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**The influence of thermal stress on the fertility of honey bee drones**

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**Abstract:**

**Background/Objective:** Climate change causes heat waves which are recorded in several areas of the globe. Although the honeybee colony stabilizes climatic conditions under which immature stages develop, research shows that extreme weather can lead to fluctuations of internal temperature in the nets, also near the brood. The present study aimed to determine the effect of a short-term, field-realistic thermal shock at the pupal stage on the fertility of adult drones.

**Methods:** Fractions of the drone combs were placed for 3h in an incubator with the appropriate temperature set. When drones reached sexual maturity the viability of stressed and unstressed drones was compared by double fluorescent staining (Hoechst 33342/PI). The motility was measured quantitatively, using a protocol validated against direct fertility indicators. Additionally, queen fertility after insemination with semen from the experimental drones and the ability of semen to migrate to the spermatheca were checked.

**Results:** The obtained results indicate that the thermal stress occurring during the development of drone brood may affect the semen quality in adult drones. Reduced sperm viability and motility were measured in drones from the experimental group. Also, a decreased number of spermatozoa in the spermatheca of queens inseminated with semen was observed. The research suggests that the insemination of queens with the semen of experimental drones results in a lower egg hatching.

**Conclusion:** Results shows that changes in environmental factors can generate problems in honeybee reproduction.

**Keywords:** heat stress, drones, semen quality

This research was funded in whole by National Science Centre, Poland, nr.2021/05/X/NZ9/01397. This study was conducted by the Animal Science for Future (ASc4Future) research group.