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DNA fragmentation in oocytes of Holstein x Gyr cows supplemented with organic chromium under heat stress in climatic chamber

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Heat stress may cause reversible or irreversible cellular damage, causing an adaptive response or cell death. Considering that apoptosis is important for the reduction of number of oocytes in mammals, it is possible that it plays an essential role in oocytes exposed to heat stress conditions (Paula-Lopes et al., Animal Reproduction,9:395-403, 2012). It is observed that cows under heat stress have higher peripheral glucose metabolism, a strategy for greater heat dissipation. Chromium enhances the function of insulin, acting as a cofactor and increasing its efficiency, aiding in the absorption of glucose by the cells, including the reproductive tract. The present study aimed to evaluate the DNA fragmentation of oocytes from Holstein x Gyr dairy cows submitted to heat stress in climatic chamber supplemented with organic chromium in the diet. It was used thirty-six ¾ Holstein x Gyr cows, average 113 days in milk, in a 2 x 3 factorial design, two diets (control and diet with 0.08 mg Cr/kg metabolic weight) and three environmental conditions: heat stress in climatic chamber - temperature and humidity index (THI) 85 for eight hours daily, thermoneutral environment in free stall - THI 68 feeding *ad libitum* and pair-fed group in same thermoneutral environment, totaling 6 contemporaneous groups with 6 animals each. The cows were submitted to OPU while all the animals were in thermoneutral environment (first collection) and after three days of being distributed under the three environmental conditions (second collection). The viable oocytes were matured *in vitro* and the "terminal deoxynucleotidyl transferase-mediated dUTP nick and labeling" (TUNEL) test was performed to determine DNA fragmentation, in which, TUNEL-positive: cells with DNA fragmentation; TUNEL-negative: cells without DNA fragmentation. Fisher's exact test was used to evaluate the categorical variable and the significance level was $P<0.05$. In the pre-heat stress collection, 40.51% (n=32) of oocytes were TUNEL-positive while 59.49% (n=47) were TUNEL-positive in the second collection ($P<0.05$). Evaluating only the second time of collection, which was caused the heat stress in a group in the climatic chamber, there was no difference between the different environments or between diets offered ($P>0.05$). However, comparing the diets offered in the two moments of collection, the cows that were fed with diet supplemented with organic chromium presented no difference in the percentage of DNA fragmentation: 43.18% (n=19) in first collection and 56.82% (n=25) in second collection ($P>0.05$). While those fed with control diet presented 37.14% (n=13) of TUNEL-positive oocytes in first collection and 62.38% (n=22) of TUNEL-positive oocytes in the second collection ($P<0.05$). Although there was no difference between the environments in the second collection, the dietary supplementation of organic chromium is a promising management in promoting provide protection against genetic material damage in dairy cows.