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Research Article

EVALUATION OF THE EFFECTIVENESS OF DRUGS FOR MINK EIMERIOSIS

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Abstract:

Eimeriosis of minks are widespread diseases that cause significant economic damage to animal farms. The development of new anti-cocci drugs, the evaluation of the therapeutic efficacy of drugs used for the treatment and prevention, remains an urgent task. The aim of this work was to study the therapeutic efficacy of coccidiostats, which have different active substances in their composition, for mink eimeriosis. This paper presents the results of studies that were conducted in the period from 2009 to 2019. in six fur farms located in the North-West region of the Russian Federation. Young mink of 1-12 months old, adult population of females and males aged 1-2 years were used as objects of research. The total number of animals examined in all farms was 6,118 animals, of which 2840 adult animals, of which 1212 were males and 1628 were females, 3278 were young. Coprological studies were carried out in the laboratory for the study of parasitic diseases "St. Petersburg State Academy of Veterinary Medicine." According to the results of laboratory studies, it was found that in the conditions of the North-West region of the Russian Federation, eimeriidoses were found in minks in all surveyed farms. In all animal farms, eimeriidoses occur more often in the form of monoinvasions (37.2%), mixinvasion of two parasites was found in 6.15%, and mixinvasion by three protozoa was registered only in 0.57% of cases. The most common among monoinvasions, a species of Ameriid in most animal farms in the North-West region was the species of isospores. - Isospora laidlawi. The extensiveness of invasion by this parasite was 22.16% of the number of animals examined. In second place is the type of Eimeria vison (14.2%). For the prevention of eimeridous invasion, it is recommended to carry out regular processing of the entire population of minks with coccidiostats - at the end of winter (before rutting), at the end of spring (after whelping) and young stock after jiggling from females. As drugs of choice for treating minks, "Stop Coccide" and "Eymeterm 5%" are proposed. During the production test, these drugs showed the greatest extrasensitivity: so with isosporosis after treatment with the first drug on the 10th day, this indicator was 96.42%, and with eymerioze - 100%, the second drug - 98.09 and 100%, respectively.

Keywords: minks, eimeria, «Isospores», «Eymeterm 5%», «Stop Coccide», «Baycox», toltrazuril.

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INTRODUCTION:

Eimeriidozo minks are the most common intestinal protozoa, which are recorded from year to year in fur farming [1, 5, 9, 10]. As a result of parasitic eimeriid, there is a depletion of the body, a lag in growth and development, feed conversion per unit of growth, a decline in the quality of fur, and in some cases death of animals, which causes significant economic damage [5, 10].

According to literary data, now in the world of mink (*Mustela vison*) 3 types of isospores registered and described – *Isospora laidlawi*, *I. eversmanni*, *I. bigemina* and 7 species of Eimeria – *Eimeria vison*, *E. furonis*, *E. mustelae*, *E. ictidea*, *E. melis*, *E. hiepei* [1, 4, 5, 9]. However, according to some researchers, this number of species may change [2, 5].

Anisimova E. I., Poloz S. V. (2010) believe that all fur farms in varying degrees, dysfunctional eimeriidae burrows. Successful disease control requires a scientifically based approach, which includes knowledge of the biology of pathogens, epizootic features of invasion, clinical and pathological signs of diseases, as well as the selection of effective drugs [2].

In addition, to maintain the well-being of fur farms for eimeriodoses of mink, it is necessary to carry out preventive measures, which include both biological and chemoprophylactic methods [3, 5, 7, 10].

For the treatment of Minks suffering from Eimeria and isospora, in European countries the most commonly used sulfonamides (Neuman M., 1970).

In Russia for the treatment of Minks at americash in different years, used different drugs, in particular koktsidiovit (0.1% solution), himcocid-7 (0.06% solution), clopidol (0.05%), which was administered to the animals during the week with food [5].

Tokarev A. N., Zhuravlev D. A., Kuznetsov, Y. E. (2012) conducted a comparative assessment of the kinetics of drugs ametherm 5% and baycox 5% in the animals body. Researchers have proven bioequivalence of these drugs and later found that their regular use prevents infection of animals by eimeriidae [11].

Gerasimchik V. A. (2004) tested a large number of drugs in eimeriosis and isosporosis of mink. We studied the effect Bicocca, trichopolum, furazolidone, biovita-120, oxidate (oxihumate) peat, himcocid, himcocid-7, amprolium, ragingox, salinomycin, coccidiomycosis, samoxa-120, Klingons, lysozyme

G3x, Interamericana, MKK-2, spruce and aspen bark [5, 7].

Despite the large range of medicines used in americaso, the issue is not resolved, so the researchers are developing measures to combat these invasions. Development of new anticoccidial drugs, evaluation of therapeutic efficacy of drugs used for treatment and prevention remains an urgent task at present [3-7].

Purpose of research.

The aim of this work was to study therapeutic efficiency of koktsidostatikov when eimeriidae mink, has different active ingredients.

MATERIAL AND METHODS:

The studies were conducted in the period from 2009 to 2019 in six fur farms located in the North-Western region of the Russian Federation.

The objects of the study were young mink of 1-12 months of age, adult population of females and males at the age of 1-2 years. The total number of surveyed animals in all farms amounted to 6118 animals, including adult animals-2840, of which males were 1212 heads and females 1628 heads, young animals – 3278. Coprological studies were conducted in the laboratory for the study of parasitic diseases "St. Petersburg state Academy of veterinary medicine".

To determine the extent of invasion (EI), a species composition of coccidium oocysts, a flotation method with an improved fluid was used, for which a patent for the invention was obtained [12]. The intensity of invasion (II) was established by counting the number of oocysts using the VIGIS camera.

Test the efficacy of drugs "Stop-empty", "Ametherm suspension 5%", "Salinomycin 12%", "Metronidazole" was performed during spontaneous Eimeria and isophorone young mink 1-5 months of age.

The first series of experiments was carried out on 220 Minks, 140 of them were infected with *E. vison* and *I. laidlawi*, EI was 63.62%, the extinction rate at the beginning of the experiment was 21.81 and 41.81%, respectively. As a test drug used coccidiostatic "Stop-coccid" (the active substance toltrazuril), at a dose of 20 mg/kg, twice. The drug was given with a small amount of food after a hungry diet, thoroughly mixed at the rate of 0.4 ml per 1 kg of body weight of the animal.

The second series of experiments to test the drug

"Eimeterm suspension 5%" (the active substance toltrazuril), was carried out on 135 animals, among them 105 mink were infected *I. laidlawi* and *E. vison*, EI was 77.77%, extinvazirovannost 53.33 and 24.44%, respectively. The drug was given twice, at a dose of 20 mg / kg at the rate of 0.4 ml per 1 kg of animal body weight.

The third series of experiments was to study the effectiveness of the drug "Metronidazole" (active ingredient metronidazole 250 mg). Of the 65 selected samples of fecal masses in 35 were found oocysts *I. laidlawi* and *E. vison*, EI was 53.84%, the extinction at the beginning of the experiment was 26.15 and 27.69%, respectively. The drug was administered to animals with food twice a day, two days in a row at a dose of 20 mg/kg.

In the fourth series of experiments also involved 65 mink, 35 of them were infected, ei 53.84%, was ekstinvazirovannost *I. laidlawi* 24.62%, and *E. vison* 29.23. Animals were given the drug "Salinomycin 12%" (active substance salinomycin sodium), two days in a row with food at a dose of 30 mg/kg. Two experimental groups were used as control. The first group included 35 Minks, 20 of them were

infected with *Eimeria* and isospores, this group of animals did not receive specific therapy, they were given water with starch at a dose of 2 ml per head along with feed. The second control group consisted of 65 holes, of which only 35 goals was infected eimeriidae, activationist *I. laidlawi* and 32.3%, and *E. vison* – 48,57%, animals were administered with food the drug analogue "Baycox 5%", the active substance toltrazuril at the dosage of 30 mg/kg.

During the experiment the animals of all groups were in equal conditions of keeping and feeding.

Accounting for the effectiveness of drugs was carried out according to the data of coproscopic studies on the methods of Fulleborn and darling 10-11 and 30 days after treatment.

RESULTS AND DISCUSSION:

As a result of the research, two species of *Eimeria* – *E. vison* and *E. furonis* and two – isospores – *I. laidlawi* and *I. eversmanni* – were found in Minks (*Mustela vison*). Of 6118 mink infected were 2687, EI was 43.92% (table 1).

Table 1: Extensiveness of mink invasion with eymeriozy in animal farms of the North-West region of the Russian Federation

Types of <i>Eimeria</i> and Isospores	The number of surveyed	Invaded	EI, %
<i>E. vison</i>	6118	869	14,20
<i>E. furonis</i>	6118	48	0,78
Total <i>Eimeria</i>	6118	917	14,99
<i>I. laidlawi</i>	6118	1356	22,16
<i>I. eversmanni</i>	6118	3	0,05
Total isospores	6118	1359	22,21
Total monoinvasive:	6118	2276	37,20
<i>E. vison</i> + <i>E. furonis</i>	6118	34	0,56
<i>E. vison</i> + <i>I. laidlawi</i>	6118	294	4,81
<i>E. vison</i> + <i>I. eversmanni</i>	6118	2	0,03
<i>E. furonis</i> + <i>I. laidlawi</i>	6118	34	0,56
<i>E. furonis</i> + <i>I. eversmanni</i>	6118	1	0,02
<i>I. laidlawi</i> + <i>I. eversmanni</i>	6118	11	0,18
Mixinvasia by two parasites:	6118	376	6,15
<i>E. vison</i> + <i>I. laidlawi</i> + <i>I. eversmanni</i>	6118	4	0,07
<i>E. vison</i> + <i>E. furonis</i> + <i>I. laidlawi</i>	6118	31	0,51
Mixiinvasia by three parasites:	6118	35	0,57
TOTAL:	6118	2687	43,92

In all the farms of eimeriidae often occur in the form of moneywise (37,2%), extenuate two parasites were found to 6.15%, and extenuate three protozoa was only in 0,57% of cases. The most common among moneywise, Emerie in most fur farms in the North-

West region was kind isopor – *I. laidlawi*. EI this parasite was 22.16% of the number of examined animals. On the second place of occurrence is the view of *E. vison* (14,2%), while isospora meet on 7,2% more than Amerie.

E. furonis species was found only in two fur farms, one is located in Leningrad, the other – in the Kaliningrad region, EI was 0.78%. Isosporosis caused by *I. eversmanni* (EI – 0.05%) was registered by us only in one animal farm in the Kaliningrad region. At the same time, it was recorded there for the first time, previously it was described only in Kazakhstan and

Belarus in animals recently imported from the Stavropol territory.

Among all diseased animals, EI *I. laidlawi* is more than half – 50.5%, *E. vison* – 32.3%, the Association of these two protozoa in third place – 10.9%, the remaining parasite species and their associations are much less common (figure 1).

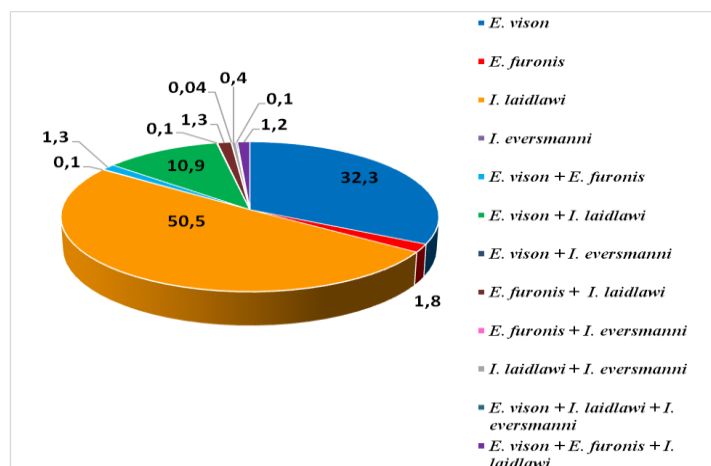


Figure 1: Species composition of eimeriidae in the farms of the North-West region of the Russian Federation

Analysis of the research conducted on species composition of Emerie showed that the fauna of protozoa related to the age of the animals, but does not depend on the model the color of mink and location services.

The next stage of the experiments was to test the effectiveness of drugs "Stop-coccid", "Eimenterm 5%", salinomycin, metronidazole in spontaneous eimeriosis and isosporosis of young mink 1-5 months of age, the results of the experiments are presented in table 2).

Table 2: Efficacy of drugs "Stop coccid", "Eymeterm suspension 5%", "Metronidazole", "Salinomycin 12%" and "Baikoks 5%" with isosporosis and eymeriz young mink

A drug	Dose, mg / kg, frequency rate	Number of examined / infested	Extensinvasion, %						Extensibility, %			
			Original		After 10 days		After 30 days		After 10 days		After 30 days	
			I*	E**	I*	E**	I*	E**	I*	E**	I*	E**
Minks (young)												
"Stop coccide"	20 mg / kg -1	220/140	41,81	21,81	2,27	0	2,27	0	96,42	100	96,42	100
"Eymeterm 5%"	30 mg / kg -2	135/105	53,33	24,44	10,48	0	1,48	0	98,09	100	98,09	100
"Metronidozol"	20 mg / kg -1	65/35	26,15	27,69	12,31	10,77	12,30	10,76	71,14	77,14	71,14	77,14
"Salinomycin 12%"	30 mg / kg -2	65/35	24,62	29,23	7,69	10,77	7,69	10,76	85,71	80,0	85,71	80,0
1st control group	2 ml / head	35/20	57,14	51,43	57,14	51,42	57,14	51,42	0	0	0	0
2nd control group "Baycox 5%"	30 mg / kg -1	65/35	32,30	48,57	11,42	2,85	11,42	2,85	88,57	97,14	88,57	97,14

*I – isosporic invasion;

**E – eimeriosis invasion.

The two products, «Stop Coccide» and «Eymeterm Suspension 5%», showed the greatest extent of efficacy. So, with isosporosis after treatment with the first drug on the 10th day, this indicator was 96.42%, and with eimeriosis - 100%, with the second drug - 98.09 and 100%, respectively.

"Metronidazol" was the least effective of the tested drugs: Extensive efficacy was 71.14% with isosporosis, 77.14% with eimeriosis. The low efficacy of Metronidazol is probably related to the fact that it was used for a long time in this economy and with time the parasites developed resistance to this active substance.

In animals from the fourth series of experiments, on which "Salinomycin 12%" was tested, this drug showed a greater extension efficiency against isosporosis in minks - 85.71%, and against eymeriosis less - 80.0%.

Also, two control groups of animals participated in the experiment; in the 1st control group, all animals remained infected with eimeridoses throughout the experiment, since specific therapy was not received. In the 2nd control group, minks were treated with the "Baycox 5%" analogue (active ingredient toltrazuril) at a dose of 30 mg / kg, extension efficiency was 88.57% with isosporosis, and 97.14% with eymeriosis.

CONCLUSION:

It was found that in the conditions of the North-West region of the Russian Federation coccidia were found in minks in all the farms surveyed. Amerioidosis often occurs in the form of monoinvasions (37.2%), the mixed parasite of two parasites was found in 6.15%, and the mixing of the three protozoa was registered only in 0.57% of cases. Among monoinvasions, the most common type of eimeriosis in most animal farms in the North-West region was *I. laidlawi* isospores. EI of this parasite accounted for 22.16% of the number of animals examined. The second place in terms of occurrence is the species *E. vison* (14.2%), while isospores are found 7.2% more often than eymeriosis.

Most authors are of the same opinion about the use of the most effective coccidiostats for the prevention of eimeridoses.

It is advisable for the prevention of amerioidosa invasion to carry out regular processing of the mink with all the mink's coccidiostats at the end of winter (before rutting), at the end of spring (after whelping)

and the young after deposition from females.

We recommend two drugs as the drug of choice for mink treatment – «Stop Coccide» and «Eymeterm 5%». In the course of the production test, they showed the greatest extension efficiency: for example, with isosporosis after treatment with the first drug on the 10th day, this indicator was 96.42%, and with eymeriosis - 100%, with the second drug – 98.09 and 100%, respectively. It is important to note that preparations even with the same active ingredient under the conditions of the production experiment may have different extensibility, as was proved by our experiments. The use of the same drugs, especially together with the feed (coccidiostatic feed), gradually lead to the development of resistance to them in *Eymeria*.

Pathogens eimeriidae, once in the body of mink, begin to actively proliferate in the epithelial cells of the small intestine, causing destruction of the cells of the mucous membrane. Secondary microflora penetrates into the damaged parts of the intestine, which increases inflammatory processes leading to tissue necrosis and the development of putrefactive microorganisms on it, causing intoxication [4, 6, 7]. Therefore, to suppress these pathological processes, it is recommended to use together with specific therapy with coccidiostatics and antimicrobial drugs – antibiotics, in particular a combined broad – spectrum antimicrobial agent-azicycline at a dose of 7.0 mg/kg body weight, once a day for 5-7 days. However, the use of a broad-spectrum antimicrobial drug in Minks in coccidiosis does not replace specific treatment [8].

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