

Thermal environment and daily patterns shaping water intake of Caracu young bulls in a tropical region

Graziela Z. Sussai^{*,1}, Karolini T. De-Sousa¹, Gustavo H. C. Borges¹, Viviane A. Ligorí¹, Rogério R. Vicentini¹, Lenira El Faro¹

^{*} Presenting author, ¹Instituto de Zootecnia – São Paulo State, Brazil
Contact emails: karoltenffen10@hotmail.com, grazizaca@gmail.com

INTRODUCTION & AIM



Supports physiological processes → **Thermoregulation**

- Animal intrinsic factors → body size, breed
- Environmental factors → temperature, relative humidity, solar radiation

🎯 If water intake is affected by:

- 🌡️ Thermal environment → BGHI
- 🐄 Body weight
- 🕒 Hours of the day

METHOD

- **Feed Efficiency Test**
 - 68 days
 - June – September 2024 - Brazil
- 🐄 **46 animals**
 - 267 ± 30 days old
 - 226 ± 35 kg
- **Intergado® eletronic water troughs**
 - Hourly individual water intake (L)
 - Daily body weight (kg)
- **NASA-POWER**
 - Hourly environmental data
- 3-hour moving average of Black Globe-Humidity Index (BGHI)
- **Analysis**
 - **Generalized Additive Mixed Model (GAMM) → REML**
 - smooth terms for **BGHI** and **BW**
 - **hour** (24h) as a **fixed effect**
 - **random** intercept for **animal**

RESULTS & DISCUSSION

- 🌡️ **BGHI** had a non-linear effect ($p < 0.05$)
- two inflection points (71 and 76.7)
- ≤ 71 water intake increased (+0.105L/ BGHI unit)
- 71.1 - 76.7 there was a reduction (-0.041L/ BGHI unit)
- >76.7 intake increased again (+0.0128 L/ BGHI unit)

☀️ **Diurnal** pattern in water intake

- Low consumption during the night and early morning (hours 0-4)
- Intake **rose** around **5h** (+0.43 L; $p = 0.018$)
- **Highest** levels **8h-11h** (+1.6 to +2.1 L; $p < 0.001$)

🌤️ **Afternoon** pattern in water intake

- consumption **gradually declined** and returned to **baseline** 12h-17h; $p < 0.01$)

🌙 **Night** - secondary increase occurred at **22h** (+0.27L; $p = 0.045$)

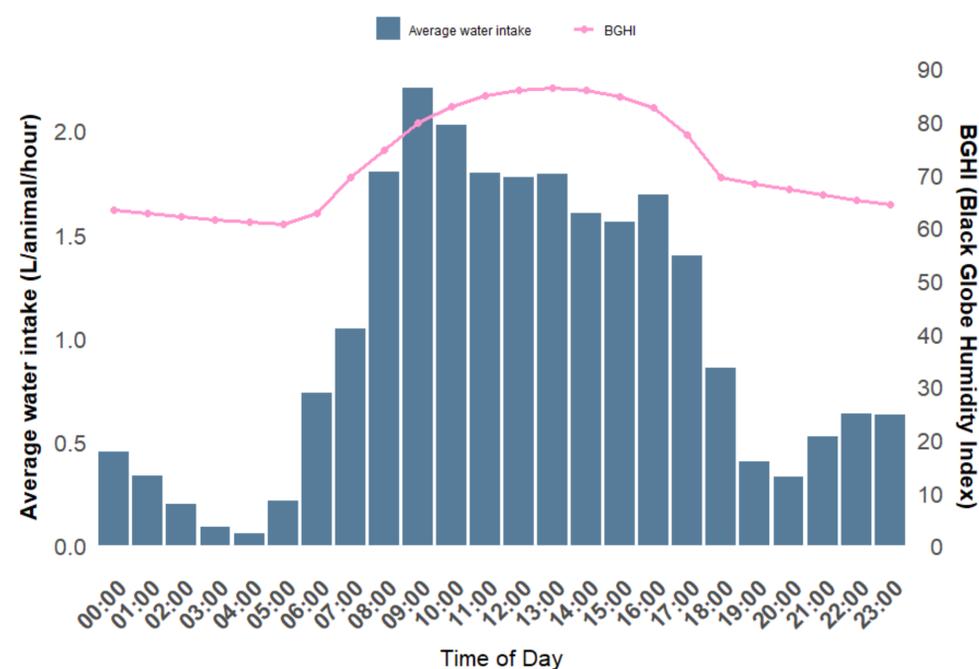


Figure 1. Hourly patterns (24h) of average water intake (L/animal/hour) and Black Globe Humidity Index (BGHI) during a Feed Efficiency Test. Bars represent water consumption (L/animal/hour), and the line indicates environmental thermal conditions (BGHI).

🐄 Body weight → water intake ($p < 0.001$)
+ 1 kg → + 0.018 L

CONCLUSION

- **Thermal environment drives water intake**
- Although individual increases may seem small, when multiplied across many animals over several days under heat stress, they can reduce water-use efficiency in the system
- This reinforces the need for management practices that reduce heat load and ensure adequate water availability in tropical production systems.

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