time was near to the time when pellet was allocated.

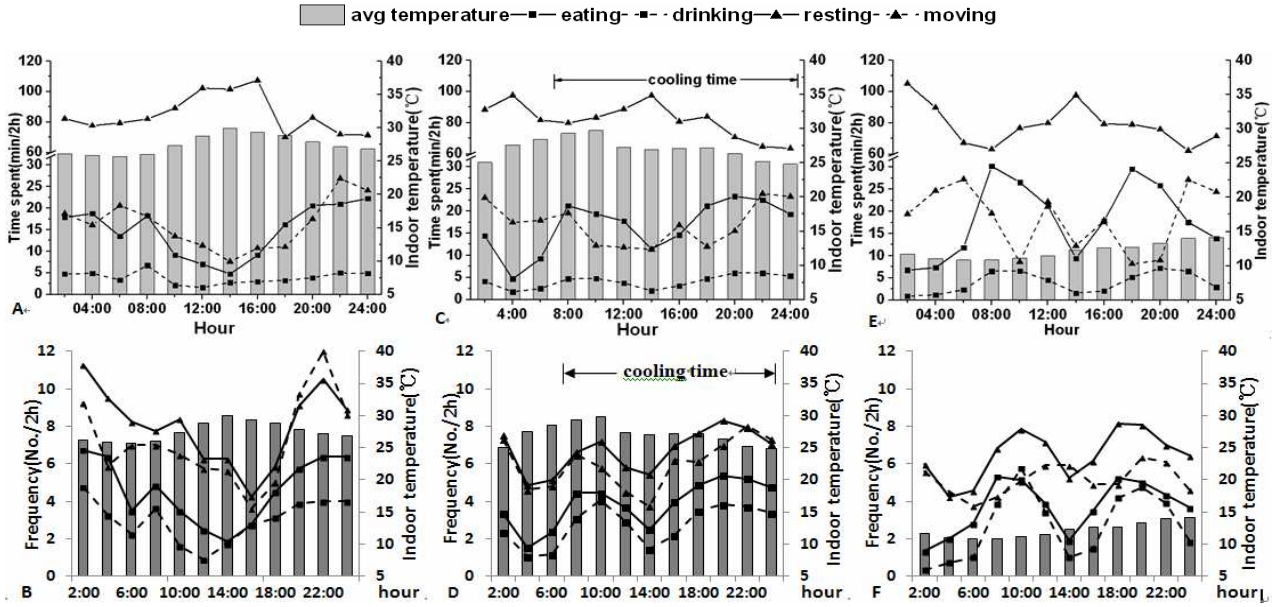

Figure 1: The daily average temperature, the time spent and frequency per 2h of the behaviours of lactating does under environments without cooling in summer (A, B), with cooling in summer (C, D) and without heating in winter (E, F).

CONLUSIONS

The temperature directly affected not only the time spent and the frequency of behaviour, but also the distribution of each examined behavioural pattern during the day. The duration of eating without cooling in summer was shorter and concentrated on the period between 18:00h and 4:00h, which was mainly dark and the lowest temperature period of the day.

These behaviours were consistent with the feeding time in group of does with cooling in summer and without heating in winter. Thus, in rabbit farms, we should take appropriate cooling measures to reduce heat stress in hot summer, and adjust the feeding time to conform to the behaviour habits of the rabbits during evening.

REFERENCES

Buijs S, Maertens L, Hermans K, Vangeyte J U R, Tuyttens F A E M. 2015. Behaviour, wounds, weight loss and adrenal weight of rabbit does as affected by semi-group housing. *Appl. Anim. Behav. Sci., 172, 44-51.*

Fernández-Carmona J, Solar A, Pascual J J, Blas E, Cervera C. 2005. The behaviour of farm rabbit does around parturition and during lactation. *World Rabbit Sci., 13, 253-277.*

Gerencser Z, Szendro K, Szendro Z, Odermatt M, Radnai I, Nagy I, Dal Bosco A, Matics Z. 2014. Effect of floor type on behavior and productive performance of growing rabbits. *Livest. Sci., 165, 114-119.*

Olivas I, Rodriguez-Latorre A, Estell E S F, Calvet S, Villagr A A. 2013. Short communication: Assessment of activity patterns of growing rabbits in a flux-controlled chamber. *World Rabbit Sci., 21, 107-110.*

Rashed R R, El-Edel M A. 2015. Behavior and performance of growing rabbit under various floor types. *Global Vet., 14, 149-155.*

Trocino A, Filiou E, Tazzoli M, Bertotto D, Negrato E, Xiccato G. 2014. Behaviour and welfare of growing rabbits housed in cages and pens. *Livest. Sci., 167, 305-314.*

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