

The negative effect of heat load on the intercalving length in Italian Holstein cows

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In the era of climate change, the frequency of heatwaves is rising, becoming a chronic stressor for cattle. High-producing dairy cows struggle to dissipate heat due to their high metabolic activity, putting them at significant risk of heat stress (HS), which negatively impacts fertility by impairing heat detection, oocyte and embryo development, implantation, and the uterine environment. In this study, we evaluated if intercalving length (IC, d) was affected by season at calving (S-c) and season at insemination (S-i). Data referred to 66,686 lactations of 11,585 Holstein cows in 162 Italian commercial farms in the period 2012-2019. IC was calculated as a difference between two consecutive calving dates from 1st up to 4th calving. The minimum value was set at 280 d and the maximum at the 99th percentile, i.e. 723 (1st to 2nd calving), 705 (2nd to 3rd calving), and 693 d (3rd to 4th calving). Two analyses of variance were carried out separately: one with S-c as fixed effect and one with S-i. Other fixed effects were parity and herd-year, while cow (repeated data) and residual were the random terms. Although we had no information regarding farm-specific THI and heat mitigation strategies, weather stations located in the studied area revealed that THI peaked in Jul. and that days with THI > 70 (threshold conventionally considered as dangerous for cows) were mostly frequent in Jul. and Aug. Least square means revealed that, when conception occurred in summer, IC (419 d) was 21 d longer compared to spring (398 d) and, in any case, significantly higher ( $P < 0.001$ ) than autumn and winter too. Least square means of S-i confirmed the pattern: IC was the greatest (419 d;  $P < 0.001$ ) in spring-calving cows, which are those inseminated in summer. Regardless of the parity, HS had a significant impact on the cow's reproductive sphere, with delay in conception causing direct and indirect losses and being an evident cost for the farmer.