

Uterine subinvolution, ovarian hypofunction in productive cows and infertility as a result of their

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Abstract. The article notes gynecological diseases in 763 heads out of 107 cows (14%) examined during an obstetric and gynecological dispensary in order to study the degree of prevalence, causes and features of the course of obstetric and gynecological diseases in cows. It was found that infertility in cows is accompanied by such common signs as changes in appetite, hypotension of the pancreas, pallor of the mucous membranes, subinvolution of the uterus during rectal examination, persistence of the corpus luteum in the ovaries, ultrasound results are accompanied by accumulation of fluid in the uterus, enlargement of the uterus, thickening of its wall, decrease in blood parameters below normal.

1 Introduction

Agricultural animal husbandry in the country is rapidly developing in number, thanks to benefits and practical assistance from the state, but in terms of productivity we have a rather low efficiency. In this regard, veterinary science and practice face urgent tasks to reduce the cost of production by developing and implementing effective and resource-saving methods for the prevention and treatment of diseases of livestock belonging to farms, increasing productivity and reproductive functions of animals.

Diseases of the genital organs of animals, including endometritis, uterine subinvolution, hypofunction and ovarian diseases in cows occupy the main place among the diseases that significantly complicate the effective solution of tasks, improving the breed of cattle and increasing their productivity.

The analysis of data obtained from literary sources and observations of specialists shows that, despite the prevalence of uterine subinvolution, ovarian diseases and infertility caused by them in productive cows brought from abroad to livestock farms of our republic, the prevention of these diseases, the causes and features of the disease, methods of early diagnosis and effective methods of treatment.

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The aim of the study was to study the causes and features of development, clinical signs and morphobiochemical changes in blood during uterine subinvolution, ovarian hypofunction and infertility in productive cows.

Objects and methods of research. In farm conditions, in order to study the causes of the prevalence and features of the development of the disease, clinical signs and morphobiochemical changes in the blood of productive cows, 6 dairy cows were selected as "reference" animals on the principle of "paired analogues". They were observed from the 1st month of childbirth to their insemination 1 time in 10 days by studying the clinical and physiological status and morphobiochemical parameters of blood, during gynecological examinations (through the rectum and using ultrasound) with a description of the condition of the uterus and ovaries.

Attention was paid to the following parameters of the development of experimental animals: -general condition; -fatness; -the condition of the mucous membranes; - appetite; - reactions to external influences; -the condition of the skin and skin, as well as the condition of the organs of movement. Using conventional clinical examination methods, body temperature, heart rate and respiration were determined in 1 minute, and the number of contractions of the pancreas in 5 minutes. External examination of the genitals studied the condition of the labia, mucus secretion, its color, odor and consistency, the color of the mucous membranes. Rectal examination was used to determine the condition of the uterus and its involution (taking its original form), the condition of the cervix, the degree of its closure, the condition of the ovaries, the presence of follicles or yellow bodies. Using a vaginal mirror, the condition of the vaginal mucosa, fluid secreted from the uterus, the degree of maturation of follicles and the course of the sexual cycle in cows were studied. The uterus was examined using ultrasound, the state of the endometrium, the amount and nature of exudate in the uterine cavity, the level of maturation of follicles, the consistency of the corpus luteum, the presence of cysts and other pathological changes in the ovaries were determined.

Using zootechnical methods, the composition and nutritional value of cow diets, the content of digestible protein, sugar, carotene, calcium, phosphorus, fiber were analyzed and the level of satisfaction of the needs of the animal body was studied based on comparison with feeding norms.

To study morphobiochemical changes in blood in gynecological diseases, blood was taken from dairy cows and examined on a BIOBASE hemoanalyzer in the laboratory of parasitology of the Veterinary Research Institute. The number of erythrocytes and leukocytes, hemoglobin, glucose, total protein and alkaline reserve were determined in the blood samples taken (I.P. Kondrakhin's method).

2 Materials and methods

As a result of the study of the causes of the prevalence and peculiarities of the course of obstetric and gynecological diseases in cows in the livestock farm "Sieb Shavkat Orzu" of the Tailyak district of the Samarkand region, during the medical examination of 763 heads of cows, 107 (14%) turned out to be infertile. Of these, 31 cows (29.0%) had afterbirth retention, 15 cows (14.9%) had uterine subinvolution, 22 cows (20.6%) had endometritis, 21 cows (19.6%) had ovarian hypofunction, 18 (16.8%) had alimentary infertility.

The production of feed and the preparation of a feed mixture has been established in the farm using an innovative approach and the composition of the feed mixture for cows includes alfalfa hay – 0.89 kg (2.1%), straw – 0.15 kg (0.35%), cotton flour – 1.59 kg (3.71%), bone meal – 0.56 kg (1.3%), soy meal – 0.30 kg (0.7%), mixed feed – 10.55 kg (24.6%), silage – 3.97 kg (9.3%), silage – 7.44 kg (17.4 %), silage – 17.35 kg (40.5%), total – 42.8 kg. The total nutritional value of the diet was 27.22 feed units, digestible protein

3881 g, sugar 1379.6 g, carotene 248 mg, calcium 149.1 g, phosphorus 125.2 g, fiber 3829 g.

It was found that in the diet, compared with the norms of nutrition, 1970.4 g of sugar, 252 mg of carotene, 15.8 g of phosphorus, 45.9 g of calcium, 931 g of fiber, 811 g of digestible protein are excessive. The digested protein in the diet amounted to 3.881 grams, its provision was 126.41 percent. There were 143 grams of digested protein per food unit of the diet. The ratio of sugar to protein in the diet was 0.35:1 instead of the standard 0.8:1, and the ratio of phosphorus to calcium was 0.8:2 instead of the standard 1:2.

Analyzing the diets of dairy cows, we came to the conclusion that the diets do not fully meet the needs of the cow's body in nutrients and biologically active substances, macro- and microelements by type, composition and nutritional value. Infertility is recorded in the farm due to protein and energy imbalance of diets, low sugar-protein and phosphorus-calcium ratios, lack of magnesium and sunlight, frequent postpartum delay in cows, uterine subinvolution, ovarian hypofunction.

Cows with uterine subinvolution and ovarian hypofunction have such common signs as general weakness, apathy, changes in appetite, hypotension of the pancreas, pallor of the mucous membranes (anemia), enlargement of the uterus when examined through the rectum, Clinical signs: the presence of fluid in the cavity, uneven surface of the wall of the uterine horns, formation of folds, incomplete resorption of yellow bodies in the ovaries, decreased uterine tone. Ultrasound results showed accumulation of a large amount of fluid in the uterus, thickening of the uterine wall and its location in the abdominal cavity (Figure 1). The number of erythrocytes in the blood of dairy cows at the beginning of the tests averaged 5.18 ± 0.08 1012/l (norm 5.0-7.5 1012/ by the end of the tests - on average to 4.68 ± 0.06 million /ml, a decrease in hemoglobin concentration was observed from 110.6 ± 4.6 g/l to 86.4 ± 5.7 g/l (normally 99-129 g/l) ($R < 0.05$).

At the beginning of the dispensary examinations, it was noted that the concentration of glucose in the blood of dairy cows was significantly lower than the standard values, the average (norm 2.22-2.33 mmol/l) was 2.19 ± 0.24 mmol/L. During lactation, this indicator decreased and by the end of the tests averaged 2.12 ± 0.06 mmol/l. The decrease in the amount of glucose in the blood during the tests can be explained by the low level of satisfaction of the energy needs of cows during lactation



Fig. 1. Accumulation of fluid in the uterus during uterine subinvolution in cows.

The amount of total protein in the blood serum of dairy cows at the beginning of the experiments averaged 83.6 ± 6.3 g / l, and by the end of the tests averaged 64.8 ± 5.2 g / l. The amount of alkaline reserves in the blood serum of cows is significantly less than normal values (norm 46-66 vol.% CO₂), whereas at the beginning

of the tests it averaged 48.5 ± 2.02 vol.% CO₂, by the end of the tests it was noted that it had decreased to an average of 38.4 ± 2.26 vol.%CO₂. A decrease in the supply of alkaline substances in the blood indicates a change in the environment in the body of dairy cows towards acidity, that is, an increase in the state of acidosis ($R < 0.05$).

Table 1. Hematological parameters of experimental cows, n-10.

No.	Indicators	Before the start of the study	At the end of the research
1	Red blood cells, $10^{12}/l$	5.18 ± 0.08	4.68 ± 0.06
2	Hemoglobin, g/l	110.6 ± 4.6	86.4 ± 5.7
3	Glucose, mmol/l	2.19 ± 0.24	2.12 ± 0.06
4	Total protein, g/l	83.6 ± 6.3	64.8 ± 5.2
5	Reserve alkalinity, volume% CO ₂	48.5 ± 2.02	38.4 ± 2.26

3 Results and Discussion

Chronic uterine subinvolution is common on dairy farms and causes great economic damage. The disease occurs in 33.8-85.6% of cows, on average in 65.7% of infertile animals, mainly in highly productive animals. Chronic subinvolution of the uterus is characterized by its increase, uneven surface of the wall of the uterine horns, the formation of longitudinal and transverse folds, the formation of a cavity in the furrow between the horns of the uterus, a decrease in tone and a reaction to massage. These changes can be observed 12 months after birth [4].

The main causes of uterine subinvolution in the postpartum period and during the first 3 hours after delivery are a slowdown in the retraction of uterine muscles and a violation of the normal course of postpartum processes due to a decrease in the rate of fire of the muscles of the uterine wall. Usually, uterine subinvolution ends at the end of the first month after childbirth, when postpartum processes are at the level of the physiological norm [3].

Low sugar-protein ratio and lack of fiber in the diet of dairy cows cause lactic acidosis and inflammation of the scar (ruminitis). Changes in the quantity and qualitative composition of microflora in the pancreas, a decrease in the number of small and medium-sized microorganisms, a decrease in their activity, increased hydrolysis leads to a deficiency of fiber. Excess fiber in the diet leads to a decrease in the pH in the rumen to an average of 6.5 ± 0.05 instead of 6.8-7.4 [11].

During subinvolution of the uterus, lochial fluid accumulates in its cavity, its decay, putrefaction, reproduction of microflora, development of postpartum endometritis, ovarian dysfunction leads to infertility.

Failure to comply with the standards of keeping and feeding cows during the deadwood period causes them various gynecological diseases and infertility after childbirth. In pregnant cows, trace elements are characterized by a decrease in red blood cells by 12.3%, hemoglobin – 3.6%, glucose – 10.9%, total protein – 3.4%, alkaline reserve – 3.7% compared with healthy animals. % of total protein – 8.7%, inorganic phosphorus – 7.0%, copper – 3.9%, cobalt – 6.9%, manganese – 18.9% decrease [9].

Along the course of uterine subinvolution, acute (within 2 weeks after birth), acute (15-30 days after birth) and chronic (after 30 days after birth) forms are distinguished, for reasons of primary and secondary (placenta retention, postpartum sepsis, endometritis, etc.) degrees, according to the rate of progression, mild and severe types [3].

According to the literature, it takes 40-60 days for cows to restore the uterus after childbirth, therefore insemination in the first month after childbirth is ineffective, and it is

advisable to carry out insemination in the second month. According to the authors, the most optimal time for insemination of cows with a yield of 4000 kg is about 40 days after calving.

According to the author, chronic uterine subinvolution is characterized by a lack of secretion from the genital tract and changes in the sexual cycle, several inseminations are ineffective due to hypofunction of the ovaries and cysts, persistent yellow bodies. In the chronic course of uterine subinvolution, the conditionally pathogenic microflora characteristic of postpartum and chronic endometritis is practically absent [4].

In veterinary practice, gonadotropins produced by the pituitary gland are widely used as follicle-stimulating hormones. These drugs are obtained from the adenohypophysis of beef cattle and blood serum of a foaled mare. Currently, their analogues are also obtained artificially. Chorionic gonadotropin, which is isolated from the urine of pregnant women, is used as a luteinizing drug. Gonadotropins, prostaglandin F_{2α} (PGF_{2α}) and gonadoliberin are often used in ovarian dysfunction in animals. In some cases, neurotropic drugs (proserin, carbacholine) and ovarian hormone preparations (progestogens, estrogens) are used. Hormonal drugs normalize the endocrine and generative functions of the ovaries, increase the contractility of the uterus, activate proliferative secretory processes, restore the reproductive functions of cows and heifers of different ages [12].

When feeding animals does not meet the established standards, the body weakens, which also affects the development of sexual processes (there is no estrus and ovulation). As a result of unilateral (protein, carbohydrate and fat) feeding of animals, the functions of the ovaries are disrupted, and their special tissue is gradually replaced by adipose tissue. The ovaries of obese animals not only decrease, but also thicken, in which hunting becomes short-term, and then completely stops [6].

According to literature sources [1], the lack of certain macro- and microelements in the diet of cows (Mn, Cu, I, Fe, Se, Zn, P) causes metabolic disorders and deterioration of reproductive function.

According to the authors [10], ovarian hypofunction is characterized by impaired development, maturation, ovulation of follicles and formation of the corpus luteum. This pathology is characterized by persistence and delayed ovulation of follicles, anovulatory sexual cycle (lack of ovulation), hypoplasia and dysfunction of the corpus luteum formed at the site of the ovulated follicle, or complete dysfunction of the gonads and prolonged anaphrodisia. In highly productive cows, the causes of ovarian hypofunction are most often a decrease in the synthesis and secretion of gonadotropins by the pituitary gland or a decrease in the ovarian response to gonadotropins. A decrease in ovarian reactivity to gonadotropins can be observed with increased synthesis of corticosteroid hormones in the body, as well as in the absence of thyroid hormones.

According to literature sources [7], 80-90% of cows are removed from the main herd due to infertility, 74-89% - metabolic disorders, 17% - breast diseases, 19% - ovarian hypofunction, 3% - follicular and luteal ovarian cysts, 15-17% - limb diseases, 14-16% - digestive diseases and 18% of cases are due to low productivity. The duration of use of cows on the farm was on average 2.6 lactation.

With ovarian hypofunction, neurohumoral control of reproductive function is disrupted, folliculogenesis decreases, and most of the follicles undergo atretic changes. The search for the most effective and safe methods of restoring cow productivity in ovarian hypofunction is an important area of modern veterinary obstetrics. This, in turn, requires the emergence of completely new technologies for determining the optimal timing of insemination of cows in modern dairy farms and requires appropriate scientific justification [1].

Ovarian hypofunction occurs in almost every third cow (35.4%) in 40-60 cows after the first calving. The prevalence of functional ovarian insufficiency depends on the age of

female animals: in heifers it occurs almost 2 times more often than in animals that gave birth 1-2 times [7].

The pathological stage of the postpartum period is characterized by a delay in the restoration of the generative and endocrine functions of the ovaries. At the end of the postpartum period, the next wave of follicle growth ends not with ovulation, but with their cystic atresia. At the same time, the functional activity of the reproductive system organs is often disrupted in many cows after childbirth against the background of an imbalance in the synthesis and metabolism of thyroid hormones, a decrease in triiodothyronine secretion [2]. The initial stage of ovarian hypofunction, manifested by follicle persistence, is characterized by a delay in ovulation up to 24-72 hours after the end of sexual arousal (ovulation is normally observed 10-12 hours after the end of sexual arousal), bleeding from the uterus is noted on the 2-3 day after fertilization, the level of fertility of animals decreases [9].

When examining the genitals using ultrasound with manual identification and echographic visualization of the cervix, body and horns of the uterus, their diameter, wall thickness, the presence of fluid in the uterine cavity and its characteristics are determined. Then, using fingers, the right and left ovaries are scanned and their size, shape and echostructure are studied [1].

4 Conclusion

- The etiological factors of the occurrence of uterine subinvolution, ovarian hypofunction and infertility in cows are not fully satisfying the needs of the cow's body in terms of type, composition and nutritional value of feed in biologically active substances, macro- and microelements, protein and energy components of the diet. The main etiological factors are an imbalance, low sugar-protein and phosphorus-calcium ratios in diets, as well as a lack of exercise and sunlight.
- Infertility caused by uterine subinvolution and ovarian hypofunction in cows is characterized by common signs in the form of general weakness, apathy, changes in appetite, hypotension of the pancreas, pallor of the mucous membranes (anemia). When examined through the rectum, an enlargement of the uterus, the presence of fluid in the cavity, an uneven surface of the wall of the uterine horns, the formation of folds, incomplete resorption of the corpus luteum in the ovaries, and the observation of such clinical signs as a decrease in uterine tone during massage, ultrasound - a large accumulation of fluid in the uterus, an increase and thickening of its wall, in a decrease in the number of red blood cells to $4.68 \pm 0.06 \cdot 10^{12}/l$, hemoglobin – 86.4 ± 5.7 g/l, total protein – 64.8 ± 5 g /l, a decrease in the alkaline reserve to $38.4 \pm 2.26\%$ CO₂ volume compared with the norm for healthy animals.

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