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## Prospects Of Using Antioxidant Drugs For The Treatment And Prevention Diseases Of Farm Animals.

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### ABSTRACT

Free radical processes are permanent participants in the metabolism in the body of farm animals and against the background of disturbances in the system of antioxidant protection of the body can acquire a pathological course and disrupt internal homeostasis. Years of research in this field confirms that free radical pathology can cause many diseases in animals and adversely affect their productivity and reproductive qualities. It is proved that the use of veterinary drugs with an antioxidant effect leads to the normalization of the functional state of the antioxidant system and allows the pharmacological correction of the free radical balance in the animals. The use of antioxidants in livestock production in the form of targeted drugs or as part of complex schemes of prevention and therapy of various pathologies can be an effective method to reduce the incidence of farm animals and improve livestock efficiency.

**Keywords:** agricultural animals, antioxidant drugs, antioxidant system, free radicals, pathology, treatment, prevention.

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**REVIEW**

Satisfying the food needs of the world's population is one of the most important tasks facing the world science and its solution is impossible without achieving veterinary well-being and full realization of the genetic and productive potential of farm animals. In order to maximize the productivity and extend the life of animals, a sound etiologic and pathogenetic approach is needed to ensure their health. In the metabolism, the oxidative-reduction processes play an extremely important role and control of their normal course is an important factor in maintaining the internal homeostasis of the organism.

In many ways, the redox balance of the body depends on the state of oxidant / antioxidant reactions, and the pathology of this biochemical process in animals can lead to complex and serious diseases. The essence of the problem lies in the accumulation in the cells and tissues of the body of reactive compounds - free radicals - atoms and molecules with unpaired electrons. Most of them are active forms of oxygen and nitrogen.

Free radical processes are normal physiological reactions in the body that fulfill their role in ensuring its normal functioning. The participation of free radicals in apoptosis - timely and programmable cell replacement - has been proven by many scientists to isolate their protective effect in infections through the destruction of microbial cells, regulation of blood flow and many other functions [23, 46]. But with certain effects of a number of endogenous and exogenous factors, free radical reactions take a pathological course, which leads to an excessive accumulation of a large number of free radicals and gives the process a chain-free uncontrolled character [27, 41]. The products formed as a result of the interaction of free radicals during biochemical reactions are extremely toxic and lead to damage to the organism [21].

Free radical pathology, which develops in response to the intensification of prooxidant processes in the body, has been termed oxidative stress in a professional environment. To date, the participation of free radicals in the development of most known pathologies has been demonstrated [1, 13, 19]. It has been established that in the etiology of such diseases as cardiomyopathy, pancreatitis, obstructive pulmonary disease, hepatopathy, atherosclerosis, reproductive disorders [35, 39], the disturbance of immune processes [38], the exchange of thyroid hormones [44], infectious and viral lesions [4], and many other diseases, oxidative stress may participate. Many scientists agree that when developing an inflammatory response in organs and tissues, part of both general and local pathogenesis is the hyperproduction of free radicals [5, 17, 33].

The mechanism of damage to the body under the influence of oxidative stress is associated with the action of reactive compounds with biological membranes of cells, leading to a disruption in their functioning and death [11, 25]. In this case, in our opinion, we can say that instead of one of its physiological purposes - initiation of apoptosis, free radicals start the process of necrosis of healthy cells. In addition, they are able to influence the course of biochemical reactions and initiate new ones, during which many toxic by-products are formed. An example of this can be the flow of free radical reactions by the type of lipid peroxidation [12, 26].

In the course of the evolutionary development of warm-blooded animals, a protective mechanism against oxidative stress was formed in their organism, which is a multilevel system of antioxidant defense of the organism [36]. It includes antioxidant enzymes and proteins that can neutralize free radicals, that is, in essence, they can be restored. There are also a number of exogenous substances that directly neutralize reactive compounds or promote the activation of the enzymatic link of the antioxidant system [10]. These include selenium,  $\beta$ -carotene, ascorbic acid, vitamin E, succinic acid salts and a number of other natural and synthetic compounds that have an antioxidant effect.

There is a direct correlation between the functional state of the antioxidant defense system in animals and the intensity of free radical reactions taking place in their body. Most often the development of oxidative stress develops against the background of disturbances in the antioxidant system and its inability to control the redox balance [30]. Therefore, it is advisable to carry out pharmacological correction of pathological changes in free radical oxidation by the use of drugs that have an antioxidant effect.

Studies of many scientists indicate a positive effect of the use of antioxidant drugs for the prevention and treatment of obstetric and gynecological diseases in agricultural animals [2, 8, 43]. We conducted studies

to determine the effectiveness of a number of antioxidant drug dosage forms of our own in the prevention of complications in cows in the postpartum period. In particular, a preparation containing selenium nanoparticles stabilized with a high-molecular nitrogen-containing polymer and preparations based on the seleno-organic substance 2,4,6,8-tetramethyl-2,4,6,8-tetraazabicyclo (3.3.0) octadiselenone -3,7. It has been experimentally established that the administration of these preparations to pregnant cows for 60 and 30 days before the proposed calving and immediately after birth contributes to reducing the incidence of postpartum retention and is an effective method of complex endometritis prophylaxis, and also leads to a reduction in the duration of the service period and a decrease in the number of insemination. We came to the conclusion that in recent months of pregnancy, cows have a high concentration of lipid peroxidation products in the body and, perhaps, this is one of the main etiological factors in the development of postpartum complications. The introduction of the drugs developed by us contributed to an increase in the activity of glutathione peroxidase, catalase and a decrease in the concentration of malonic dialdehyde and diene conjugates, which was a prerequisite for the reduction of clinical cases of animal disease. The data obtained in these experiments allow us to recommend the use of antioxidant agents in a system of preventive measures aimed at reducing losses from postpartum complications in cows and increasing reproductive capacity.

It has been accumulated enough information that oxidative stress takes part in the etiopathogenesis of mammary gland inflammation in cows, since there is no doubt that the intensification of free radical oxidation is an essential attribute of inflammatory reactions [7, 31, 37]. We consider it expedient to use antioxidant drugs as part of complex schemes for the prevention and treatment of mastitis in cows. In order to prove this, we conducted experimental studies on the effect of antioxidant drugs on the effectiveness of prevention and treatment of mastitis in cows. Pregnant animals at the beginning of the dry period were preventively administered the drug "Septogel" (Ltd Nita-Farm, Russia) containing iodine povidone. In addition to this specific prevention, we introduced the developed preparation "Polioksidol" on the basis of 2-ethyl-6-methyl-3-hydroxypyridine succinate, ascorbic acid and nanoparticles of nivalent selenium for 60 and 30 days before calving in a dose of 5 mg / kg of live weight. In analyzing the results obtained, it was found that the additional administration of polyoxidol led to a statistically significant increase in the activity of glutathione peroxidase and a decrease in the concentration of malonic dialdehyde and diene conjugates in the blood of cows. The use of an antioxidant helped reduce the number of cases of clinical and subclinical mastitis in cows in the postpartum period by 42%. Therapeutic efficacy of polyoxidol was studied in cows in patients with clinical and subclinical mastitis. In addition to the standard therapy, which consisted of a triple intracisternal injection of septogel at intervals of 12 hours, a single intramuscular injection of polyoxidol was made at a rate of 5 mg / kg body weight of the animal. The results showed that the additional use of polyoxidol led to a reduction in the duration of treatment of subclinical mastitis by 1.2 days and catarrhal mastitis by 2.1 days. Based on these studies, we recommend the use of antioxidant drugs as part of comprehensive schemes for the prevention and treatment of mastitis in cows to improve their effectiveness.

It has been convincingly proved that as a result of the impact of technological stress in agricultural animals, a progressive increase in the intensity of the processes of free radical oxidation takes place, which makes them a participant in the mechanism of the development of pathological changes in the body under stress reactions [14, 30]. In an experiment on sheep of the North Caucasian meat- action of antioxidant and antistress agent for the prevention of technological stress. The experiment was carried out on lambs aged 4.5-5.5 months. As a stress factor, lambs were beaten from the ewes. The day before the beating, animals used their own preparations: anti-stress - including a combination of lithium oxybate, sodium selenite and ascorbic acid as the active substance, at the rate of 3.9 mg / kg; antioxidant - an oily solution containing 2-phenyl-1,2-benzisoselenazole-3 (2H) -one, phenyl tert-butyl nitron, alpha-tocopherol acetate and beta-carotene at a rate of 5.4 mg / kg body weight; their combination in similar doses, and compared their effects with each other and with respect to control. It was found that the influence of technological stress was accompanied by a sharp increase in the blood of lambs in the level of cortisol and products of lipid peroxidation, as well as a decrease in the level of thyroxine and the activity of antioxidant enzymes. In this case, the use of drugs contributed to the stabilization of these indicators. It was noted that the introduction of anti-stress drugs to lambs led to a greater optimization of the hormonal background, antioxidant parameters of lipid peroxidation and the activity of glutathione peroxidase, catalase and glutathione reduced, and their combination allowed to keep all these indices within the reference values. The observation showed that the impact of stress led to a decrease in the body weight of animals, but it decreased significantly in animals receiving drugs, the smallest decrease was recorded with their combined use. And also noted that in the group where a combination of anti-stress and antioxidant drugs was used, there was subsequently the highest average daily weight gain. Thus, we

recommend antioxidant agents in combination with tranquilizers before applying technological operations that involve a stressful load to agricultural animals.

The influence of disturbance of processes of free radical oxidation on the state of animal immunity is confirmed, which decreases under the influence of oxidative stress and the vulnerability of the animal organism to the development of diseases of infectious and invasive etiology is increased [3, 42]. There is ample evidence that the use of antioxidant drugs enhances immunological protection in farm animals. [6] In our experiments, we attempted to clarify this by using a self-developed antioxidant preparation, including sodium selenite, levamisole base, and ascorbic acid, with seven-day-old calves. Its double intramuscular injection at a dose of 1.2 mg / kg of live weight with an interval of 30 days allowed to normalize the level of selenium in the blood of calves. A statistically significant increase in the activity of glutathione peroxidase and a decrease in the concentration of malonic dialdehyde were observed in the animals of the experimental group. The results of the analysis showed that, under the influence of this dosage form, the lysozyme activity of blood serum increased in the calves and there were significant differences from the control in bactericidal activity of blood serum. At 60 days after the beginning of the experiment, the animals from the experimental group had a higher level of immunoglobulins of class G, and the level of immunoglobulins A and M classes was significantly higher in comparison with the control group. This study gives grounds to recommend the use of antioxidant agents with immunostimulating effect, agricultural animals at various stages of their operation, especially during the most stressful periods.

The results of numerous studies indicate that parasitic invasion increases the generation of free radicals and develops oxidative stress against the background of the depressed state of the system of antioxidant protection of the organism of agricultural animals [20, 24, 32, 40]. According to a number of scientists, the use of antioxidant drugs by the invaded animal, along with specific therapeutic agents, has a positive effect, which increases the effectiveness of treatment and normalizes the metabolic status of the organism. [18, 34]. Currently, positive results have been obtained for the treatment of shadeosis with praziquantel in combination with pathogenetic and antioxidant therapy.

### CONCLUSION

Studies in the field of studying the functioning of the system of antioxidant protection of the animal's organism and the processes of free radical oxidation are currently being carried out quite actively throughout the world. Their results attest to the extremely important importance of these parameters for health, the productive use of animals, the quality of the products derived from them and, in general, the efficiency of livestock production. The development of modern dosage forms of antioxidant drugs and methods of their application by agricultural is an actual task of veterinary science. The study of the effectiveness of antioxidant prophylaxis and therapy in veterinary practice can open new opportunities for reducing the incidence of animals. In general, this can make a significant contribution to increasing the intensity of agricultural production and increasing the availability of quality animal products for the consumer.

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