

Black globe temperature and humidity index in integrated crop-livestock-forest systems in the Brazilian Midwest

Fabiana V. ALVES^{1*}, Nivaldo KARVATTE JUNIOR², Caroline C. de OLIVEIRA³, Eliane S. MIYAGI², Roberto G. DE ALMEIDA¹, Natália AJALA⁴

¹Embrapa Beef Cattle, 79106-550, Campo Grande, MS, Brazil; ²Fed. University of Goiás, Goiânia, 74001-970, GO, Brazil; ³Fed. University of Mato Grosso do Sul, Campo Grande, 79090-900, MS, Brazil; ⁴Catholic Univ. Dom Bosco, 79117900, Campo Grande, MS, Brazil.

E-mail address of presenting author*: fabiana.alves@embrapa.br

Introduction The meat and milk production in tropical countries, as Brazil, is mainly on pastures (free-range systems). In these regions, the offering of enough shade to animals is an alternative for protection against solar radiation and mitigation of excessive heat, even in winter (Karvatte Junior, 2014). This study aimed to evaluate the thermal comfort index of an integrated system (crop-livestock-forest system) in Brazil Midwest.

Material and Methods

The experiment was conducted in winter (july-september, 2013), at Embrapa Beef Cattle, Campo Grande-MS, Brazil (20°27'S, 54°37'W, 530 m asl). The experimental area, with 6 ha, consists of a integrated crop-livestock-forest system with Piatã grass (*Brachiaria brizantha* cv. BRS Piatã), and eucalyptus (*Eucalyptus grandis* x *urophylla*, clone H 13), 22x2 m (227 trees/ha), 26 m (height), pruned 6 m. It was determined hourly some microclimatic variables (dry and wet bulb air temperatures - Ta and Tbw, black globe temperature - Tbg, dew point temperature - Tdp, wind speed - ws and relative humidity - RU). It was also calculated the Black Globe Temperature and Humidity Index (BGHI) as Karvatte Junior (2014). It was calculated the analysis of variance and regression at 5% probability (SAS 9.0).

Results and Conclusions

Significant quadratic effects were found ($P < 0.05$) for local conditions and time. At 12.00 pm, in the sun, it was obtained the highest levels of Tbw (25,1°C), Tbg (38.5°C) and BGHI (89.0). The presence of trees resulted in a decrease of 8.2% on Tbw and 12.0% on Tbg, resulting in a lower value of BGHI (5.3%). Thus, the tree component (eucalyptus) is able to promote changes in the understory environment and to improve the welfare animal, by blocking of solar radiation. The integrated crop-livestock-forest systems are a good alternative for the thermal stress mitigation in tropical regions, like Brazil.

References cited

Karvatte Junior N (2014). Master's thesis. 81.

Acknowledgements

To Embrapa, CNPq, CAPES and Fundect.