

Evaluation of dairy heifers' drinking dynamics in agrivoltaic systems in a tropical region

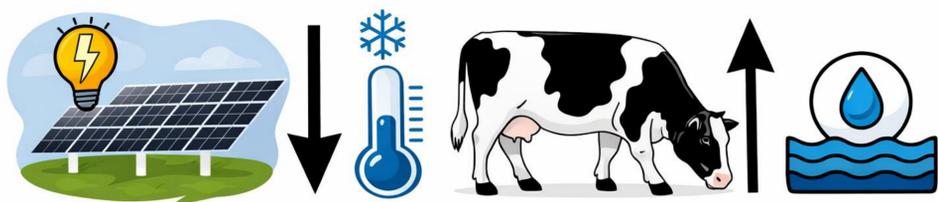
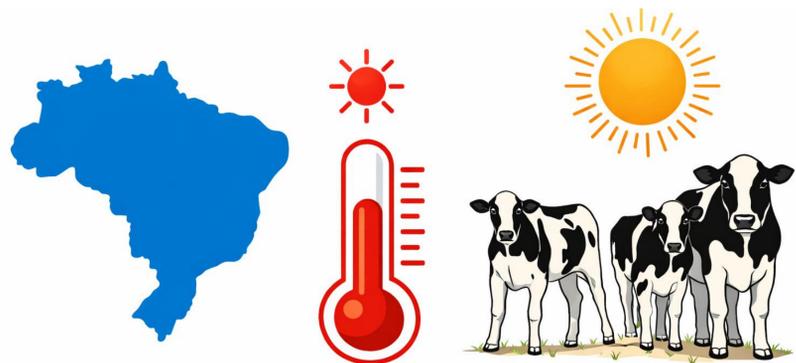
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INTRODUCTION & AIM



METHOD

The experiment during 12 consecutive days at FMVZ/Unesp–Botucatu, São Paulo State, Brazil. Visits to the water trough of 21 dairy heifers (550 ± 55 days old; 247 ± 37 kg, mean ± SD) were registered continuously from 9 h to 16 h. The heifers were divided into three groups (7 heifers/group):



Figure 1. Image of the agrivoltaic systems area (AGRlhor and AGRliver).



Figure 2. Agrivoltaic system with horizontally positioned photovoltaic panels (AGRlhor).



Figure 3. Agrivoltaic system with vertically positioned photovoltaic panels (AGRliver).

Table 1. Characteristics of shaded area of pasture systems.

Pasture system	Shaded area	Measure
AGRliver	Compact and wider	12 m long x 2 m wide
AGRlhor	Narrow and longer	24 m long and 1 m wide
OPS	No shading structure	-

Position of the Photovoltaic Panels



East-west orientation and facing north



Fixed height of 2.30 m and an inclination of 10°, providing 24 m² of useful shading area.



Side by side (without spacing) in the center of each paddock

RESULTS

There was no effect ($p > 0.05$) of agrivoltaic systems in relation to OPS. However, a difference was found between agrivoltaic systems ($p = 0.02$).

The AGRlhor had, on average, 23% more events of water intake than AGRliver. Additionally, there was an interaction ($p < 0.05$) between treatment and hours.

The number of water intake events decreased progressively over the observation hours, with a decrease of 22% to 42% compared to the beginning of the observation. The highest number of water intake events (196) was recorded in the first hour of observation (9 h–9:59 h), while the lowest number of events (94) occurred between 12 h and 12:59 h.

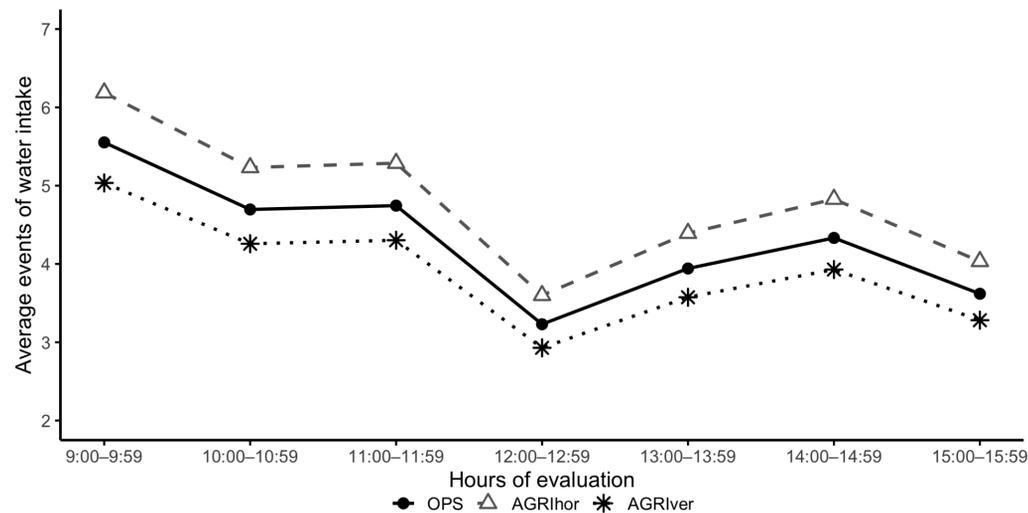


Figure 4. Average events of water intake (N of events/ group/ hour) during hours of evaluation (9h – 15:59h) by pasture system. OPS: open pasture; AGRlhor: agrivoltaic system with horizontally arranged photovoltaic panels, and AGRliver: agrivoltaic system with vertically positioned panels.

CONCLUSION

The arrangement of the agrivoltaic system influenced the heifers' water intake behavior, indicating that the shading generated by agrivoltaic systems, especially in the horizontal configuration, can modify the behavioral dynamics of heifers in tropical conditions.

ACKNOWLEDGEMENTS