Heat stress compromises the thermal environment of different portions of the genital tract in the cow

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During summer, the cow is 3.7 times more likely to lose embryo in comparison to winter. The present study aimed to investigate the effect of heat stress on the thermal environment of different portions of the female genital tract in comparison to winter and spring. Three non-pregnant Japanese Black cows were investigated using a digital thermometer with special design to record the temperature of vagina (VT), cervix (CT), uterine body (UBT) and uterine horns (UHT) on D0 (D0 = heat), 1, 2, 3 and 8 of the estrous cycle (between 0630–0800 h), D0 and D8 was selected to represent the day of artificial insemination (AI) and embryo transfer (ET), respectively, under field condition. Moreover, D1, 2 and 3 were selected to represent the process of fertilization and early embryogenesis. During the experiment, temperature humidity index (THI) was recorded. This experimental design was carried out in winter, spring and summer in Miyazaki, Japan. The THI in summer was higher than the alert THI (i.e. THI > 74), indicating heat stress and was significantly higher (P < 0.001) than winter and spring (78.45 ± 0.32 vs. 60.26 ± 1.20 and 68.51 ± 0.80, respectively). The VT, CT, UBT and UHT were significantly (P < 0.001) elevated during summer in comparison to winter and spring. Moreover, THI was positively correlated (P < 0.001) with VT, CT, UBT and UHT. Based on this correlation, we developed a mathematical model to predict the temperature of different portions of the female genital tract based on THI. In conclusion, heat stress compromises the thermal environment of different portions of the female genital tract which could passively affect gametes and/or embryo with subsequent reduction of pregnancy rate in the cow.