The influence of dihydrochloride -2-methyl-4-dimethylaminomethylbenzimidazol-5-ol on the reproductive ability of the silver-black fox

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Abstract. The silver-black fox belonging to the LLC breeding farm "Vyatka" of the Kirov region was used in the work. We used Arkusit, TU 9325-005-51022776-2007, (Developed by the N.M. Emanuel Institute of Biochemphysics and the K.I.Skriabin Moscow State Academy of Medical Sciences), is introduced without any time limits. 2 groups were formed from breeding females of the silver-black fox, according to the principle of analogous groups: control (n = 1235) and experimental (n = 1164). From breeding males of the silver-black fox, 2 groups were formed according to the principle of analogous groups: control (n = 243) and experimental (n = 217). During the experiment, animals of both groups received the general economic ration. Preparation Arkusit was introduced into the feed of breeding animals in 10-day courses with 10-day breaks for 2 months before rut and before whelping at a dose of 0.004 mg / kg of body weight. As a result, there is a decrease in the number of missed and an increase in the number of safely whelped females, an increase in the safety of live puppies and, as a consequence, an increase in the number of registered puppies per successfully whelped female from 4.9 in the control group to 5.6 puppies in the experimental group. Preparation Arcusit promotes an increase in the number of working males, their polygamy, an increase in the number of covered and safely whelped females, an increase in the number of puppies born per male (5.87 puppies) in comparison with the control group.

1. Introduction
Oxidative stress is accompanied by the accumulation of prooxidants and free radicals, which leads to premature aging. However, free radicals are inevitably accumulated in any organism in the course of redox reactions [1]. As a result, there is an accumulation of radical anions, hydrogen peroxide, singlet oxygen, etc. Free radicals are also produced during oocyte: oxidative phosphorylation in mitochondria is the main source of energy that provides the final stages of this process [2]. Antioxidants are a wide group of substances of natural and synthetic origin that inhibit the processes of free radical oxidation of feed mixture components with molecular oxygen and protect cells and tissues from the effects of reactive oxygen species. The most famous antioxidants - vitamin E, vitamin C, glutathione, uric acid, are widely used in medicine in the treatment of infertility. Also, the results of a number of domestic and foreign experiments confirm the effectiveness of the use of antioxidant preparations (AP) in animal husbandry. AP allows more efficient absorption of feed nutrients and thus lower unit costs. In this regard, it is
obvious that it is necessary to study the effect of AP on the metabolism and reproductive system of fur animals, as well as the quality of the obtained fur and fur raw materials. [3, 4, 5, 6].

One of the ways to prevent and hinder the oxidative reactions of feed is to increase the antioxidant activity by introducing AP. Currently, in animal husbandry, more and more attention is paid to synthetic antioxidants [7].

Today, there is a wide range of new types of preparations and biologically active additives with multifunctional properties of oxidative stress correction, immuno- and stress protection. Nevertheless, there is a need for new biological products due to the limited spectrum of specific activity of known probiotics and a variety of microecological disorders of the normal microflora that cause desbacteriosis [8].

AP has a very wide spectrum of functional activity, and, as a rule, has in addition to antioxidant properties, stress, hepato and immunoprotection; AP also provides an increase in the fertility and survival rate of offspring of fur-bearing animals. The restoration of the antioxidant status is necessary to increase reproduction and protect the body from stress factors. For this purpose, micronutrients or synthetic AP are introduced into the body, for example, preparation Arcusit developed by domestic researchers. Preparation Arcusit has been produced since 2009 by LLC "Agrobusinessscenter", Moscow city under the leadership of the N. M. Emanuel Institute of Biochemphysics and the K. I. Skriabin Moscow State Academy of Medical Sciences. (4 hazard class according to GOST 12.1.007 - 76) [1]. This preparation is intended to increase resistance, reproductive functions and prevent stress in farm animals. Antioxidant Arcusit belongs to the group of synthetic AP substances, which have the ability to inhibit the processes of free radical oxidation of feed mixture components with molecular oxygen, and in biological systems to protect cells and tissues from the effects of reactive oxygen species. In females, Arcusit stimulates females hunting, shortens the service period, especially in animals with a disturbed sexual cycle, and has a beneficial effect on the functional state of the body under stress and exposure to radiation and chemical factors of the external environment; stimulating cellular and humoral immunity. The study of the prospects for the use of AP is a new direction of their practical use in the cellular fur farming; in this connection, the study of the drug Arcusit is relevant.

2. Materials and methods
The experiment was carried out on the basis of the breeding farm of LLC Vyatka in the Kirov region. The work used silver-black foxes. From breeding females, according to the principle of analogous groups, 2 groups were formed: control (n = 1235) and experimental (n = 1164). Also 2 groups from breeding males were formed: control (n = 243) and experimental (n = 217). All animals were kept in the same conditions in compliance with veterinary and zootechnical requirements. Conventional feed rations were used throughout the experiment in the feeding of the animals. The animals of both groups received the general economic ration, normalized by the ratio of proteins, fats and carbohydrates, corresponding to the physiological state of the animals and the season of the year. Arkusit was preliminarily diluted in warm water until complete dissolution and before feeding was mixed with the fodder mass and was given to the animals of the experimental groups according to the scheme. For 2 months before rut and before whelping, in 10-day courses with 10-day breaks. The foxes of the experimental group were injected with the additive Arcusit at a dose of 0.004 mg / kg of feed. Registration of puppies was carried out at 2 months of age during deposition from their mothers. The results of the data obtained were taken from the report of the breeding farm of LLC Vyatka. The statistical processing of the digital materials was carried on a Microsoft Excel 98 computer, using the statistical software package “Statgraphics” and “HG”.

All experiments on animals were carried out in accordance with the basics of experimental work in animal husbandry [9]. The work was performed in compliance with the international principles of the Helsinki Declaration on the humane treatment of animals, the principles of humanity set out in the European Community directive (86/609 / EC), "Rules for conducting work using experimental animals" [10], "Bioethical rules for conducting research on humans and animals ”(2004).
3. Results and discussion
After the experiment, the reproductive ability of the breeding females of the silver-black fox was assessed: females in the experimental group gave birth safely by 5%, the safety of puppies by - 4.8%, puppies per breeding female were registered by - 16% more than in the control group (table 1).

| Reproduction indicators | Control group | Experimental group |
|-------------------------|---------------|---------------------|
| Number of females       | 1235          | 1164                |
| Females covered, %      | 98.87         | 99.48               |
| Females missed, %       | 7.53          | 4.81                |
| Females whelped safely, % | 87.85       | 92.35               |
| Fertility of females, incl. stillborn puppies, (number) | 6.23 | 6.75 |
| Safety of puppies, %    | 89.48         | 93.8                |
| Registered puppies: - on a safely whelped female, number per a breeding female | 5.39 | 5.96 |
|                         | 4.73          | 5.51                |

Thus, the introduction of preparation Arcusit into the food of the silver-black fox increases the number of safely whelped females and the safety of puppies, reduces the number of stillborn puppies and increases the number of registered puppies per successfully whelped female by 0.57 puppy and breeding female by 0.78 puppy versus control group.

The results of the experiment on the study of the reproductive ability of the breeding males of the silver-black fox, with the introduction of Arkusit into the food at a dose of 0.004 mg / kg of body weight, are shown in table 2.

| Reproduction indicators | Control group | Experimental group |
|-------------------------|---------------|---------------------|
| Breeding males (number) | 243           | 217                 |
| Females covered (number) | 1221          | 1158                |
| Working males, %        | 92.40         | 92.74               |
| Polygamy (number).      | 5.49          | 5.34                |
| Females safely whelped, (number) | 1085     | 1075               |
| Born puppies per male (number) | 26.7   | 32.57              |

It was also found that the use of microvit E, echinolan – B, agidol and Eurotiox in the diets of female minks decreased more than twice the stillbirth of puppies and increased the yield of young by an average of 0.76 puppy. It also increased the yield of especially large skins [11, 12, 13]. Also, the use of Baksin-vet during the rut and pregnancy increases the fertility of female arctic foxes by 7-10% and significantly reduces stillbirth [14]. Perminov P. M. [15] has confirmed the effectiveness of the use of preparation "fervistim": the fertility of females was higher in the experimental group: 6.60 versus 5.74 in the control group. Thus, the use of AP promotes an increase in the number of working males, their polygamy, an increase in the number of covered and safely whelped females, an increase in the number of puppies born per male (5.87 puppies) in comparison with the control group. The positive effect of AP on the productivity and health of animals in the experiment of preparations - feed agidol, Eurotiox Plus Dry and Oxy-Nil Dry is described by I. Ye. Rastsvetaev [16]. In addition to basic antioxidant vitamins, a range of molecules are involved in counteracting oxidative stress and preparing the reproductive system...
for successful conception. Thus, many dietary flavonoids have properties that are fundamentally important for normal reproduction, including antioxidant activity, the effect of selective modulation of estrogen receptors, antiproliferative potential, and normalization of vascular tone [17-21]. AP makes a significant contribution to countering oxidative stress by reducing the accumulation of free radicals caused by stress [5, 13].

Table 3. Economic efficiency of using preparation Arcusit on the silver-black fox.

|                                | Control | Experience |
|--------------------------------|---------|------------|
| Registered puppies per breeding female silver-black fox (with the cost of a puppy 7000 rubles), (number) | 4.73    | 5.51       |
| Cost of puppies for a breeding female of the silver-black fox, rubles. | 33110   | 38570      |
| Economic efficiency per breeding female of the silver-black fox, rubles | 5460    |            |

As you can see from table 3 the economic efficiency per a breeding female of the silver-black fox is 5460 rubles. Thus, this made it possible for the farm to receive additional profit on the yield of puppies by 16.5%.

Based on the above, a promising way to strengthen the feed base of fur farming and prevent oxidative stress in fur-bearing animals is to increase the efficiency of the use of feed and rations due to AP. It does not only improve the sanitary and hygienic state of feed, but also increases the fertility of females by 0.45 puppies. It increases the yield of young animals by an average of 0.9 puppies. A.I. Novitsky (2003) in the study of AP - echinolan - B has found that the introduction of the preparation into the diets promoted an increase in fertility by 0.45 puppies and the release of young animals to the main female by 0.92 puppies. In reproductive medicine, the use of rutin is based on its positive effect on sperm quality associated with antioxidant activity, which is especially noticeable in the presence of diabetes mellitus [17-21].

4. Conclusions

In the study of preparation Arcusit on fur-bearing animals (silver-black fox), an effective dose of its use was established - 0.004 mg/kg of body weight, which makes it possible to obtain an administrative and economic effect. The preparation is easy to use (added to the feed mixture immediately before feeding it to the animals). It can be recommended to apply this AP to the animals of the breeding herd (males and females) for two months before the rut and before the start of whelping in courses of 10 days with 10-day breaks. It was found that as a result of the use of AP Arkusit, the number of safely whelped females and the safety of puppies increase, the number of stillbirths significantly decreases, as a result, the number of registered puppies per successfully whelped female increases by 0.57 puppy and for all breeding females (0.78 puppies per female), in comparison with animals of the control group. Also, the use of the preparation contributes to an increase in the number of working males, their polygamy, and, as a consequence, to an increase in the number of puppies. Thus, the use of AP in animal diets helps reduce oxidative processes in feed and the body, ensure high safety of young animals, and increase the general resistance and productivity of animals. Considering the above, the use of AP contributes to the creation of a fodder base, ensuring the profitability of fur farming, affecting the increase in the reproductive capacity of the herd of its productivity, and, as a consequence, obtaining high quality fur raw materials at low feed costs.
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