

Aim

Silvopastoral systems are an alternative to monoculture system for improve the sustainable production of dairy systems in Colombia. These systems provide benefits for animals such as the availability of shade, greater diversity in food supply and environmental enrichment. The present study evaluated the thermal comfort of Holstein cows in silvopastoral (SSP) and monoculture (M) systems.

Methods

- Visits for eight months in four farms (two for each system) of the municipality of Saboyá within the department of Boyacá.
- At each visit, was used a compact infrared thermometer (Extech 42510A) to measure the hair coat temperature (HCT) of 10 animals per farm every 30 minutes for 5,5 hours per day (3520 observations)
- Environmental variables like relative humidity (HR) and temperature (ET) were recorded with an Extech Rht10 data logger.
- Temperature-humidity index (THI) = $0.8^{\circ} ET + ((HR / 100) * (ET - 14.3)) + 46.4$
- Data were analyzed using analysis of variance of time-repeated measures and Pearson correlations with the statistical software R.



Figure 1. SSP systems provided natural shade to animals, while in M systems always exposed to direct solar radiation.



Figure 2. In the monoculture systems the animals always exposed to direct solar radiation.

Results

The results of the environment variables are summarized in table 1, however in both systems the highest temperatures in the environment were recorded between 11 am and 1 pm (maximum 26.8 ° SSP and 37, 5 ° M).

Table 1: climatic differences between silvopastoral and traditional systems.

System	Environmental temperature (ET)	relative humidity (HR)	THI
Silvopastoral	20.4 (3.1) a	48.3 (10.07) a	65.3 (3.4) a
Monocultive	22.3 (2.7) a	47.0 (2.7) a	65.3 (3.2) a

The hair coat temperature showed statistical differences ($p < 0.05$) between M systems (34.7° SD 3.9) and SSP systems (32.3° SD 3.4).

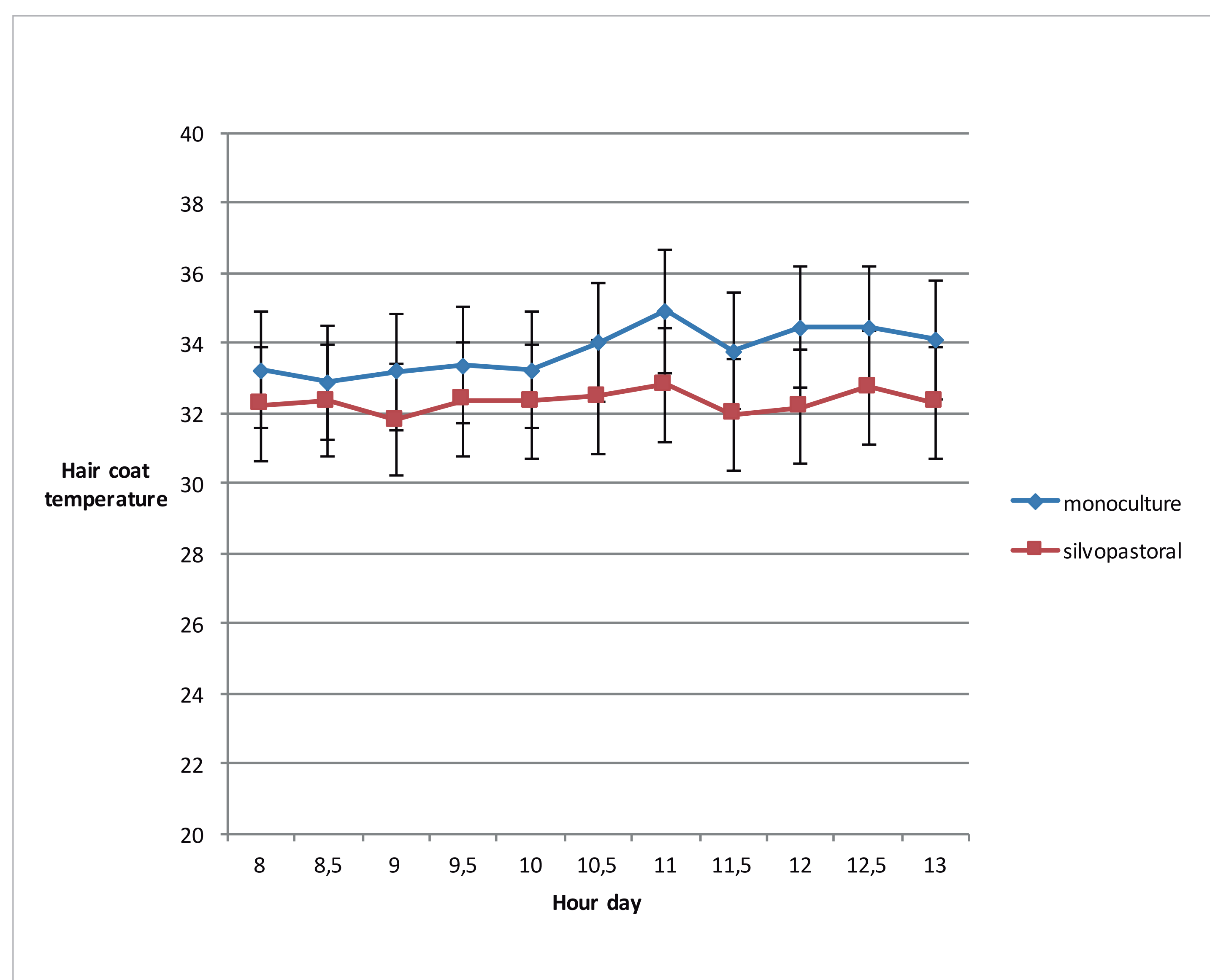


Figure 3. Fluctuations of hair coat temperature in the SSP and monoculture systems.

According to the ITH scale (Armstrong, J. Dairy. Sc.77, 1994) in the SSP 2.58% (mean 73,7 THI SSP) of the animals are at risk of moderate caloric stress and in the T 3.55% (mean 76.5 THI M) of the animals ($p < 0, 05$).

Conclusions

- These results demonstrate a greater thermal comfort in the SSP systems compared to the M systems
- It is suggested to carry out studies that relate the thermal comfort and its contribution to the sustainability of these systems.

