

**Molecular Genetic Response to Heat Stress in
Cows (*Bos taurus*) and River Buffalo (*Bubalus
bubalis bubalis*) in Egypt**

Presented by

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ABSTRACT

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Title of the thesis: Molecular Genetic Response to Heat Stress in Cows (*Bos taurus*) and River Buffalo (*Bubalus bubalis bubalis*) in Egypt.

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The aim of the present work was to Study the effect of heat stress on the ovarian intra-follicular microenvironment of the Egyptian cattle "*Bos taurus*" and buffalo "*Bubalus bubalis bubalis*" as a key stone into the reproduction process.

Follicular fluid samples were collected by aspiration from medium sized ovarian follicles of Egyptian cattle "*Bos taurus*" and buffalo "*Bubalus bubalis bubalis*" during spring and summer seasons. Part of the follicular fluid samples were searched for oocytes and another part was stored at -80°C for hormonal and gene expression analysis. The picked up oocytes were examined under stereomicroscope and divided according to their morphological state into four classes: A (excellent), B (good), C (fair) and D (poor). Total oocytes recovery rates were recorded as well as the percentages of each class. Oocytes of classes A and B were used for IVM and IVF, the oocytes maturation, fertilization, cleavage, morulae and blastocyst formation rates were recorded and data were statistically analyzed using ANOVA. The hormonal levels of progesterone and 17β-estradiol were estimated by the ELISA technique and statistically analyzed using student's t-test. The changes in mRNA expression levels of the FST, INHBA and ESR2 genes were determined using real-time PCR, the data were analyzed using the $2^{-\Delta\Delta ct}$ method and statistical significance was evaluated using the student's t-test. The data showed a lower oocytes yield and a significant decrease ($P<0.05$ for cattle and $P<0.01$ for buffalo) of oocytes's quality in heat stressed animals as well as a significant ($P<0.05$) lower IVM rates, progesterone and 17β-estradiol levels were also significantly decreased ($P<0.01$) during the hot season. As for the gene expression levels, FST gene was significantly up-regulated ($P<0.01$) in heat stressed animals and ESR2 was significantly down-regulated ($P<0.01$ for cattle and <0.05 for buffalo), the INHBA gene was significantly down-regulated ($P<0.05$) in heat stressed buffalo but surprisingly up-regulated ($P<0.01$) in cattle. In general, the data concerning cattle showed a better response to heat stress compared to that of buffalo.

Key words: Heat stress, cattle, buffalo, IVF, FST, INHBA, ESR2,