

CONSTRUINDO SABERES, FORMANDO PESSOAS E TRANSFORMANDO A PRODUÇÃO ANIMAL

. Heat loss from cutaneous evaporation in wool sheep: a preliminary investigation on the precision of some methods

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There are several ways to determine the cutaneous evaporation in animals, but the question that arises is what the precision of these methods? The measurement of water loss by evaporation through weight differential in a certain time interval (gravimetry) can be considered as the most accurate technique, but requires the use of high precision scales and animal restraint, limiting their use in field. Therefore, this study aims to test the effectiveness of different methods to quantify the moisture evaporation at the skin surface, using the gravimetric as standard, comparing it with the colorimetric and ventilated capsule technique. Fifteen measures were taken in four Corriedale ewes with 56.17 ± 15.20 kg of body weight and 5.3 ± 0.5 cm of fleece thickness during three consecutive days under controlled ambient condition (Air temperature: $26.68 \pm 0.19^\circ\text{C}$ and relative humidity: $59.44 \pm 0.94\%$) in the Biometeorology Laboratory at the São Paulo State University. Ewes were placed on a high-sensitivity strain gauges (resolution: ± 10 g) and weight changes were monitored during two hours; moisture evaporation throughout the respiratory tract was also accounted using a face mask adjusted on the animal muzzle, which the ventilation (V_E ; L s^{-1}), expired air temperature (T_{EXP} ; $^\circ\text{C}$), and saturation vapor pressure ($e_{\text{T}_{\text{EXP}}}$; kPa) were recorded. Simultaneously, three paper discs (diameter: 0.5 cm) and a ventilated capsule (diameter: 6.5 cm; air flow: 145 ml/min) were placed over the shaved and unshaved surface body region, respectively. The means (\pm SEM) of sweating rate recorded by gravimetry, ventilated capsule and colorimetric method were 47.24 ± 5.65 , 26.70 ± 6.26 , and 145.65 ± 14.39 $\text{g m}^{-2} \text{h}^{-1}$, reflecting in a heat transfer from moisture evaporation of 31.98 ± 3.83 , 18.07 ± 1.22 , and 98.62 ± 9.75 W m^{-2} , respectively. These preliminary findings showed that the colorimetric method overestimate the sweating rate and heat transfer from sweat evaporation in wool sheep; perhaps, this discrepancy is due to the fact that the mass and heat transfer recorded do not consider the resistance caused by the fleece. Considering the error deviation of the scale (± 10 g), measures performed by the ventilated capsule seems to be the most accurate way to quantify the moisture evaporation from cutaneous surface in wool sheep.

Keywords: mass transfer, heat loss, sweating, gravimetry

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