

Environmental and endocrine assessment of sheep welfare in a climate-controlled room: A preliminary study

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Abstract

The nutritional status of sheep grazing in the Montado ecosystem varies considerably throughout the year, due to variations in the availability and quality of pastures, strongly influenced by the typical climatic conditions of the Mediterranean region: dry summer and autumn with very little rain. These variations lead to severely restricted feeding for approximately half the year, causing under-nutrition, limitations on animal production and a poor level of welfare.

The main objective of this work was to test the use of a salivette device to measure salivary cortisol concentrations in order to assess heat stress situations. The idea is that those variables will be used with PLF techniques to provide a rapid diagnostic test that could have a major impact on the assessment of animal welfare.

Experiments were conducted in a climate-controlled room using pregnant adult ewes, fed on dehydrated alfalfa pellets at a restricted level (20g/kg^{0.75}). The air temperature, humidity and CO₂ concentration were recorded continuously inside and outside the room. The temperature and humidity index (THI) was used to assess heat stress level. Samples of blood and saliva were collected and cortisol, used as indicator of animal welfare, was determined by enzyme-linked immunosorbent assay (ELISA).

The THI was compared with the cortisol concentration and the results showed that cortisol levels in saliva collected using the salivette device correlated highly with levels in the plasma. There appears to be evidence that salivary cortisol is a promising biomarker for automatic measurement of chronic heat stress.

Keywords: Temperature-humidity index, automatic monitoring, salivary cortisol, thermal stress