

AI PREDICTION OF LUTEAL OVARIAN CYSTS IN COWS BASED ON PROLACTIN LEVELS

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Abstract: The restoration of fertility in dairy cattle is closely associated with metabolic and hormonal regulation of reproductive functions. The present study aimed to investigate the role of prolactin in the formation of the metabolic status of Holstein black-and-white cows affected by luteal ovarian cysts. The experimental work was conducted in 2021–2022 on a farm in Azerbaijan State Agricultural University. Blood samples were collected from cows with diagnosed luteal cysts (experimental group) and cyclic cows (control group). Serum levels of prolactin, albumin, glucose, and ketone bodies were determined using standard biochemical methods.

The results demonstrated a significant increase in prolactin concentration in cows with luteal cysts, exceeding the control level by 2.41 times ($p < 0.05$). This hormonal change was accompanied by a 19.07% decrease in blood albumin levels and a 31.84% reduction in glucose concentration, indicating an energy deficiency state. In contrast, ketone body levels were elevated, reflecting intensified lipid mobilization and oxidative metabolism. These findings suggest that hypoglycemia and altered protein-energy metabolism play a key role in the pathogenesis of luteal ovarian cysts, while prolactin may be involved in regulating ovarian function under metabolic stress conditions.

Keywords: cows, blood, prolactin, proteins, glucose, ketone bodies, luteal cysts.

INTRODUCTION

Reproductive efficiency in dairy cattle is one of the most important factors affecting productivity in modern livestock farming. However, postpartum metabolic disorders and hormonal imbalances often lead to ovarian dysfunctions, including the development of luteal ovarian cysts. These conditions significantly reduce fertility and prolong the calving interval, causing economic losses in dairy production.

Recent studies indicate that ovarian dysfunctions are not only reproductive disorders but are also closely linked to disturbances in metabolic homeostasis. In particular, the interaction between energy metabolism and hormone regulation plays a crucial role in the normal functioning of the hypothalamic–pituitary–ovarian axis [1]. Among various hormones, prolactin is considered to have a

multifunctional role, not only in lactation but also in regulating reproductive processes such as follicular development, ovulation, and corpus luteum maintenance [2].

Despite existing research, the exact relationship between prolactin levels and metabolic changes in cows with luteal ovarian cysts remains insufficiently studied. It is still unclear how energy deficiency, reflected by changes in glucose, protein, and ketone body levels, influences prolactin secretion and ovarian function.

Therefore, the aim of this study was to investigate the role of prolactin in shaping the metabolic status of Holstein black-and-white cows with luteal ovarian cysts and to evaluate its association with key biochemical indicators of energy metabolism [3].

MATERIAL AND METHODS OF RESEARCH

The experimental part of the work was carried out in 2021-2022 in the farm of Azerbaijan State Agricultural University. The object of the study was cows of Holstein black-and-white breed 2 lactation, not coming to the hunt for 60-65 days after calving, even after drug stimulation. The diagnosis of "luteal cyst" was made on the basis of anamnesis, clinical signs and transrectal studies. Two experimental groups of 10 heads each were formed to perform the work. The first group (experimental) consisted of animals in whose ovary the presence of a luteal cyst was detected. The second group (control) consists of cycling cows. The material for biochemical studies was blood taken from cows from the tail vein in the morning before feeding. Serum concentrations of albumin (Alb), urea, glucose, ketone bodies, and prolactin were determined.

RESEARCH RESULTS

The concentration of the hormone in animals of the experimental group (in the presence of a luteal cyst in the yellow body of the ovaries) exceeded the control level by 2.41 times ($p < 0,05$). Consequently, the level of PRL was associated not only with lactation of cows, but also with the functional state of the ovaries, which is consistent with the data [2], according to which the hormone regulates follicle maturation and ovulation, supports the existence of the corpus luteum and the formation of progesterone [3]. Along with prolactin, we determined some biochemical parameters in the blood of cows of the experimental groups that allow us to assess the state of energy metabolism in their body.

Blood albumins in animals are a reserve source of free amino acids. Proteins, coming from the circulatory system into the cells of peripheral organs and tissues, are used for energy synthesis through the Krebs cycle or gluconeogenesis [1; 2; 3].

The concentration of albumins in the blood of cows of the experimental group decreased, compared with the control, by 19,07% ($p < 0,05$) (table), indicating an increased use of proteins in

metabolic processes. In the body of cows of the experimental group, the intensity of albumin catabolism increased as a result of a lack of easily oxidizing carbohydrates (glucose), the concentration of which decreased by 31,84% compared to the control. At the same time, hypoglycemia is a powerful stimulus for prolactin secretion [2]. In the body of cows, against the background of a lack of glucose, the rate of oxidative decomposition of fatty acids, which are the main source of energy in the body of ruminants, sharply increased. This was evidenced by an increase in the concentration of ketone bodies in the blood of cows of the experimental group.

Thus, the results of our research have shown that the pathogenetic basis for the appearance of luteal cysts in the ovaries of cows is a lack of energy in the animal body, which is compensated by the use of protein reserves, that is, blood albumins. In turn, hypoglycemia initiates an increase in the secretion of prolactin, which regulates the functional activity of the corpus luteum of the sexual cycle and directly its ability to atresia after ovulation.

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