

Abstract

The study objective was a comparative analysis on the composition of ovarian follicles between large pre-ovulation, dominant and atretic follicles. The analysis included steroid hormones (P_4 , E_2), bone morphogenetic protein-15 (BMP-15), follicle-stimulating hormone (FSH), glucose, protein, urea, creatinine, uric acid, lipid and ion components. What is more, the impact of cow age on the composition of follicular fluid and the relationship between the concentration of the tested factors in follicular fluid and their concentration in cow serum were tested.

The following research hypothesis was established in the study: concentration of steroid hormone, follicle-stimulating hormone, bone morphogenetic protein and biochemical composition of follicular fluid depend on the follicle status and cow age.

The experiment was carried out on 72 Black-and-White Holstein-Friesian cows (aged 2-18). One ovary was collected from each cow after slaughter, containing a large follicle measuring 12 to 20 mm. Concentrations of bone morphogenetic protein-15 (BMP-15), follicle-stimulating hormone (FSH), progesterone (P_4) and 17- β -estradiol (E_2) were determined in the obtained follicular fluid. What is more, concentrations of glucose (GLU), total protein (TP), uric acid (URIC), creatines (CREA), urea (UREA), total bilirubin (TBIL), total cholesterol (CHOL), HDL-cholesterol (HDL), LDL-cholesterol (LDL), triglycerides (TAG), phosphorus (P), calcium(Ca), magnesium (Mg) and iron (Fe) were determined via colorimetry. Sodium (Na) concentration was determined via potentiometric method.

The present study demonstrated that the higher concentration of progesterone and lower of 17- β -estradiol was demonstrated in atretic follicles compared to pre-ovulatory and dominant follicles ($P < 0.01$). Differences depending on age were also found. They concerned both follicle and serum concentrations of steroid hormones. Significant differences were also shown in the concentration of BMP-15 and FSH. In the follicles of the oldest cows, the BMP-15 concentration was significantly higher than in the younger cows ($P < 0.01$). Moreover, in atretic follicles in the oldest cows, the BMP-15 concentration was significantly higher than in pre-ovulatory and dominant follicles ($P < 0.01$). There was a positive correlation between the follicular BMP-15 concentration and the age of the cows ($r = 0.45$; $P < 0.01$). A similar relationship was also found in the concentration of this factor in the serum. The concentration of FSH in the follicles of older cows was significantly higher than in the follicles of younger

cows, and the correlation between age and concentration of this hormone was positive ($r = 0.62$; $P < 0.01$).

The study also showed significant differences in the biochemical composition. The differences depending on the status of the follicle concerned mainly glucose, HDL cholesterol and phosphorus. The highest concentration of glucose and phosphorus was recorded in the dominant follicles ($P < 0.05$). In contrast, HDL cholesterol was highest in atretic follicles ($P < 0.05$). Moreover, the relationship between the concentration of the tested components in the follicles and their serum concentration and the age of the cows was demonstrated.

On the basis of the conducted research, the results obtained in this study confirm the research hypothesis that the concentration of steroid hormones, follicle-stimulating hormone, bone morphogenetic protein and biochemical components in the ovarian follicle fluid differs depending on the status of the follicle and the age of the cows.

Mojcić 15.12.2020