Tropentag, September 17-19, 2018, Ghent

"Global food security and food safety:
The role of universities"

Evaluation of Microclimate in Different Integrated Systems

Fabiana V. Alves[1], Ariadne P. Mastelaro[2], Mariana Pereira[3], Genilson F. Costa[4], Geovani F. Alves[5], Pedro N.C. Amaral[4]

[1] *Embrapa Beef Catle, Research Group on Integrated Production Systems, Brazil*
[2] *University Federal of Paraná, Animal Science, Brazil*
[3] *University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Germany*
[4] *State University of Mato Grosso do Sul, Animal Science, Brazil*
[5] *Federal University of Mato Grosso do Sul, Brazil*

Abstract

The use of natural shade is one of the most efficient and economical practices to minimise the adverse effects of climate on animal production in the tropics. Therefore, production systems as integrated crop-livestock-forest (ICLF), with trees are so important. The objective of this study was to evaluate the microclimate and its effect on different arranges of integrated livestock systems. The experiment was carried out at the Boa Aguada farm at the Technological Reference Unit (TRU) of Embrapa Beef Cattle, located in Ribas do Rio Pardo-MS, Brazil, on final summer. The experimental design was completely randomised blocks, with four treatments and three replicates. The microclimate was evaluated in four systems: T1 - Traditional pasture (*Brachiaria brizantha*, cv. BRS Piatã); T2: Forest; T3: ICLF system with simple line tree (28×2 m); T4: ICLF system with triple line tree ($28 \times 3 \times 2$ m). The complexive area of each system is approximately 4 hectares. The tree component is Eucalyptus urograndis (I 144). Were determined the psychometric characteristics of the area: air temperature (Ta, °C), black globe temperature (Tbg, °C), wet bulb temperature (Tbw, °C), relative humidity (RH %) and wind speed (Sw, ms^{-1}) on three consecutive days, from 8:00 a. m. to 17:00 p. m. (local time, GMT -04:00). The mean height of the trees was measured. For all treatments, the temperature and humidity index (THI) index globe temperature and humidity (BGHI) and radiant thermal load (RTL) were calculated. Ta values ranged from 33 to 37, Tbg 34 to 41 °C, RH 54 to 55 % and Sw 0,66 to 0,80 m.s-1.$TheTHIvaluesrangedfrom84to87; BGHIfrom84to92; RTLfrom309to322RTLWm-2$. The mean height of the arborous component varied from 10 to 11 meters. The treatments with trees have the lowest values for all microclimate parameters. In tropics, pastures that contain trees promote better conditions of thermal comfort for livestock.

Keywords: Eucalyptus urograndis, integrated systems, shadow, sustainability, thermal comfort, welfare

Contact Address: Mariana Pereira, University of Hohenheim, Inst. of Agric. Sci. in the Tropics (Hans-Ruthenberg-Institute), Garbenstrasse 13, 70599 Stuttgart, Germany, e-mail: mariana.pereira@uni-hohenheim.de