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Evaluation of skin temperature change as stress indicator in rabbit through infrared thermography

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ABSTRACT

Stress-induced reactions in animals include behavioural and physiological modifications aiming at coping towards the stressor, such as manipulations. Thermography, that is the detection of infrared radiation emitted by a subject, permits to measure the superficial temperature without any contact with the animal. A thermographic system was employed in order to detect the rabbit skin zones most suitable for temperature monitoring during stress challenges. The trial was assessed over a 2-month period. At the end of fattening period, 12 rabbits were housed in single cages and fed *ad libitum* a commercial diet.

Water was also administered *ad libitum*. During the trial, environmental temperature and relative humidity (daily average) were 21°C and 52% respectively. Rabbits were first analysed in their own cages (basal condition) and then after placing into a containment box (stress condition) for 15 minutes. Due to the presence of thick hair on the body, only ocular area (globe and periocular skin) and internal ear pavilion were suitable for thermographic measurements. Basal condition, were observed during 30 min. (rate 1 image/min).

Stress condition were recorded in 2 images both from ocular and ear areas. As reference, the rectal temperatures of rabbits were recorded during basal and stress conditions. To analyse corticosterone level variations induced by stress, two blood samples were taken the day before the test (basal condition) and immediately after the stress condition. Blood was collected using an insulin syringe and the serum analysed using a specific commercial kit for mouse and rat based on RIA competition method with double antibodies. Thermographic data, divided per shoot areas (eye/ear) were the average obtained on all rabbits during the 5 trials.

The temperature value of each subject is the average of all the images in the same experimental conditions. Corticosterone data were analysed by analysis of variance according to a linear model.

The average of the temperatures recorded by infrared camera was 35.4°C (basal condition) and 35.1°C (stress condition) for eye and 35.3°C (basal) and 34.8°C (stress) for ear pavillon. Average rectal temperature was 39.2°C and 39.7°C during basal and stress conditions, respectively. The corticosterone levels increased from 17.7 µg/ml (basal) to 85.2 µg/ml after stress challenge.

The results of this study show that the thermography is a suitable method for the evaluation of superficial temperature variation in rabbit, according to the applied stressor. The variations related to the physiological changes during the stress reaction are evidenced in the ear pavilion and periocular area, where vasoconstriction occurs. Further researches are running in order to standardise the methodology.