ASSESSMENT OF STRESS DURING HANDLING OF COMMERCIAL RABBITS

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ABSTRACT

In order to ensure the animal welfare of meat rabbits, our study evaluated the effect of handling on peripheral temperature as a physiological indicator of stress. A total of 21 adult male rabbits were distributed in individual cages and assigned to three treatments. Each treatment consisted of a different method of handling (type 1: rabbit lifted with one hand across the shoulders, rump supported; 2: rabbit tucked under handler's arm; 3: rabbit carried in the box). Superficial body temperature of the rabbits was taken in different areas (muzzle, eye and ear) and two times (pre and post-handling). Superficial temperature was collected in three points of the internal auricle pavilion (tip, middle and base). Overall, the results showed a temperature fluctuation between pre and post-handling ($p < 0.05$), except for the eyes ($p > 0.05$), with lower temperatures post-handling (ear tip: - 8.5%; middle ear: - 4.6%; ear base: - 3.2%; muzzle: - 3.9 %). There was no significant difference between treatments ($p > 0.05$). In conclusion, these results suggest that the three types of handling applied in this study induce the same level of stress in meat rabbits.

Key words: Welfare, Handling, *Oryctolagus cuniculus*, Skin temperature, Stress indicator.

INTRODUCTION

Some activities in the rabbitry such as breeding, vaccination, weighing and weaning require handling of the rabbits, which can be very stressful to them (Bradbury, 2015). In order to reduce that stress and avoid escape attempts that might lead to fractures or tendon injuries in the limbs (Chapel *et al*., 2015), a gentle handling is recommended (Sayers, 2010). Stress is well known as the relationship between adverse stimulus, which alter the homeostasis, and its response to this stimulus. Furthermore, the stress can produce physiological and behavioral changes in animals (Kim and Diamond, 2002). The fluctuation of superficial body temperature has been widely used as a stress indicator in rabbits, due to its practicality and precision (Ludwig *et al*., 2010). Therefore, the aim of this study was to evaluate the effect of three out of the most recommended handling for meat rabbits (Malley, 2007; Sayers, 2010; Swennes *et al*., 2011; Bradbury and Dickens, 2016; EFSA, 2020) on peripheral temperature used as a physiological indicator of stress.

MATERIALS AND METHODS

Animals and experimental design

The experiment was carried out in the experimental rabbit farm at the São Paulo State University, equipped with shed and ventilation system, housing a total of twenty-one male rabbits from *Botucatu* line and distributed in a single cage (85x40x30 cm) equipped with feeder and nipple drinker. Animals

were fed *ad libitum* with balanced food and forage. All rabbits were removed from the cages individually by the same operator in order to be carried through the facility for 60 secs, under three methods of holding, and then placed back into their individual cages, as it follows:

Type 1 handling: with the right hand the operator gently holds the loose skin on the top of the rabbit's back and neck. With the left hand held under the back as if it were sitting on the palm to support the weight of the animal (seven rabbits).
Type 2 handling: rabbit is placed under the forearm, pressing the rabbit's back and then hugging it around its back, between the operator's arm and his body (seven rabbits).
Type 3 handling: rabbit is removed out of the cage and gently transported in a wooden box (seven rabbits).

Surface temperature of the rabbits was registered in two times (pre and post-handling) in different areas (nose, eye and ear). Ear was divided into three regions within the internal auricle pavilion: tip area, middle area and base. Temperature was measured by infrared thermometer (Fluke 59 MAX, Fluke Corporations, Washington, USA) and was taken prior to handling and right after returning the rabbit back to its cage.

Figure 1: Methods of handling: a) type 1; b) type 2 and c) type 3.

Statistical Analysis

The experiment was of a completely randomized design (CRD). The experimental unit considered for all variables measured during the study was the rabbit. All analyses were performed using the GLM procedure of Statistical Analysis System package (SAS) Version 9.0 software (Statistical Analysis System, SAS Institute Inc., Cary, NC, USA) and statistical significance was set at $p<0.05$. Data were subjected to one-way analysis of variance (ANOVA) using a model that included treatment and animal as possible source of variation.

RESULTS AND DISCUSSION

There was no significant interaction ($p > 0.05$) between handling methods and times (pre and post-handling), however, the post-handling peripheral temperature was lower ($p < 0.05$) when compared to the pre-handling temperatures for all variables, except for the eye (ear tip: - 8.5%; middle ear: - 4.6%; ear base: - 3.2%; muzzle: - 3.9 %), as shown on table 1. That would might have happened due to the peripheral vasoconstriction in animals at situations that represent danger to their integrity (Vianna and Carrive, 2005), where the 'fight or flight' response is exhibited and the sympathetic division of the autonomic nervous system (SNAs) and the hypothalamic-pituitary-adrenal axis (HPA) are activated. The SNAs is responsible for peripheral vasoconstriction, blood pressure increase, bronchial tubes and pupils' dilatation (Sapolsky, 2002). Furthermore, it induces adrenal glands activity in order to release more adrenaline in the bloodstream, which is responsible for increasing the respiratory cardiac rate and increases blood flow in skeletal muscles to prepare organisms for two types of response (fight or flight) (Gómez-González and Escobar, 2006). Overall, we observed that the most sensitive variable

was the ear due to the higher temperature difference between pre and post handling, which was similar to the results obtained by Ludwig *et al*. (2010). These authors showed that under stress condition there is a decrease on cutaneous temperature with respect to the basal condition (ΔT~1°C) and this trend is more evident for the auricle pavilion.

Table 1: Average temperature values at nose, eyes and ear (tip, middle and base) at two times (pre and post-handling) with three methods of handling (type 1, 2 and 3).

	Nose	**Ear**			**Eye**
		Tip	**Middle**	**Base**	
Time (T)					
Pre-handling	35.0 ^{A}	38.1 ^{A}	38.9 ^{A}	38.6 ^{A}	37.1
Post-handling	33.7 ^{B}	35.1 ^{B}	37.2 ^{B}	37.4 ^{B}	35.8
Handling (H)					
Type 1	33.7	37.2	37.9	38	34.6
Type 2	34.9	36.5	38.2	38.2	36.2
Type 3	34.6	36.0	38.0	37.9	36.5
P-value					
T	0.005	<0.001	<0.001	<0.001	0.987
H	0.095	0.179	0.585	0.691	0.494
TxH	0.595	0.265	0.314	0.254	0.265

Means followed by distinct letters (in the columns) differ from each other at the Tukey test ($p < 0.05$).

CONCLUSIONS

In conclusion, the temperature fluctuation in the ear areas (tip, middle and base) can be used as an efficient indicator of stress by handling. These results also show that the three types of handling applied in this study induce the same level of stress in commercial rabbits.

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