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Pharmacological Prevention of Obstetric and Gynecological Diseases in Cows.

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ABSTRACT

Currently, one of the most important problems of veterinary medicine remains the pathology of the reproductive system in cows in the postpartum period. The authors conducted research to determine the effectiveness of an injection preparation containing β-carotene and vitamin E in obstetric and gynecological pathology in cows. It has been determined that the use of an antioxidant complex to calvers reduces the intensity of free-radical lipid oxidation in animals during the most critical period before calving that contributes to the physiological course of calving and postpartum period.

Keywords: veterinary pharmacology, obstetric and gynecological pathology, cows, prevention, antioxidants, carotene, tocopherol

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INTRODUCTION

In countries with intensive dairy cattle breeding the diseases of the reproductive organs, which cause significant economic losses in the industry, are deterrent factors of the increase of animal productivity. In this regard, the development of preparations with a complex action, aimed at restoring the homeostasis of the organism of animals, increasing its resistance to the action of pathogenic factors and being effective in obstetric and gynecological pathology, is a reasonable and relevant direction in veterinary pharmacology [11].

Medicinal products with similar pharmacological properties include a complex preparation kartok containing β-carotene of microbiological synthesis – at least 0.18% and alpha-tocopherol acetate – at least 0.5% dissolved in vegetable oils.

Carotenoids, which include β-carotene, are the large group of pigments which constituent cells of microorganisms, higher plants and seaweed, as well as animals and human. In addition, there are carotenoids of anthropogenic origin, artificially synthesized by human using physicochemical methods. Beta-carotene is a powerful antioxidant, it increases the intensity of growth and productivity of animals, and it also has an immune-modulating effect against the humoral immunity and a positive effect on the reproductive functions of the body [2, 9].

Hypocarotenemia can cause infertility in animals that have violated ovulation, estrus manifests itself late or mild and frequent intrauterine death of the fetus and its resorption are also possible. Carotene deficiency causes an increased susceptibility of newborn animals to diseases. It is proved that the use of beta-carotene additives to calvers stimulates the protective properties of the organism of animals, which is very important for obtaining healthy offspring and formation of their resistance [3, 4].

Vitamin E (tocopherol) belongs to the group of natural compounds from tocol derivatives. Tocopherol regulates fat metabolism, stimulates the synthesis of gonadotropic hormones of the pituitary gland and the metabolism of sulfur-containing amino acids and vitamin C and increases the antioxidant status of the body. Due to these properties, vitamin E primarily affects sexual function and ensures the normal development of the fetus. With a lack of tocopherol there is a resorption of the fetus at an early stage of pregnancy (hidden abortion). In cows the fertility decline is noted because of the impairment of the physiological functions of the uterus, in bulls the degeneration of the testes and sterility are noted. It is proved that being a synergist of selenium and carotene, vitamin E, when used in combination, enhances the effect of these substances in several times [4, 9].

The aim of the research is to study the prophylactic efficiency of the preparation kartok containing β-carotene and vitamin E in obstetric and gynecological pathology in cows.

METHODOLOGY OF RESEARCH

Research and production experiment was conducted on Ayshire cows with an annual milk yield of 6000 kg from the previous lactation. The effect of the complex preparation kartok on the animal organism was compared with the effectiveness of its constituent components: beta-carotene and vitamin E (sterile oil solutions).

For the experiment we formed 4 groups of 15 cows, similar in body weight and productivity for the last lactation. On the first day of calving and then on the 10th and 20th days of the research they were injected with preparations according to the following scheme: the 1st group of cows – preparation kartok in a dose of 10 ml; the 2nd group of cows – 0.18% oil solution of beta-carotene in a dose of 10 ml; the 3rd group of cows – vitamin E in a dose of 5 ml (50 mg α-tocopherol acetate); the 4th group of cows served as a negative control. All preparations were injected to cows subcutaneously in the lower part of the neck in a heated form of 37-38 °C.

The cows were kept under constant clinical observation, on the 15th day after calving a rectal examination was made, the condition of the uterus and ovaries was determined and the duration of

treatment, the appearance of the sexual cycle and the results of insemination of animals were further taken into account.

A month after calving in five cows from each group the level of lipid peroxidation processes and the antioxidant defense system of the body were evaluated according to a number of indicators such as conjugated dienes, ketodienes and malondialdehyde in the thiobarbituric acid test using method of Andreeva L.I. (1988).

Statistical data processing was performed using Statistica v. 6. The significance criteria were determined by the Student's table.

RESULTS

The conducted studies have shown that the use of kartok has a positive effect on the reproductive system of cows (Table 1).

Table 1: Prophylactic efficiency of the preparation kartok in obstetric and gynecological pathology in cows (n = 15)

Indicators		Groups			
		1 kartok	2 β-carotene	3 vitamin E	4 control
Got sick with endometritis	Animals	8	8	9	10
	%	53.3	53.3	60.0	66.6
Duration of treatment, days		9.9	12.5	12.9	16.5
Manifestation of the first sexual cycle, days		40.5	45.8	52.5	58.4
Insemination results in the first estrus	Animals	10	6	6	4
	%	66.6	40	40	26.6
Days of infertility		60.7	72.9	75.5	92.5

In all groups of cows the incidence of acute postpartum endometritis in the early post-calving period was high, ranging from 53.3 to 66.6%. However, the animals treated with kartok recovered 2.6 and 3 days faster compared to cows receiving β-carotene and vitamin E preparations and 6.6 days faster compared to the intact control. The animals to which kartok was applied had estrus 5.35 and 12 days earlier compared to the 2nd and 3rd experimental groups of cows, the difference with the negative control was 17.9 days.

According to the results of insemination in the first estrus, the fertility of cows of the 1st experimental group was 26.6% higher than the positive control (group 2 and 3) and 40% higher than the negative control (group 4). In addition, in the 1st group of animals the period of infertility decreased by 12.2 and 14.8 days relative to the 2nd and 3rd groups and by 31.8 days compared with the 4th group.

Since the preparations include antioxidants (carotene and tocopherol), the positive effect of preparations on the indicators characterizing the intensity of lipid peroxidation in the body of cows was manifested in a decrease in the concentration of lipid peroxidation products in all groups (Table 2). The maximum effect was registered in the 1st experimental group (with the use of kartok), while the levels of conjugated dienes in comparison with the cows of negative control (group 4) were lower by 18.7%, ketodienes were lower by 16.5%, malondialdehyde was lower by 12.4%. Consequently, under conditions of increased generation in the body of reactive oxygen forms (which include the period after calving), when the chain self-induced mechanism of free radical reactions goes beyond the stationary level, the kartok components (β-carotene and tocopherol) exhibit an inhibiting effect on them.

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Table 2: Indicators of the level of lipid peroxidation products when using the preparation kartok (M±m; n=5)

Indicators	Groups			
	1 kartok	2 β-carotene	3 vitamin E	4 control
Conjugated dienes AU/mg lipids	0.223±0.04*	0.215±0.03	0.198±0.06	0.181±0.02
Ketodienes AU/mg lipids	0.093±0.01*	0.086±0.07	0.075±0.05	0.078±0.03
Malondialdehyde, μmol/l	1.39±0.12	1.34±0.18	1.16±0.09	1.22±0.21

Note: * – significance level $P \leq 0.05$ in relation to intact control

DISCUSSION

Lipid peroxidation is currently regarded as one of the dominant metabolic processes that regulate the functional activity of all physiological systems of the body [1, 7]. In the postpartum period one of the factors that can lead to the development of complications is the imbalance of the antioxidant processes of the animal organism. At the same time, activation of lipid peroxidation induces the inclusion of antioxidant defense mechanisms, the action of which is aimed at suppressing the excessive formation of toxic lipid peroxidation products and preventing their damaging effect on various biological structures [6, 10].

The main mechanism of the protective effect of both carotenoids and tocopherols on the animal organism is their ability to deactivate highly reactive free radicals, xenobiotics and peroxides [8]. The properties of antioxidants in kartok interrupt the course of chain reactions and protect cells of the body from damage determine the prophylactic efficiency of the preparation in the pathology of the reproductive system of cows, which was confirmed in our experiments.

The results of a number of researchers prove the ability of carotenoids to accumulate intensively in the ovaries and in the corpus luteum during pregnancy, and their accumulation in gonads occurs due to the synthesis of progesterone and other steroids, which provides for active peroxide processes, therefore, the antioxidant properties of carotenoids help to protect the egg from the negative effects of peroxides [3, 5].

Therefore, the implementation of an antioxidant complex to calvers reduces free radical oxidation of lipids during the most critical period before calving, which contributes to the physiological course of calving and the postpartum period.

CONCLUSION

Thus, the conducted experimental studies indicate that the preparation kartok containing β-carotene and vitamin E has a pronounced positive effect on the antioxidant system of animals and shows a high prophylactic efficiency in obstetric and gynecological pathology in cows.

REFERENCES

[1] Dorozhkin V, Reznichenko L. Metabolism of beta-carotene. Poultry. 2004; 3: 6-7.
[2] Kirsanov A, Shaposhnikov A. Beta-carotene in animal husbandry. Animal husbandry. 2004; 8: 47.
[3] Kuznetsov AS, Kundyshev PP. Influence of beta-carotene on the reproductive qualities of cows. Journal of Dairy and Beef Cattle Farming. 2010; 7: 20-21.
[4] Kuzminova EV, Semenenko MP, Koshchaev AG, Troshin AN. Biological functions of carotenoids at cattle reproduction. Polythematic online scientific journal of Kuban State Agrarian University. 2017; 129:1065-1084.
[5] Kundyshev PP, Kuznetsov AS. Influence of beta-carotene on the reproductive qualities of animals. Zootechniya. 2010; 10: 21-22.
[6] Malyavina VV, Shvidko EA, Sampiev AM. Prospects for expanding the range of medical use of beta-carotene. Kuban Medical Bulletin. 2010; 3/4: 122-125.

[7] Retskii MI, Buzlama VS, Kaverin NN *et al*. Lipids peroxidation and system of antioxidant protection at the period of early postnatal adaptation in calves. Agricultural Biology. 2004; 2: 56-59.

[8] Koutsos EA, García López JC, Klasing KC. Maternal and dietary carotenoids interactively affect cutaneous basophil responses in growing chickens. Comparative Biochemistry and Physiology. 2007; 147: 87-92.

[9] Kuzminova EV, Semenenko MP, Kornen NN, Shakhray TA, Viktorova EP. Use of Secondary Resources of Grape's Processing to Obtain Additives of Antioxidant Action. RJPBCS. 2018; 9(3): 830-835.

[10] Maoka T, Akimoto N. Natural product chemistry in carotenoid, some experimental techniques for structural elucidation and analysis of natural carotenoids. Carotenoid Sci. 2008; 13:10-17.

[11] Semenenko MP, Kuzminova EV, Tyapkina EV, Abramov AA, Semenenko KA. Molecules of Medium Mass as an Integral Indicator of Endogenous Intoxication in the Diagnosis of Hepatopathy and its Effect on Improving the Economic Efficiency of Veterinary Measures in the Field of Dairy Farming. Journal of Pharmaceutical Sciences and Research (JPSR**).** 2017; 9(9): 1573-1575.