

Use of an Automated Behavior Monitoring System for heat stress to check and optimize cooling strategies

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INTRODUCTION

Heat stress in dairy cows can have detrimental effects on milk production and reproduction, but also in the colostrum quality and the future calf born penalizing its body weight, survival rate and milk production (Dahl y col., 2020; Dahl, 2018; Tao y Dahl, 2013). Traditional indicators like the temperature-humidity index (THI) provide an estimate of potential stress but fail to measure the actual impact on the animals. To address this, the study utilized an automated behavior monitoring system (SenseHub™ Dairy, MSD Animal Health), which records panting, a direct indicator of heat stress (Ramón et al., 2021; Bar y col., 2018; Dahl, 2018), along with intake and rumination data.

OBJECTIVE

The objectives of this work were to evaluate the impact of heat stress on cows in different production phases and assess the effectiveness of cooling strategies such as showers.

MATERIALS AND METHODS

- ▶ A total of 77 cows from various production cycles, including end of lactation (less than 73 days to dry off), dry cows, prepartum cows, and postpartum cows, were monitored using a behavior monitoring neck sensor (SenseHub™ Monitoring Neck Tag, MSD Animal Health).
- ▶ Information on panting, eating, and rumination behaviors was collected from June to December 2022 over 24 hours, as well as daily and monthly averages.
- ▶ For lactating cows, two cooling strategies were compared:
 - ▶ 2 hours per day in three sessions (group 16) in the waiting room of the milking parlor vs 4 hours per day in six sessions (group 17) 3 in the waiting room of the milking parlor and 3 in cooling rooms.
 - ▶ Dry and postpartum cows received 4 hours of cooling per day in six sessions in cooling rooms.

Heat stress monitoring proved to be a valuable real time tool to evaluate the impact on the cow and the results of cooling. Moreover, it gives objective insights to improve future cooling strategies.

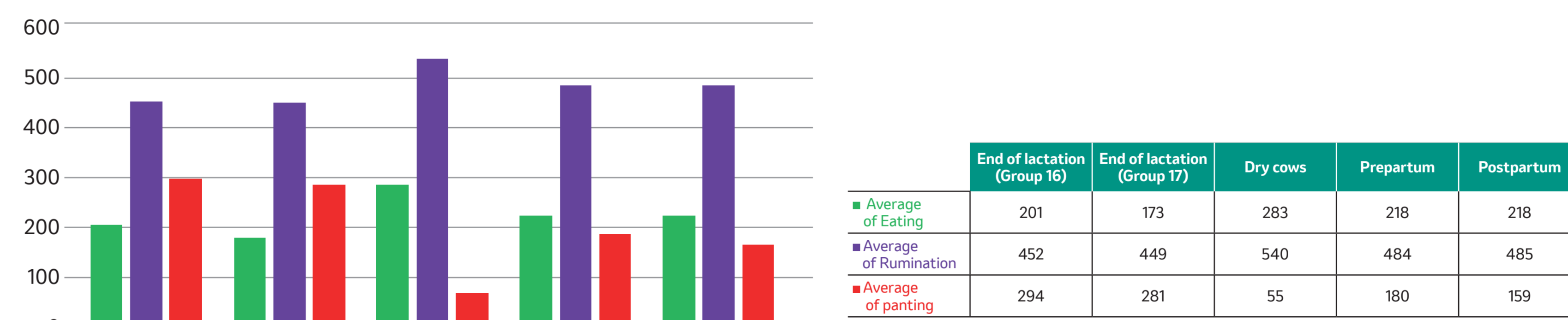


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RESULTS

- ▶ The results showed that lactating cows at the end of lactation experienced the highest impact of heat stress, followed by postpartum and in a lesser extent by the dry cows.
- ▶ Moreover, an inverse correlation of panting with both, eating and rumination activity behavior, was found.

FIGURE 1. Daily minutes dedicated to the different behaviours (eating, rumination and panting) in the different study Group cows

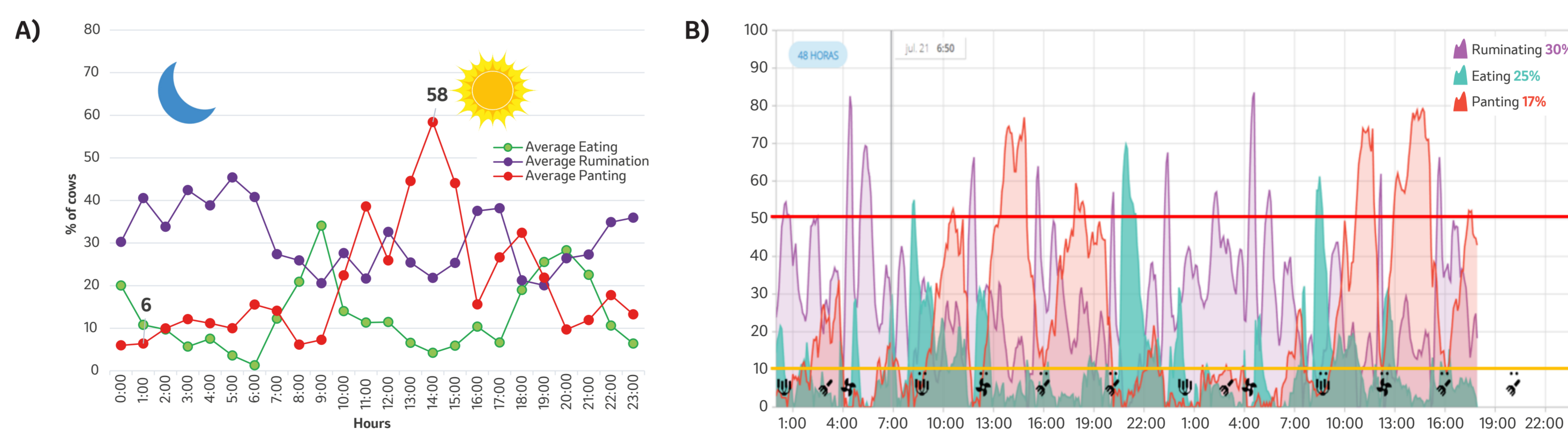


RESULTS

The 24 hours monitoring revealed:

1. A significant difference between day and night impact, with a peak of 58% of cows panting in the middle of the day (14pm) and 6% of minimum at night (1am). Panting correlated inversely with eating and rumination behaviors, indicating the severity of heat stress.
2. There is a clear beneficial effect of cooling on heat stress. However, its impact was much greater in the daytime period compared with the night. In both periods the cooling effect was relatively short, lasting around 1.5 hours.

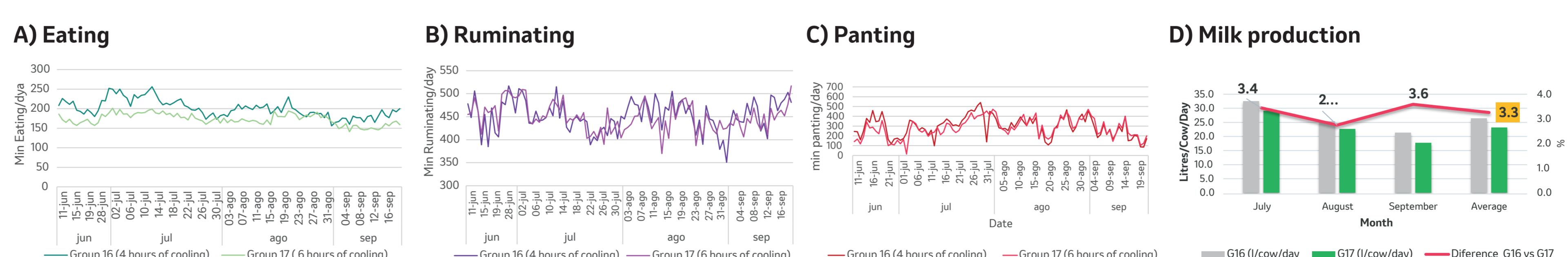
FIGURE 2. Example of 24 hours follow with the percentage of Group 17 cows (end of lactation with 4h of cooling) showing the different behaviours: eating, ruminating and panting: A) Daily average through summer time; B) Example of SenseHub™ Dairy graphic.



RESULTS

3. When comparing the two cooling strategies in the cows at the end of lactation, an unexpected higher ingestion and rumination was found in the 2 hours of cooling per day group (1.51 ± 0.39 and 1.04 ± 0.58 minutes more, respectively). Moreover, a higher average production of 3.3 l/cow/day was identified. Then, the additional movement for cooling looks to be not beneficial for this cows

FIGURE 3. Comparison of average time (minutes per day) dedicated to the different behaviours (A: eating, B: ruminating and C: panting) and D: milk production; comparing the cows at end of lactation with different cooling strategies: 4 hours vs 6 hours.



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