Heat load at birth has a carryover effect on Holstein heifers' age at first calving

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Heat stress (HS) occurs when cows do not manage dissipate excess body heat, leading to behavioral changes, elevated heart and breath rate, and reduced milk production in lactating cows. HS also impacts fertility, causing issues with estrus detection, oocyte quality, implantation, embryo development, and fetal development, particularly in the final weeks of pregnancy. Specifically, HS in utero during the last three weeks of gestation results in lighter calves at birth, which may affect survival in the first days of life, growth and performance as heifers. This study aimed to detect whether HS affects age at first calving (AFC) in Holstein heifers born in summer. The AFC in 750 Holstein heifers born between Jul. and Aug. from 2012 to 2015 and reared in 125 farms of the Po Valley in Italy, were identified. Each farm was located nearby, a weather station (12 in total in this study), that measured temperature and humidity on hour basis which were used to calculate the temperature-humidity index (THI). An analysis of variance was performed to investigate the differences between two extreme situations: 'cold group' (332 heifers with THI <=68 on the birth date) and 'hot group' (468 heifers with THI >=75 on the birth date). The fixed effects were the two THI group and the year of birth of the heifers, while the random effect was the farm.

The least square means ($P<0.05$) showed that heifers born under high HS conditions reached AFC two weeks later (830 d) than those in the 'cold group' (816 d). Although the least square means demonstrated that HS at birth causes a delay in AFC still it should be considered that cows born in summer tend to be inseminated approximately 15-18 months later, i.e. during winter (no HS), in the optimal fertility period. This, coupled with the fact that heifers recover, explains why HS at birth of future heifers has just a small impact on the AFC. Heifers born during hot periods would be inseminated in autumn when photoperiod is optimal and THI levels in the Po Valley is rather below the critical threshold.