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## Veterinari Medicina

The effect of high temperature on swine ovarian function *in vitro*

Sirotkin AV, Kacaniova M:

Veterinari Medicina, 55 (2010): 377-382

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The aim of the present study was to understand the hormonal mechanisms behind the effect of high temperatures on reproductive function. It was proposed that high temperatures can directly alter production of ovarian hormones and/or the response of ovarian cells to hormonal stimulators. To examine this hypothesis, in the 1st series of experiments, we compared the release of progesterone ( $P_4$ ), estradiol ( $E_2$ ) and expression of the leptin gene in whole ovarian follicles cultured in conditions of normal ( $37.5^\circ\text{C}$ ) and high ( $41.5^\circ\text{C}$ ) temperatures. In the 2nd series of experiments, we examined the release of  $P_4$  and insulin-like growth factor I (IGF-I) by ovarian granulosa cells cultured in conditions of normal and high temperatures with and without IGF-I, leptin and FSH. The release of hormones was measured by RIA, while the expression of the leptin gene was evaluated by PCR. It was observed that

high temperature significantly increased  $P_4$  and  $E_2$  release and reduced the accumulation of leptin DNA in ovarian follicles. In cultured ovarian granulosa cells, high temperatures promoted the release of both  $P_4$  and IGF-I. The addition of IGF-I, leptin and FSH to granulosa cells cultured at normal temperature promoted the release of both  $P_4$  and IGF-I. High temperature was able to prevent the stimulatory effect of leptin (but not of IGF-I or FSH) on  $P_4$  output and the stimulatory action of both leptin and FSH on IGF-I release by granulosa cells. The present observations (1) demonstrate the possible production of leptin in the porcine ovary, (2) demonstrate for the first time the influence of high temperatures on ovarian  $P_4$ ,  $E_2$ , IGF-I and leptin, and (3) suggest, that the negative effect of heat stress on reproductive processes can be due to high temperature-induced malproduction of ovarian hormones and a reduction in the response of ovarian cells to hormonal stimulators.

**Keywords:**

temperature; IGF-I; leptin; FSH; progesterone; estradiol; ovaries; pig

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