



Heat production of primiparous Holstein cows with different feeding strategies during early lactation.

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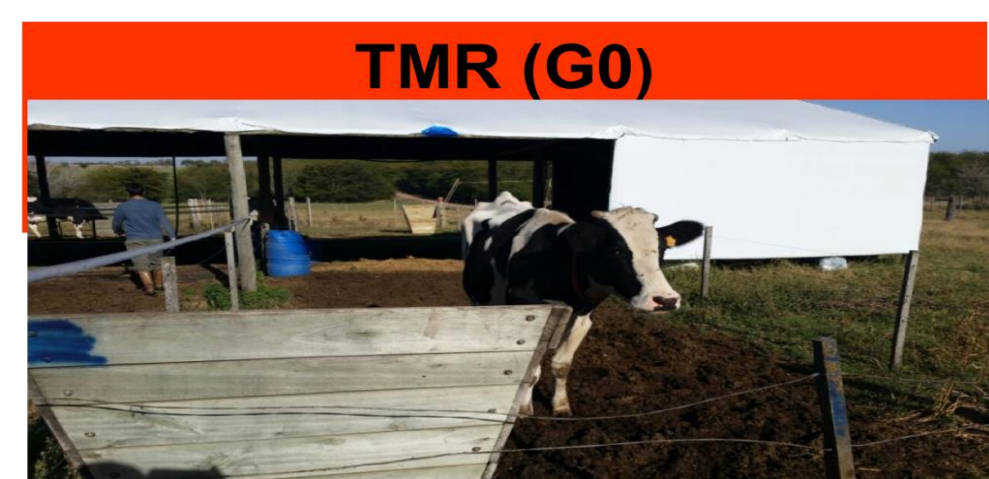
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Introduction:

- Uruguayan dairy is based on mixed (grazing + supplementation) production systems as they are economically attractive and friendly to the environment and animal comfort.
- International research showed that requirement of metabolizable energy (ME) for dairy cows is underestimated in grazing cows (Gruber L.A et al. 2007)

Materials and methods

- 18 primiparous Holstein cows (528 ± 40 BW; 3.2 ± 0.2 BCS, fall calving) were used in a randomized block design with 2 treatments (from calving until 60 days postpartum, DPP):



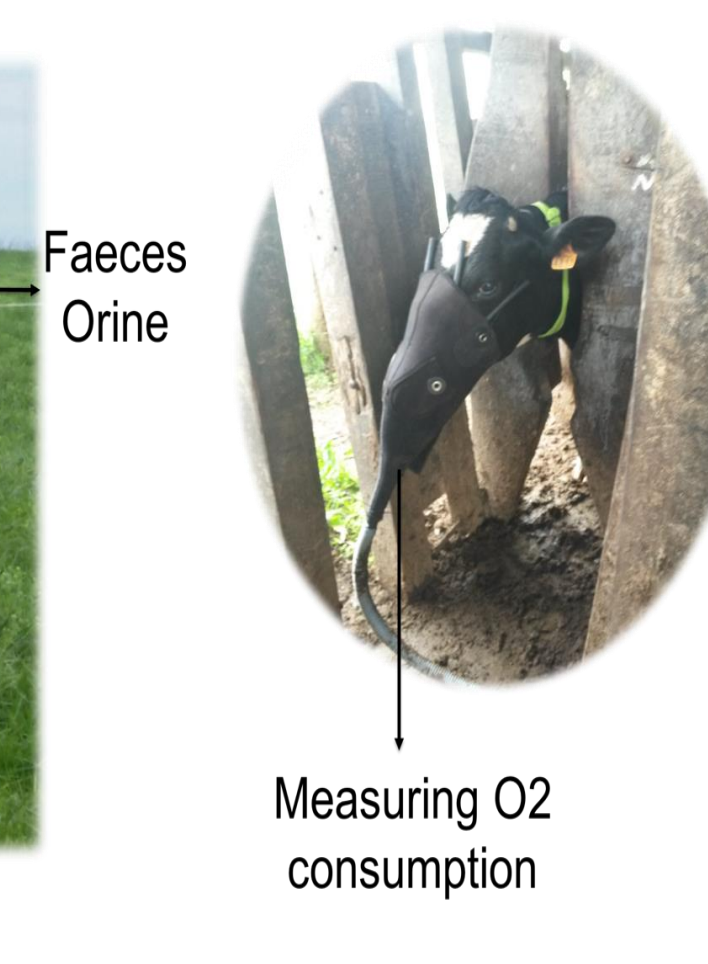
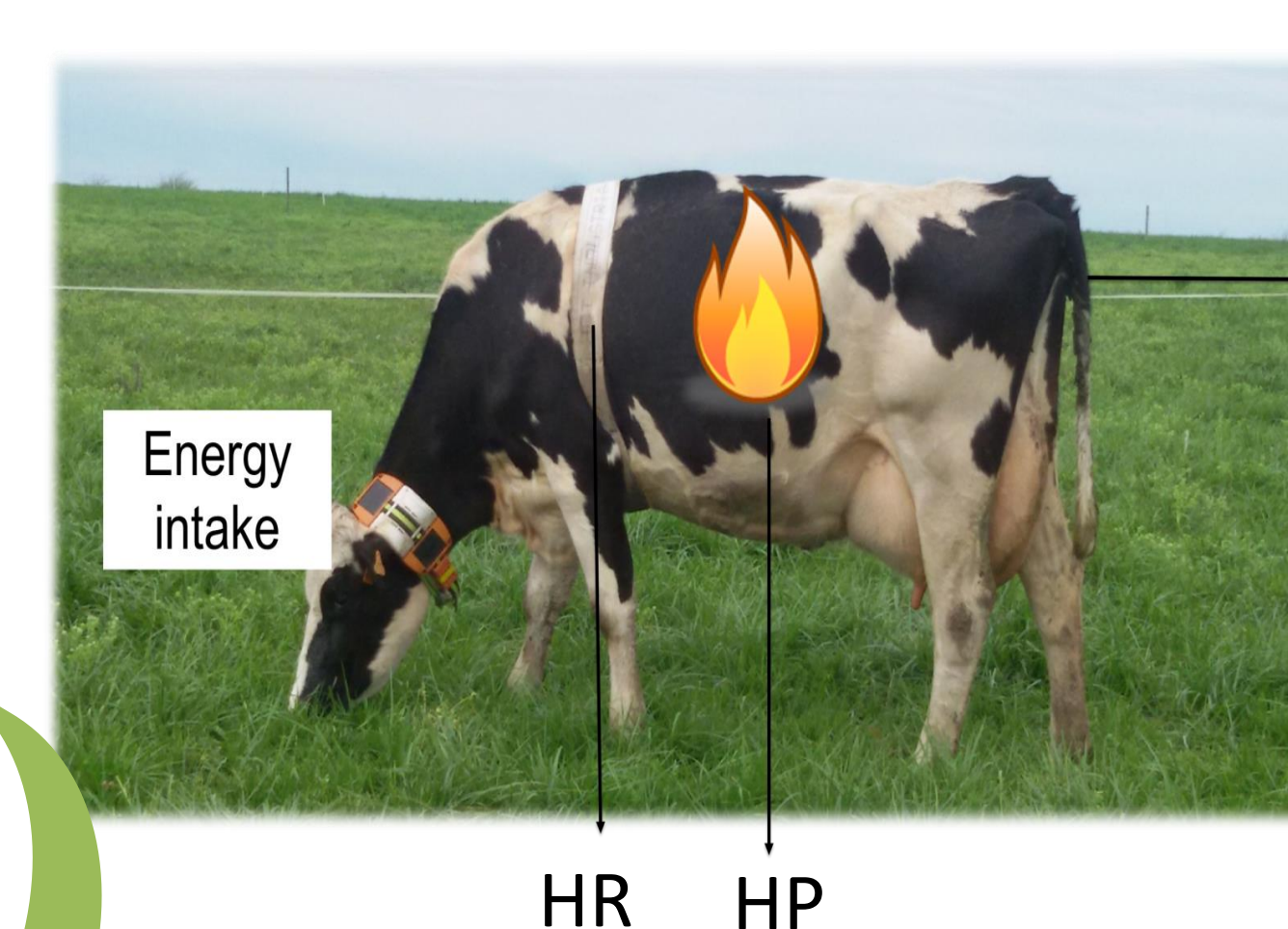
TMR (G0)
100 % TMR *ad libitum*
17 kg DM day⁻¹ offered
70% forage, 30% concentrate



PASTURE + PMR (G1)
Grazing in 3-day strips of lucern for 6 h day⁻¹ with 20 kg DM day⁻¹.cow + PMR (70% of *ad libitum* TMR)

- Cows were milked twice a day allowing 2.2 kgDM/day of a commercial concentrate.
- Measurements:
 - Milk production and composition were recorded daily and weekly.
 - Heart Rate (HR) each 5 sec. using HR monitors during 4 consecutive days (at 45 ± 5 PPD).
 - Oxygen consumption per heart beat was determined for each cow.
 - Heat production was calculated by multiplying the recorded HR by the oxygen consumption per heart beat (the O₂ pulse) and by the constant value of 20.47 kJ/L of O₂ consumed (Nicol and Young, 1990)
 - Data were analyzed as repeated measures in a mixed model including treatment (T), hour of the day (h) and their interaction as fixed effect, block as random effect and calving data as covariate

Objective: To estimate heat production in dairy cows with different feeding strategies (total mixed diet, TMR vs. grazing + partial mixed diet, PMR) in early lactation



RESULTS

- Milk energy output tended ($p=0.07$) to be greater for G0 than G1 cows (20.9 vs. 19.2 ± 0.57 Mcal ENL/d).
- Cow BW and BCS did not differ ($p>0.30$) between treatments.

Heart rate (beat/min)

G0 = 86.2 vs
G1 = 90.3 ± 2.3

Heat production
(kJ/ kgPV^{0.75}/d)
G0 = 857 vs.
G1 = 899 ± 41

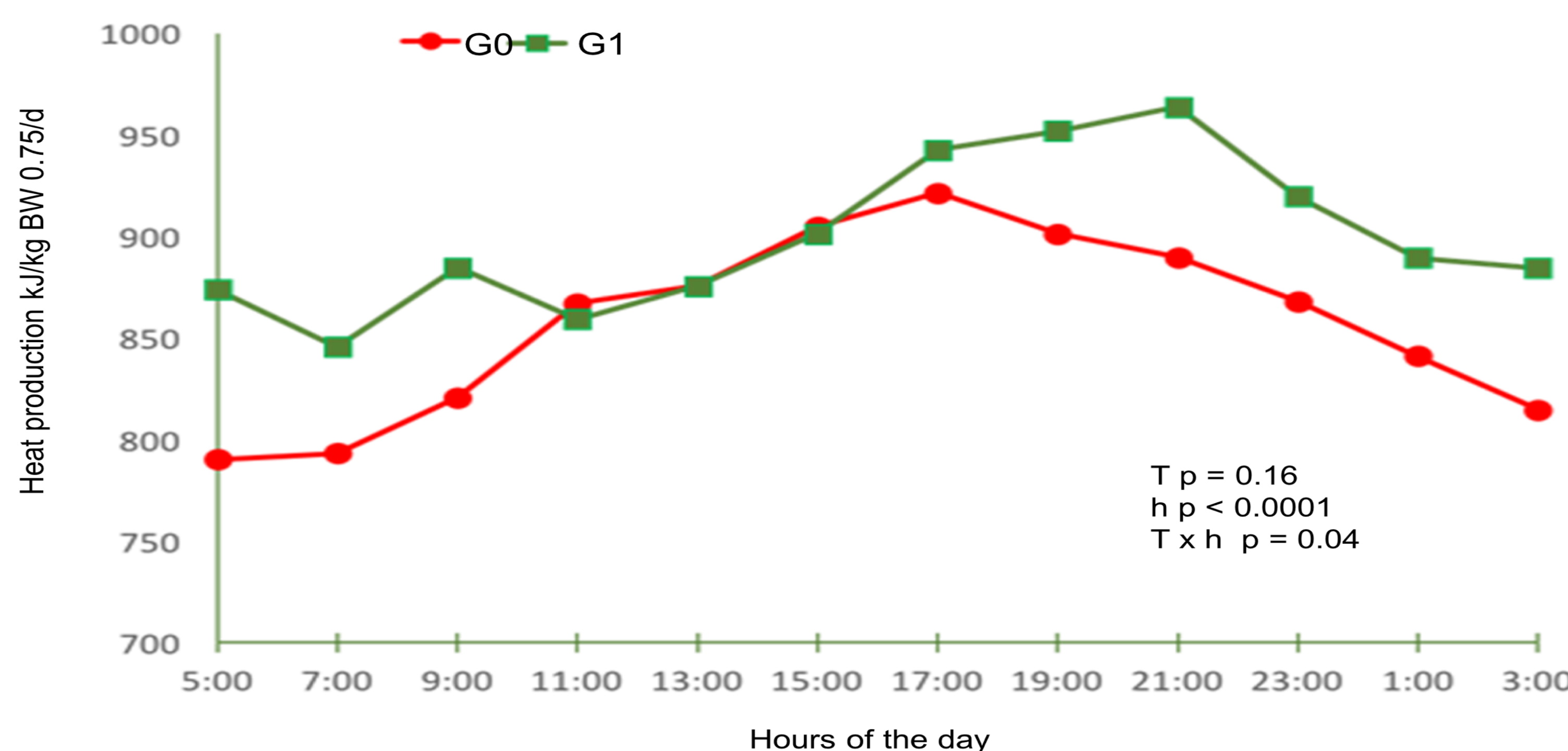


Figure 1. Heat production along the day of cows fed TMR (G0), or grazing + PMR (G1) in early lactation.

- Heart rate and heat production reached the minimum values early in the morning, increased throughout the day and decreased markedly after 19:30h (evening)
- However, minimum values were reached earlier and maximum values later in G0 than G1 (at 5:30 vs. 7:30 h and 16:30 and 18:30 h)
- In addition, HR was greater between 3:30 and 5:30 h and at 9:30 h in G1 than G0 cows

Conclusions

- These results suggest that regardless of the nutritional treatment, both walking and eating activities increased HR and heat production.
- Differences between treatments along the day would probably reflect different time allocation for eating activity.

