

Does a new water-cooled cubicle mattress used in summer in early lactating dairy cows affect cow behaviour and decrease lameness incidence? A clinical randomized trial

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Objectives

To assess if a new heat abatement system – a water-cooled cubicle mattress – used in hot periods could decrease lameness incidence in peak to mid lactation, assuming the cows on water-cooled cubicle mattress would spend less time standing and more time feeding in early lactation.

Materials and methods

A randomized clinical trial was implemented on a commercial dairy farm of Western France from 14 June to 31 December 2021. A competent ethics committee had approved the experiment (authorization # CERVO-2021-14). At calving, cattle were randomly allocated to one of two adjacent barns, equipped with either a conventional cubicle mattress (Louisiane mattress; Bioret-Agri, France) or a cubicle waterbed (Aquaclim; Bioret-Agri, France). The cows were moved to another barn at around 150 days).

The temperature-humidity index (THI) was calculated from the climatic parameters of the barns (air temperature, relative humidity) recorded every 15 minutes. The behaviour of the cows was continuously monitored using computer vision (AIherd; France). In addition, daily rumination and ingestion time were recorded by a neck collar comprising a tri-axis accelerometer and microphonic sensors (Lely Qwes HR; Lely France). All treatments were registered by the farmer. Cows' feet were trimmed by an expert hoof-trimmer at the beginning and end of the trial. Gait was scored by two of four trained observers every fortnight.

A slightly hot day was considered as a day with a THI >68 occurring between 3 and 12 h, a moderately hot day as a day with more than 12 h with a THI >68 but less than 12 h with a THI >72, and a very hot day with more than 12 h with a THI >72. Average daily standing, feeding, ingestion and rumination times, as well as cow comfort indices (CCI: proportion of cows touching a stall that are lying down; SUI: proportion of cows that are in the pen, not feeding, and that are lying down in the stalls; SSI: proportion of cows touching a stall that were standing with all 4 feet on the stall platform or perching with the front 2 feet in the stall and the rear 2 feet in the alley), were analysed by linear regression analysis taking into account intervention group (Louisiane vs. Aquaclim), cow characteristics, treatments and THI indices as covariates. The incidence of lameness was analysed by Cox proportional hazards regression models, controlling for intervention group, cow characteristics and THI indices as covariates.

Results

At the start of the trial, cows were mainly affected by digital dermatitis, with a significantly higher proportion of cows with active lesions in the intervention group (28/44 vs 42/51 cows with a least one M1 or M2 lesion in the control and intervention groups, respectively; $p = 0.04$).

Between June 14 and September 30, 102 days were slightly hot, 26 moderately hot and 16 very hot. 83 cows calved during this period. In their first 30 DIM, on median 6 days were considered as slightly hot (min – max: 0 – 12 days), 1 day moderately hot (min – max: 0 – 7 days) and 0 days very hot (min – max: 0 – 5 days).

Of the 58 cows that were sound at their first post-calving assessment (32 and 26 in the control and intervention groups, respectively), 41 developed lameness before 150 DIM (75% and 65% in the control and intervention groups, respectively; $p = 0.42$), at a mean of 68 DIM (69 and 68 DIM in the control and intervention group, respectively; $p = 0.83$).

No statistically significant difference could be demonstrated in the survival analyses between the two groups for the incidence of lameness. There was only a trend towards an increased risk of becoming lame with at least on day with a maximum THI >72 between 2 and 14 DIM ($p = 0.09$) or with at least 3 moderately or very hot days between 2 and 14 DIM ($p = 0.07$).

Results on behaviours were not available at the time of writing.

Conclusions

Water-cooled cubicle mattress used in summer could be interesting to decrease lameness in fall, but this could not be demonstrated in this study. Further studies with a larger sample size and in herds more prone to claw lesions are needed to draw a firm conclusion.

Results on cow behaviour are still pending.